Chapter Sixteen ◆ Air Quality

INTRODUCTION

16.1 This chapter presents the air quality assessment which has been completed for the Environmental Statement (ES) for the London Resort. The chapter presents the assessment results of the likely air quality effects from the Proposed Development. The following information is presented in the air quality ES chapter:

- the relevant law, policy and guidance that has informed the assessment approach and methodology;
- an overview of the scoping report and consultation that has informed the assessment approach and methodology;
- details of the assessment approach and methodology;
- a review of existing baseline conditions;
- an assessment of the likely air quality effects associated with the Proposed Development and any proposed mitigation;
- provide commentary on the significance of any residual air quality effects; and
- provide commentary on cumulative and in-combination effects on air quality.

16.2 The main sources of potential air quality impacts associated with the Proposed Development are:

- dust and particulate matter emissions (PM_{10}/$PM_{2.5}$) from plant and equipment used during the construction phase;
- nitrogen oxides (NOx) and PM_{10} and $PM_{2.5}$ emissions from road traffic generated during the construction and operational phases;
- emissions from river traffic and vessel movements generated during the construction and operational phases;
- NOx emissions from combustion plant associated with the Proposed Development; and
- odour emissions from the waste water treatment works (WWTW).

16.3 Key receptors with potential to be affected by emissions, generated as a result of the

Proposed Development, include sensitive human receptors (residential properties, schools, hospitals, nurseries and hotels), ecological receptors (international, national and locally designated ecological sites), and cultural heritage receptors (listed buildings and scheduled ancient monuments).

RELEVANT LAW, POLICY AND GUIDANCE

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

The Ambient Air Quality Directive

16.5 The European Union (EU) directive on ambient air quality and cleaner air for Europe (2008/50/EC) sets legally binding limit values, target values and critical levels for a number of air pollutants established by the European Council for the Protection of Human Health, Vegetation and Ecosystems. This directive was made law in England through the Air Quality Standards Regulations 2010.

Air Quality Standards Regulations 2010

16.6 This UK legislation implements the requirements of the ambient air quality directive and sets legally binding limit values for air quality with respect to human health and vegetation. The regulation transposes Directive 2008/50/EC, which entered into force in Europe on June 2008, it consolidates and replaces previous ambient air quality legislation.

Part IV of the Environment Act 1995

16.7 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.

16.8 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.

Air quality objectives

16.9 This air quality assessment is carried out to assess compliance with UK air quality objectives. The air quality objectives relevant to this assessment are presented in Table 16.1. It should be noted that air quality objectives are numerically the same as the EU limit values detailed within the Air Quality Standards Regulations, however, differ in terms of compliance dates, locations where the limit values apply, and the legal responsibility for ensuring compliance.

16.10 Air quality objectives are applicable at all locations where members of the public might be regularly exposed. This includes building façades of residential properties, schools, hospitals and care homes.

16.11 EU limit values are applicable at all locations except the following:

- where members of the public do not have access and there is no fixed habitation;
- on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and
- on the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access.

Table 16.1: Air quality objectives

Pollutant	**Concentration (µg/m³)**	**Averaging Period**	**Number allowable exceedances per calendar year**
For protection of human health			
Nitrogen dioxide (NO_2)	40	Annual mean	None
	200	Hourly mean	18
Particulates <10µm in diameter (PM_{10})	40	Annual mean	None
	50	Daily mean	35
Particulates <2.5µm in diameter ($PM_{2.5}$)	25	Annual mean	None
For protection of vegetation and ecosystems			
Oxides of nitrogen (NOx)	30	Annual mean	None

Critical Levels and Critical Loads

16.12 There are two categories of pollutants that are typically considered for their potential impact at designated ecological sites: pollutants that have an effect on vegetation/habitats in a gaseous form and those which have an impact through deposition.

16.13 For some gaseous pollutants, critical levels below which significant harmful effects are not thought to occur have been adopted by the European Union and the United Nations Economic Commission for Europe (UNECE) and are used as regulatory standards.

16.14 For the deposition of air pollutants critical loads, given as a range, for different habitats have been provided by UNECE and are detailed on the Air Pollution Information Service (APIS) website[1]. APIS provides critical loads for nitrogen deposition (leading to eutrophication) and acid deposition (leading to acidification). Critical loads for nitrogen deposition are in units of kilogrammes of nitrogen per hectare per year (kg N/ha/year) and vary with habitat sensitivity.

16.15 The critical level relevant to this assessment is detailed in Table 16.1. Site specific critical loads for surrounding designated nature sites are detailed in the baseline section of this chapter.

National policy context

National Policy Statements

16.16 National Policy Statements (NPS) 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 Proposed Development includes transport and highways infrastructure, regard has been given to relevant policy in the NPS for National Networks (NPS NN).

16.17 The NPS NN provides information regarding what should be included in the applicant's assessment stating that:

'Where the impacts of the project (both on and off-scheme) are likely to have significant air quality effects in relation to meeting EIA requirements and / or affect the UKs ability to comply with the Air Quality Directive, the applicant should undertake an assessment of the impacts of the proposed project as part of the environmental statement.

The ES should describe:

- *existing air quality levels;*
- *forecasts of air quality at the time of opening, assuming that the Project is not built (the future baseline) and taking account of the impact of the Project; and*
- *any significant air quality effects, their mitigation and any residual effects, distinguishing between the construction and operation stages and taking account of the impact of road traffic generated by the project.'*

16.18 The NPS NN goes on to state that air quality considerations are likely to be particularly

[1] www.apis.ac.uk

relevant where schemes are proposed:

- *within or adjacent to AQMA; roads identified as being above Limit Values or nature conservation sites (including Natura 2000 sites and Sites of Special Scientific Interest (SSSIs), including those outside England); and*
- *where changes are sufficient to bring about the need for a new AQMA or change the size of an existing AQMA; or bring about changes to exceedances of the Limit Values, or where they may have the potential to impact on nature conservation sites.*

16.19 With regards to decision making, NPS NN states that:

'The Secretary of State must give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and / or where they lead to a deterioration in air quality in a zone/agglomeration.

The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will:

- *result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or*
- *affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision.'*

National Planning Policy Framework (2019)

16.20 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.

16.21 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.' [2]

16.22 Further to this, Section 15 of the NPPF notes that planning policies should sustain and

[2] MHCLG (2019) National Planning Policy Framework, (*Section 9- Promoting Sustainable Transport. Paragraph 103)*

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.[3] 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

16.23 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 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.'* [4]

16.24 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*

[3] MHCLG (2019) National Planning Policy Framework, (*Section 15- Conserving and enhancing the natural environment. Paragraph 181)*

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

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; and*
- *have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value.'*[5]

16.25 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 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.'*[6]

[5] MHCLG (2019) *National Planning Policy Guidance- Air Quality. Paragraph: 006 Reference ID: 32-006-20191101*
[6] MHCLG (2019) National Planning Policy Guidance- Air Quality. Paragraph: 008 Reference ID: 32-008-20191101

UK plan for tackling roadside nitrogen dioxide concentrations (2017)

16.26 In July 2017 the Department for Environment Food and Rural Affairs (Defra) released the UK plan for tackling roadside nitrogen dioxide (NO_2) concentrations. Alongside a number of measures, the plan requires local authorities that are predicted to have exceedances of the EU limit values to produce local action plans in order to achieve the statutory limit values in the shortest possible time, which may include implementation of Clean Air Zones. The overarching objective is to reduce roadside NO_2 concentrations to below legal limits in the shortest possible time, transforming the most polluted areas of the UK into clean and safe spaces.

Clean Air Strategy (2019)

16.27 In January 2019, Defra published its Clean Air Strategy which details proposals to tackle emissions from a number of sources and, presents the approach the UK Government is 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

Kent and Medway Air Quality Partnership

16.28 The Kent and Medway Air Quality Partnership has published Air Quality Planning Guidance[7] aimed at local authorities, developers and consultants. The document details relevant planning policy and guidance, summarises the information that is required to support an application, describes the air quality assessment process, and discusses approaches to mitigation. It has no legal status but acts as a guidance note summarising requirements and best practice for managing air quality within the planning process.

Kent Local Transport Plan 4

16.29 Kent's Local Transport Plan 4 (LTP4) identifies the transport priorities for the county as well as emphasising the investment required to support growth. LTP4 is informed by national and local policies and strategies and is delivered through supporting strategies, policies and action plans. LTP4 states that the ambition for Kent is '*To deliver safe and effective transport, ensuring that all Kent's communities and businesses benefit, the environment is enhanced and economic growth is supported*.' In order to realise this ambition, five overarching policies are proposed that target specific outcomes. Outcome 5 is for better health and wellbeing, and the policy states '*Provide and promote active travel choices for all members of the community to encourage good health and wellbeing, and implement measures to improve local air quality.*'

[7] Kent & Medway Air Quality Partnership (2015) Air Quality Planning Guidance. December 2015

Essex Air Quality Consortium

16.30 In 1995, as a result of local government aspirations to undertake more local air quality work in Essex, the Essex Air Quality Consortium was formed.

16.31 Consisting of all Local Authorities in Essex, Essex County Council, the Environment Agency, London Stansted Airport and the University of Essex, the purpose of the Essex Air Quality Consortium is to promote improvements in air quality related issues.

16.32 Information regarding the activities and work undertaken by the consortium are detailed on the Essex Air website[8]. Noted achievements so far include:

- sharing of Air Quality Monitoring data since 1995;
- a partnership approach has been developed and undertaken for the delivery of the Updating Screening and Assessment and Annual Progress Reports to Defra; and
- the Essex Air Quality Consortium have been able to represent the people of Essex at a regional and national level through air quality events and meetings. The group have been able to offer its views and comments on current air quality requirements and any future consultations being considered.

16.33 Future aims of the consortium include to work more closely with the local transport authority in Essex County Council to seek improvements to air quality where possible.

Dartford Core Strategy (2011)

16.34 Dartford's Core Strategy is a long-term plan to regenerate the borough and is complemented by the Development Policies Plan, which was adopted in July 2017. Of particular relevance to air quality are Policies DP3 and DP5.

16.35 Policy DP3 relates to transport impacts of developments, and states that:

16.36 *'1. Development will only be permitted where it is appropriately located and makes suitable provision to minimise and manage the arising transport impacts, in line with Core Strategy policies CS15 and CS16. Localised residual impacts on the highway network should be addressed by well-designed off-site transport measures. Adverse effects on residential amenity or the environment must be minimised.*

2. Development will not be permitted where the localised residual impacts from the development on its own, or in combination with other planned developments in the area, result in severe impacts on one or more of the following:
a) road traffic congestion and air quality;
b) safety of pedestrians, cyclists and other road-users;
c) excessive pressure for on-street parking.'

[8] essexair.org.uk

16.37 Policy DP5 relates to environmental and amenity protection, and states:

'Development will only be permitted where it does not result in unacceptable material impacts, individually or cumulatively, on neighbouring uses, the Borough's environment or public health. Particular consideration must be given to areas and subjects of potential sensitivity in the built and natural environment (including as highlighted on the Policies Map) and other policies, and other potential amenity/ safety factors such as:

a) air and water quality, including groundwater source protection zones;
b) intensity of use, including hours of operation;
c) anti-social behaviour and littering;
d) traffic, access, and parking;
e) noise disturbance or vibration;
f) odour;
g) light pollution;
h) overshadowing, overlooking and privacy;
i) electrical and telecommunication interference;
j) HSE land use consultation zones;
k) land instability;
l) ground contamination.'

Gravesham Local Plan Core Strategy (September 2014)

16.38 Gravesham's Local Plan sets out the planning policies that guide development in the Borough. Gravesham's Local Plan Core Strategy is the main document in the Local Plan, which sets a long-term vision for the future of Gravesham. Whilst there are no policies specifically relating to air quality, Policies CS01 and CS19

16.39 Policy CS01: Sustainable development states that:

'*When considering development proposals, the Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework and in this Core Strategy. It will work proactively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area.*

Where there are no policies relevant to the application or relevant policies are out of date at the time of making the decision then the Council will grant permission unless material considerations indicate otherwise, taking into account whether:

- *any adverse impacts of granting permission would significantly and demonstrably outweigh the benefits, when assessed against the policies in the National Planning Policy Framework taken as a whole; or*
- *specific policies in that Framework indicate that development should be restricted*.'

16.40 Policy CS19: Development and Design Principles states that:

- '*New development will encourage sustainable living and choice through a mix of compatible uses which are well connected to places that people want to use, including the public transport network, local services and community facilities; encourage sustainable travel; enhance Green Grid links and encourage healthier lifestyles; and*
- *New development will be located, designed and constructed to avoid adverse environmental impacts from pollution, including noise, air, odour and light pollution'*

Thurrock Core Strategy (2015)

16.41 Thurrock's Core Strategy and Policies for Management of Development is the Borough's main local plan document setting out the spatial vision strategy and planning policies for Thurrock. The key policy relating to air quality is PMD1: Minimising Pollution and Impacts on Amenity, Health, Safety and the Environment, which states:

1. *Development will not be permitted where it would cause or is likely to cause unacceptable effects on:*
   - *i. the amenities of the area;*
   - *ii. the amenity, health or safety of others;*
   - *iii. the amenity, health or safety of future occupiers of the site; or*
   - *iv. the natural environment.*

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

3. *The Council will require assessments to accompany planning applications where it has reasonable grounds to believe that a development may suffer from, or cause:*
   - *i. Air pollution;*
   - *ii. Noise pollution;*
   - *iii. Contaminated land/soil;*
   - *iv. Odour;*
   - *v. Light pollution and shadow flicker;*
   - *vi. Water pollution;*
   - *vii. Invasion of privacy;*
   - *viii. Visual intrusion;*
   - *ix. Loss of light;*
   - *x. Ground instability;*
   - *xi. Vibration.*

4. *Where the assessment confirms such potential harm, planning permission will only be granted if satisfactory solutions can be achieved through design, or suitable mitigation measures can be put in place through conditions or a planning obligation. Where an assessment is not forthcoming the Council may refuse permission on a precautionary basis.*

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

Thurrock Transport Strategy

16.42 With regards to air quality, Thurrock's Transport Strategy states the following:

'Improving air quality and reducing emissions will be achieved by minimising traffic growth and encouraging a modal shift (as per the congestion strategy above). Further improvements will be achieved by reducing emissions from residual sources (such as industry) as well as reducing vulnerability to climate change. Policy interventions will be:

- *prioritising actions that both improve local air quality and reduce CO2 emissions. These will include working with partners and transport operators to increase the use of low emission vehicles or using retrofitting, better operating practices such as switching off engines or eco-driving, and beneficial car parking for low emission cars*
- *process, such as by increasing onsite renewable energy generation*
- *prioritising action to improve air quality in Air Quality Management Areas that fall within health-deprived areas. In improving air quality in AQMAs the Council will ensure that it does not simply move the problem elsewhere*
- *making sure that other interventions, especially those to improve road safety and congestion, do not adversely impact on air quality*
- *working with freight operators to reduce emissions from HGVs*
- *integrating climate change adaptation when undertaking transport schemes, such as assessing flood risk, using more permeable road surfaces, and designing appropriate drainage.*

Thurrock Air Quality and Health Strategy 2016

16.43 In 2015, a decision was taken by Thurrock Council to develop an integrated Air Quality & Health Strategy through which to tackle the health problems associated with and exacerbated by air pollution within the borough.

16.44 The overall strategic aim of the Thurrock Air Quality & Health Strategy is to improve air quality in the borough to reduce the health impacts of air pollution. The Strategy will be delivered through three main approaches:

a) by implementing measures for managing air quality throughout the borough to prevent new AQMAs from arising;
b) by implementing measures contained within the action plans for existing AQMAs; and
c) by working with external bodies to reduce background pollution from inside and outside the borough.

Ebbsfleet Implementation Framework

16.45 The Ebbsfleet Implementation Framework (EIF) was published by the Ebbsfleet Developnment Corporation (EDC) in 2017 and was developed together with the Garden City's developers, local authorities, and local people to create a shared vision for Ebbsfleet. It assimilated their experience and ambitions, as well as the existing planning permissions, to provide a shared spatial framework for delivering a 21st Century Garden City. The EIF supports the needs of the existing communities in neighbouring towns, as well as future residents, by planning for investment in critical transport projects including A2(T) junction upgrades, and important community infrastructure such as local schools and health facilities.

16.46 The EIF provides six delivery themes to structure Ebbsfleet's planning and design. With regards to air quality delivery theme six refers to resilient and sustainable systems, with objective 15 being to:

16.47 '*Develop a 'Garden Grid' to enhance the sustainability and resilience of Ebbsfleet by improving air quality and management of the urban water cycle*'.

Key guidance documents

IAQM Land-Use Planning & Development Control: Planning for Air Quality (2017)

16.48 This document from Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) provides detail on the consideration of air quality within the land-use planning and development control processes. The guidance provides an approach to determining significance of air quality impacts, which takes account of the percentage change in concentrations relative to the relevant air quality objective. The guidance also provides a screening approach to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. Screening criteria which are of relevance to this assessment are presented in Table 16.2.

Indicative criteria for requiring an air quality assessment

Table 16.2:

The development will:	**Indicative criteria to proceed to an air quality assessment**
Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors.	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.	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.

IAQM Guidance on Assessing Air Quality Impacts on Designated Nature Conservation Sites (2019)

16.49 This ecological guidance document[9] provides detail on how to assess the impact of air pollutants on ecologically sensitive habitats. The guidance provides a three-stage approach to assessing the impact of sources on designated sites and takes into consideration industrial and road sources.

Stage 1: Scoping

- Vulnerable sites that may be affected should be identified and the specific effects from the nearest source determined. The locations and boundaries of international and national; designated sites can be found online.]
- Should a road be identified as a potential source, guidance should be taken from the Design Manual for Roads and Bridges (DMRB) and annual average daily traffic (AADT) flow thresholds of 1000 vehicles or 200 heavy duty vehicles (HDVs) should be considered.

If the site is found to not be specifically affected by the source, then no further assessment is required.

Stage 2: Quantification

- This stage involves calculating the change in pollutant concentrations due to an industrial, agricultural or road source. This is often determined by modelling the dispersion of the emissions.

Stage 3: Screening

- Once the impact has been quantified, the EA's 1% long-term air quality objective should be used as a precautionary screening criterion and where significant effects are found to be likely an ecologist should be consulted to determine possible adverse effects on the site.

IAQM Guidance on the assessment of dust from demolition and construction

16.50 This guidance was produced by the IAQM in order to assist in the assessment of air quality impacts associated with construction activities. The document provides a methodology for carrying out a risk assessment to determine the appropriate level of mitigation required to ensure that air quality effects would normally be not significant, taking into account the potential dust emissions generated by a development and the sensitivity of the surrounding area.

[9] Holman et al (2019). A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.0, Institute of Air Quality Management, London.

IAQM Guidance on the assessment of odour for planning

16.51 This guidance[10] was produced by the IAQM to assist in the assessment of odour impacts for planning purposes. It describes what the IAQM considers to be current best practice and it aims to assist with and inform current and future planning appeals and decisions. The guidance describes the different odour assessment techniques, which range from the qualitative source-pathway-receptor concept to predictive modelling and observational/empirical techniques

METHODOLOGY AND DATA SOURCES

EIA Scoping Opinion and Consultation

16.52 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 a Scoping Opinion from the Planning Inspectorate was 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 responses to the scoping opinion are detailed in Table 16.3.

Table 16.3: Summary of Scoping Opinion comments and responses

Consultee	Ref.	Planning Inspectorate comment	Response
Planning Inspectorate	4.9.2 / 15.17 to 15.31	The ES should include an assessment of impacts resulting from increased vessel emissions on air quality as a result of the Proposed Development where significant effects are likely to occur.	An assessment of vessel emissions has been carried out as detailed in paragraph 16.111.
Planning Inspectorate	4.9.3 / 15.24	The Scoping Report determines that on-site combustion could give rise to emissions but does not specify what emissions. The ES should identify and assess all the pollutants potentially released as a result of the Proposed Development where significant effects are likely to occur.	The impact from emissions associated with the proposed energy centre has been assessed in the ES (para 16.111).

[10] Bull et al (2018). IAQM Guidance on the assessment of odour for planning, Institute of Air Quality Management, London.

Planning Inspectorate	4.9.4 / 15.13 to 15.16	No information is provided to characterise the baseline other than identified AQMAs and their locations. The ES should characterise baseline air quality conditions within an appropriate study area and describe the methodology used to determine the baseline. Any surveys used to inform the assessment should be detailed in terms of location, timing, extent and what pollutants have been monitored; the results of any surveys should be provided with the application and effort should be made to agree the approach with the relevant consultation bodies.	The locations of AQMAs and available local authority monitoring data is detailed in the baseline section of this report. Where possible consultation bodies have been approached to agree the approach to assessment.
Planning Inspectorate	4.9.5 / 15.23, 15.24 and 15.44	Any modelling undertaken to inform the ES assessment should be based on relevant guidance and effort should be made to agree the approach with the relevant consultation bodies. Modelling results should be provided with the ES.	Modelling has been carried out in line with industry guidance, with results presented in the ES. Where possible consultation bodies have been approached to agree the approach to assessment.
Planning Inspectorate	4.9.6 / 15.23 and 15.24	The Scoping Report identifies PM2.5 as traffic emissions during operation but not construction. The ES should include an assessment of PM2.5 traffic emissions during both construction and operation phases where significant effects are likely to occur.	The impact of emissions generated by construction and operational road and river traffic has been considered in the ES.
Planning Inspectorate	4.9.7 / 15.34 to 15.38	The Scoping Report proposes a number of mitigation measures during construction and operation that could be employed. Effort should be made to agree any proposed mitigation measures (both embedded and additional) with the relevant consultation bodies.	Mitigation measures have been proposed in the ES where significant effects are likely. Where possible consultation bodies have been approached to agree the approach to assessment.

Planning Inspectorate	4.9.8 / 15.3 and Figure 15.1	The Scoping Report omits identifying the A2 Trunk Road AQMA in the baseline conditions. The ES should include this AQMA in the assessment.	This AQMA is presented in Figure 16.9.
Planning Inspectorate	4.9.9 / 9.52 to 9.55	The Scoping Report references DMRB figures for NO2 however, it has been demonstrated through work conducted by Highways England (HE) on the A2 Bean and Ebbsfleet Junctions and Lower Thames Crossing projects that these are under predicted and calculation factors are required to increase the results to match the monitored results identified by HE. The ES should apply calculation factors to the DMRB NO2 figures to adjust for any under prediction as necessary and effort should be made to agree the approach with the relevant consultation bodies.	Model verification has been carried out and is detailed in this ES in order to ensure the accuracy of modelled results. Where possible consultation bodies have been approached to agree the approach to assessment.
Dartford Borough Council	N/A P91 (of PDF)	Reliance on Fastrack is likely to lead to the need for increased services, reducing the headway between buses. Where service levels are required to be increased, the impact on the local traffic network, junctions and noise and air quality impacts on the local environment should be assessed.	The impact of additional road traffic generated by the proposed development has been considered in this ES.
Dartford Borough Council	N/A P100 (of PDF)	The proposed assessment methodology is generally accepted. However, the Council notes that the report states that the traffic modelling will be used to identify the full study area used for the air quality assessment. One of the Council's main concerns is the impact that the development will have on the local road network. Whilst the majority of vehicles accessing the	Where the increase in traffic indicates the need for detailed assessment, the impact of additional road traffic generated by the proposed development has been considered.

		site are likely to use the Strategic Road Network (SRN) there may be a large number of vehicles that are displaced from the SRN on to the local road network as a result of increased congestion. This scenario should be included within the modelling. The impacts of additional bus services, their direct contribution to air pollution, as well the air quality consequences of increased congestion on the local road network should also be considered.	
Dartford Borough Council	N/A P100 (of PDF)	Given the potential for wider impacts arising from the development, the other Air Quality Management Areas in the Borough should also be considered, not only the AQMA immediately adjacent to the site along the A226.	AQMAs in the study area are presented in the baseline section of this ES.
Dartford Borough Council	N/A P101 (of PDF)	The assessment of air quality should include cultural heritage receptors in terms of the effect of air quality on built heritage receptors.	Cultural heritage receptors have been considered in terms of the potential impact from dust soiling during construction.
Dartford Borough Council	N/A P101 (of PDF)	Consideration should be given to new areas with regard to worsening air quality which may lead to a need for further AQMAs to be declared. The Council would expect the developer to pay for designating such AQMA and funding mitigation. Examples might be worsening air quality in Ingress Park, due to the increased number of buses, cars looking for park etc, or worsening air quality on the new development in Ebbsfleet Garden city adjacent to Ebbsfleet junction and the Resort access road.	The impact on worsening air quality has been considered in this ES.

Gravesham Borough Council	N/A P161 (of PDF)	The scheme gives rise to impacts both from the traffic flows created but also the operation of the development, in particular the inclusion of the 30MW CHP plant. It is also in the context of a number of existing air quality management areas (including that along the A2 which does not show in Fig 15.1).	The energy strategy for the site is to utilise emission-free heat pumps, along with gas boilers to be used as a top up heat source, emissions from which have been considered in the ES. A 30MW CHP plant is no longer proposed.
Gravesham Borough Council	N/A P161 (of PDF)	As noted above in relation to noise, the current proposals include a significant use of the river. In the construction phase it will be bringing in materials from Tilbury (and the means whereby they get there in the first place) and in the operation phase both the servicing and ferry functions. Depending the propulsion used by the boats involved this could impact on air quality.	The impact of vessel emissions on air quality has been considered in the ES.
Gravesham Borough Council	N/A P161 (of PDF)	Paras 15.23 and 15.25 refer to NOx and PM10, but not NO2 and PM2.5 emitted. Both pollutants should be included in the air quality work both during construction and operational phases, NO2 as Councils have to assess that and PM2.5 as it has become clear that this is a significant source of potential harm the humans and ecosystems.	NO_2 and PM_{10} have both been considered in the ES.
Natural England	N/A (P249 of PDF)	In addition to the concern regarding direct loss of the SSSI, there is the potential for air quality impacts to the woodland to result from this proposal both during construction and operation from traffic-generated air quality impacts.	An assessment of the impact on designated ecological sites is presented in the ES.
Natural England	N/A (P251 of PDF)	There is the potential for air quality impacts to the North Downs Woodland SAC to result from traffic generated air quality.	Owing to the distance from roads affected by the proposed development and the distance from the proposed energy

		As such, Natural England recommends that an assessment of the potential for air quality impacts from this project, both alone and in combination with other plans or projects, is provided within the environmental statement.	centre point source, and in line with DMRB and EA guidance, this site has been scoped out of the assessment and any impact will be insignificant.
Public Health England	N/A (P275 of PDF)	Should compare predicted environmental concentrations to the applicable standard or guideline value for the affected medium (such as UK Air Quality Standards and Objectives and Environmental Assessment Levels).	Predicted environmental concentrations have been compared to the applicable standard where necessary.
Public Health England	N/A (P276 of PDF)	When considering a baseline (of existing air quality) and in the assessment and future monitoring of impacts these: • should include consideration of impacts on existing areas of poor air quality e.g. existing or proposed local authority Air Quality Management Areas (AQMAs) • should include modelling using appropriate meteorological data (i.e. come from the nearest suitable meteorological station and include a range of years and worst-case conditions) • should include modelling taking into account local topography	AQMAs are presented in the baseline section. Meteorological data used is presented in the ES. The impact of topography in the study area has also been considered.
Thurrock Council	N/A (P311 of PDF)	In reading the Air Quality Chapter, it was noted that no reference was given to the existing Air Quality and Health Strategy 2016 in the policy review. While the Council is looking to refresh this strategy, the current version remains adopted. There are 18 Air Quality Management Areas within Thurrock, and one is located in Tilbury. Dock Road -	Reference is given to the Air Quality and Health Strategy 2016 in the policy section. The impact of the Proposed Development on surrounding AQMAs is considered within the assessment.

		east of the Asda Roundabout forms a linear AQMA, and is caused by local traffic and congestion coupled with dwellings fronting onto the road with limited space between the carriageway and receptor points. The layout in Tilbury could encourage some (or others be directed by navigation apps) to rat-run through Tilbury from the Asda Roundabout to Brenan Road, and this will potentially exacerbate the AQMA. Additional traffic, or further reduced priority at the Asda Roundabout could also increase local traffic on Dock Road and create more harmful air quality environment for residents in Thurrock who are already likely to be most deprived communities in the borough and susceptible to higher levels of health conditions detrimental to their quality of life.	
Transport for London (TfL)	N/A (P318 of PDF)	Additional congestion on London's roads would be unacceptable, and the assessment should demonstrate that the proposed development does not compromise London's ability to meet its legal obligations with respect to air quality. Consequently, TfL considers it essential that the proposed method of assessment is rejected in favour of use of a strategic highway reassignment model.	Noted.

Consultation

16.53 A public statutory consultation was held between July and September 2020 (Planning Act 2008, s.42), which resulted in responses from various stakeholders, including Dartford Borough Council, Gravesham Borough Council, Ebbsfleet Development Corporation,

Natural England, Highways England, Port of London Authority and Southern Water. Responses relevant to the air quality assessment is summarised in Table 16.4 below.

Table 16.4: Summary of consultation comments and responses

Consultee	Consultation Comment	Response
Dartford Borough Council	The proposed assessment methodology is generally accepted. However, the Council notes that the report states that the traffic modelling will be used to identify the full study area used for the air quality assessment. One of the Council's main concerns is the impact that the development will have on the local road network. Whilst the majority of vehicles accessing the site are likely to use the Strategic Road Network (SRN) there may be a large number of vehicles that are displaced from the SRN on to the local road network as a result of increased congestion. This scenario should be included within the modelling. The impacts of additional bus services, their direct contribution to air pollution, as well the air quality consequences of increased congestion on the local road network should also be considered.	The impact of additional road traffic generated by the proposed development has been considered in this ES.
Dartford Borough Council	Given the potential for wider impacts arising from the development, the other Air Quality Management Areas in the Borough should also be considered, not only the AQMA immediately adjacent to the site along the A226 and that at Bean junction.	AQMAs in the study area are presented in the baseline section of this ES.
Dartford Borough Council	Consideration should be given to new areas with regard to worsening air quality which may lead to a need for further AQMAs to be declared. The Council would expect the developer to pay for designating such AQMA and funding mitigation. Examples	The impact on worsening air quality has been considered in this ES, however the assessment does not identify the need for further AQMA designations.

	might be worsening air quality in Ingress Park, due to the increased number of buses, cars looking for park etc, or worsening air quality on the new development in Ebbsfleet Garden city adjacent to Ebbsfleet junction and the Resort access road.	
Dartford Borough Council	The air quality of the proposed riverboat landing appears to have been assessed with regard to the construction impacts but there seems to be no assessment with regard to the operational impacts on air quality.	Assessment of vessel emissions has been considered in the ES for the construction and operational phases.
Gravesham Borough Council	The Borough has had a poor air quality base historically and has been working hard to improve this. The assessment is not simply about whether impacts are significant but also whether they help with the improvement to the air quality climate in a context where it is assumed that electrical vehicles etc. will bring benefits for pollution levels from the road network over time. The long-term impact of increased air pollution on the health and welfare of Gravesham residents, particularly the young and the elderly, should be fully assessed and mitigated.	Noted, where significant effects are likely, mitigation has been proposed.
Natural England	Natural England also recommended in our response to the 2020 EIA Scoping Opinion that the potential for traffic generated air quality impacts to designated sites should be considered within the environmental statement which may also need to be included within the Habitats Regulations Assessment.	The potential for traffic generated air quality impacts on designated sites has been considered within the ES.
Natural England	The environmental statement will need to consider whether there will be an increase in deposition to designated sites from the project. Such impacts may, for example, result from the following: - an increase in road traffic generated	Noted, these have been considered in the ES.

	air quality impacts to designated sites within 200 metres of the affected road network (both during construction and operation); - impacts from river traffic during construction and operation of the scheme; - impacts from any energy generation (including energy from waste) facilities associated with the project; and - project generated dust. Where impacts are likely to occur, full details of the mitigation measures will be implemented need to be included within the environmental statement.	
Highways England	With regards to dust, the construction methodology only refers to assessing the risks of dust impacts. As such this is woefully inadequate for determining the impacts of construction activities on the operation of the Strategic Road Network (SRN), (A2, M25 and A282) in the vicinity of the proposals. Whilst it is expected that the highways work to the A2 trunk road will be accompanied by their own Construction Management Plan and Method Statements the overall development proposals could have an adverse impact on the safe and efficient operation of the SRN.	Noted, the impact of construction activities on the strategic road network has been considered in the construction traffic emissions modelling study which is presented in the ES.
Port of London Authority	Paragraph 10.28 of the PEIR identifies that additional vessel movements will bring with it an increase in vessel emissions. Once the data is available and modelled it should be used to inform the air quality impacts of construction and operation. The PLA's Clean Air Strategy aims to reduce harmful emissions to air from marine sources within the tidal Thames, whilst facilitating the Port and London's sustainable growth.	Owing to the uncertainties associated with modelling future vessel emissions, the impact of vessel emissions has been assessed qualitatively in this ES.

	This will require everyone to play their part to reduce emissions, including London Resort.	
Southern Water	The Swanscombe and Northfleet Wastewater Treatment Works are located within the proposed development site. A precautionary buffer zone distance of 500 metres from the perimeter fence of the WWTW has been used for the purposes of this planning consultation response. Due to the potential odour nuisance from a Wastewater Treatment Works, no habitable development should be located within the 1.5 OdU odour contour of the WWTW. An Odour survey will need to be carried out to a specification agreed with Southern Water to identify and agree the 1.5 OdU contour.	There is no proposed habitable development within 500m of the Swanscombe and Northfleet Wastewater Treatment Works, therefore any assessment has been scoped out.

Assessment methodology and significance criteria

Study area

Construction dust

16.54 The impact of construction dust emissions has been assessed in accordance with IAQM construction guidance, with the following distances defining the study area of a construction site:

- human health receptors within 350 m of the boundary of the site, or 50 m of the routes used by construction vehicles on the public highway, and within 500 m of the site entrance; and
- terrestrial biodiversity receptors within 50 m of the boundary of the site or 50 m of the routes used by construction vehicles on the public highway, within 500 m of the REP site entrance.

Road traffic emissions - Construction and operational

16.55 The extent of the area assessed for likely significant effects from vehicle emissions during the construction and operational phases at human receptors has been determined by using the indicative screening criteria from the IAQM Guidance where:

- a change of Light Duty Vehicles (LDV) flows of more than 100 AADT within or adjacent to an Air Quality Management Area or more than 500 AADT elsewhere; and

- a change of HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere.

16.56 For ecological receptors the study area is defined using DMRB guidance[11] which indicates that potential for impacts at ecological sites may occur where the increase in AADT generated by the scheme is more than 1,000 vehicles per day or 200 HDVs per day, with relevant receptors within 200m of the road.

Energy centre emissions

16.57 The study area for energy centre emissions is defined by the distance over which significant effects may occur. For human receptors, a study area of 3km from the energy centre point source has been used. For ecological receptors, in line with Environment Agency AQTAG 06 guidance[12], international/European designated site have been considered within 10km of the point source, whilst national and local designated sites are considered within 2km of the point source.

Construction dust assessment methodology

16.58 Potential construction effects are assessed in accordance with the Institute of Air Quality Management (IAQM) construction dust guidance (Holman et al, 2014). This guidance document provides a methodology for assessing air quality impacts associated with construction activities (including demolition, earthworks, construction and trackout) which may be associated with a development. The construction assessment methodology involves a risk assessment to identify the appropriate level of mitigation to ensure that no significant air quality effects are likely. The risk assessment comprises the following steps:

1. A screening assessment to identify the need for detailed assessment. Detailed assessment will be required where there is:
    a. A human receptor within:
        - 350m of the site boundary; or
        - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
    b. An ecological receptor within:
        - 50m of the site boundary; or

[11] Highways Agency, 2019, Design Manual for Roads and Bridges, Sustainability & Environment Appraisal, LA 105 Air Quality.
[12] AQTAG 06, Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air, Ji Ping Shi, Environment Agency Air Quality Monitoring and Assessment Unit, Updated version (Approved March 2014

- 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

2. Assess the risk of dust impacts by:
   a. determining the potential dust emission magnitude from onsite activities,
   b. defining the sensitivity of the area to any potential dust emissions, and
   c. combine the dust emission magnitude and area sensitivity to determine the risk of dust impacts (without mitigation).
3. Determine the level of mitigation required to ensure there should be no significant effects.

16.59 Criteria for determining the potential dust emission magnitude from construction activities is presented in Table 16.5.

Table 16.5: Criteria for determining dust emission magnitude

Site activity	**Dust Emission Magnitude Criteria**		
Demolition	**Small**	**Medium**	**Large**
	• Total building volume <20,000 m^3, • construction material with low potential for dust release (e.g. metal cladding or timber), • demolition activities <10m above ground, • demolition during wetter months	• Total building volume 20,000 m^3 – 50,000 m^3, • potentially dusty construction material, • demolition activities 10-20 m above ground level	• Total building volume >50,000 m^3, • potentially dusty construction material (e.g. concrete), • on-site crushing and screening, • demolition activities >20 m above ground level;
Earthworks	**Small**	**Medium**	**Large**
	• Total site area <2 ,500 m^2, • soil type with large grain size (e.g. sand), • <5 heavy earth moving vehicles active at any one time, • formation of bunds <4 m in height, • total material moved <20,000 tonnes, • earthworks during wetter months	• Total site area 2,500 m^2 – 10,000 m^2, • moderately dusty soil type (e.g. silt), • 5-10 heavy earth moving vehicles active at any one time, • formation of bunds 4 m - 8 m in height, • total material moved 20,000 tonnes – 100,000 tonnes	• Total site area >10,000 m^2, • potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), • >10 heavy earth moving vehicles active at any one time, • formation of bunds >8 m in height, • total material moved >100,000 tonnes;
Construction	**Small**	**Medium**	**Large**

Site activity	Dust Emission Magnitude Criteria		
	• Total building volume <25,000 m^3, • construction material with low potential for dust release (e.g. metal cladding or timber).	• Total building volume 25,000 m^3 – 100,000 m^3, • potentially dusty construction material (e.g. concrete), • on site concrete batching	• Total building volume >100,000 m^3, • on site concrete batching, • sandblasting
Trackout	**Small**	**Medium**	**Large**
	• <10 HDV (>3.5t) outward movements in any one day, • surface material with low potential for dust release, • unpaved road length <50 m	• 10-50 HDV (>3.5t) outward movements in any one day, • moderately dusty surface material (e.g. high clay content), • unpaved road length 50 m – 100 m	• >50 HDV (>3.5t) outward movements in any one day, • potentially dusty surface material (e.g. high clay content), • unpaved road length >100 m

16.60 Determining the sensitivity of the surrounding area takes into account the sensitivity, proximity and number of receptors, the background concentration of PM_{10}, and any site-specific factors such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust. Criteria for determining area sensitivity are outlined below.

High Sensitivity Area

16.61 Locations sensitive to dust soiling where users would expect a high level of amenity, such as dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.

16.62 Locations where members of the public will be present for long periods of time including residential properties, hospitals, schools and residential care homes.

16.63 Locations with an international or national ecological designation and the designated features may be affected by dust soiling, or locations where there is a particular dust sensitive species such as vascular species.

Medium Sensitivity Area

16.64 Locations where users would expect to enjoy a reasonable level of amenity but would not reasonably expect to enjoy the same level of amenity as in their home, for example parks and places of work, for example offices and shops.

16.65 Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may

be affected by dust deposition.

Low Sensitivity Area

16.66 Locations where the enjoyment of amenity would not reasonably be expected, or where there is transient exposure, for example playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

16.67 Locations with a local ecological designation where the features may be affected by dust deposition.

16.68 The following tables show how the sensitivity of an area is determined for the various potential impacts. For each potential impact the highest level of sensitivity is recorded.

Table 16.6: Sensitivity of the area to dust soiling effects on people and property

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		<20	**<50**	**<100**	**<350**
High	>100	**High**	**High**	Medium	*Low*
	10-100	**High**	Medium	*Low*	*Low*
	1-10	Medium	*Low*	*Low*	*Low*
Medium	>1	Medium	*Low*	*Low*	*Low*
Low	>1	*Low*	*Low*	*Low*	*Low*

Table 16.7: Sensitivity of the area to human health impacts

Receptor sensitivity	Annual mean PM_{10} concentration	Number of receptors	Distance from the source (m)				
			<20	**<50**	**<100**	**<200**	**<350**
High	>32 µg/m^3	>100	**High**	**High**	**High**	Medium	*Low*
		10-100	**High**	**High**	Medium	*Low*	*Low*
		1-10	**High**	Medium	*Low*	*Low*	*Low*
	28-32 µg/m^3	>100	**High**	**High**	Medium	*Low*	*Low*
		10-100	**High**	Medium	*Low*	*Low*	*Low*
		1-10	**High**	Medium	*Low*	*Low*	*Low*
	24-28 µg/m^3	>100	**High**	Medium	*Low*	*Low*	*Low*
		10-100	**High**	Medium	*Low*	*Low*	*Low*

		1-10	Medium	*Low*	*Low*	*Low*	*Low*
	<24 µg/m^3	>100	Medium	*Low*	*Low*	*Low*	*Low*
		10-100	*Low*	*Low*	*Low*	*Low*	*Low*
		1-10	*Low*	*Low*	*Low*	*Low*	*Low*
Medium	-	>10	**High**	Medium	*Low*	*Low*	*Low*
		1-10	Medium	*Low*	*Low*	*Low*	*Low*
Low	-	>1	*Low*	*Low*	*Low*	*Low*	*Low*

Table 16.8: Sensitivity of the area to ecological impacts

Receptor sensitivity	**Distance from the source (m)**	
	<20	<50
High	**High**	Medium
Medium	Medium	*Low*
Low	*Low*	*Low*

16.69 Taking into account the dust emission magnitude (Table 16.5), and the area sensitivity (Table 16.6-16.8), the risk of dust impact is determined using Table 16.9.

Table 16.9: Risk of dust impacts

Sensitivity of area	**Dust emission magnitude**		
	Large	**Medium**	**Small**
High	**High risk**	**High risk**	Medium risk
Medium	**High risk**	Medium risk	*Low risk*
Low	Medium risk	*Low risk*	*Negligible*

16.70 IAQM construction guidance indicates that with appropriate mitigation in place, the effects of construction dust will be 'not significant'. Therefore, the assessment focuses on determining the appropriate level of mitigation required to ensure that effects will be 'not significant'.

Road traffic emissions assessment (construction and operation)

Approach to assessment

16.71 Road traffic generated during the construction and operation of the Proposed Development will give rise to emissions of NO_x and particulate matter (PM_{10} and $PM_{2.5}$)

which will have a potential impact on air quality at both human and ecological receptors.

16.72 Traffic data has been provided by the Applicant's transport consultants for a network of roads predicted to experience an increase in traffic as a result of the construction and operation of the Proposed Development.

16.73 The impact of the Proposed Development has been predicted at worst case existing and proposed future receptor locations using the dispersion model ADMS-Roads (v5). 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.

16.74 The assessment considers existing traffic flows on the road network as well as the predicted change in future traffic as a result of the Proposed Development.

16.75 Traffic-related pollutant concentrations (NO_2, PM_{10} and $PM_{2.5}$) are predicted at sensitive receptor locations for the following assessment scenarios:

- 2018 Existing Baseline (to establish existing baseline conditions and verify the model);
- 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).
- 2024 Do Nothing; Future baseline (including committed developments) without the Proposed Development;
- 2024 Do Something; Future baseline (including committed developments), Gate One opening year with all associated trips.
- 2029 Do Nothing; Future baseline (including committed developments) without the Proposed Development;
- 2029 Do Something; Future baseline (including committed developments), Gate Two opening year with all associated trips.
- 2038 Do Nothing; Future baseline (including committed developments) without the Proposed Development; and

- 2038 Do Something; Future baseline (including committed developments) Maturity of Proposed Development;

16.76 The impact of the Proposed Development has been assessed for each assessment year by comparing the Do Nothing and Do Something scenarios for future years.

16.77 Vehicle emissions have been calculated based on vehicle flow, composition and speed data using Defra's Emission Factor Toolkit (Version 10.1), which provide projections up to 2030. For the 2038 assessment year, 2030 emission factors have been used; which is a conservative assumption as emission factors reduce year on year owing to improvements in vehicle emission standards entering the national vehicle fleet.

16.78 Hourly sequential meteorological data from London City Airport for 2018 has been used in the traffic emissions modelling.

16.79 Surface roughness represents the extent of mechanical turbulence in the atmosphere caused by the roughness of the ground over which the air is passing. A surface roughness length of 0.3m was used at the study area and 1m at the meteorological measurement site.

16.80 The Monin-Obukhov length represents the stability of the atmosphere. In very stable conditions such as rural areas, the value is typically between 2-20m. For large urban areas, there is a significant amount of heat generated by buildings and traffic which warms the air above the city creating an effect called urban heat island. A Monin-Obukhov length of 30m was used for the study area and for the meteorological measurement site.

16.81 Pollutant concentrations (NO_2, PM_{10} and $PM_{2.5}$) have been predicted at human receptor locations within 200m of roads predicted to experience an increase in Annual Average Daily Traffic (AADT) flows above the IAQM criteria detailed in Table 16.2.

16.82 For ecological receptors, NOx concentrations and nitrogen nutrient deposition rates have been predicted at designated nature conservation sites within 200m of roads predicted to experience an increase in AADT of >1,000 vehicles per day or >200 HDVs per day. Only the 2038 assessment year was considered for this assessment, when the traffic generated by the Proposed Development will be highest. An initial model run was carried out to determine the maximum impact across each site boundary. Where results cannot be screened as insignificant, a further model run has been carried out to predict the impact across a transect with 10m intervals in order to determine the extent of the potential impact.

16.83 Receptor locations included in the model are detailed in Appendix 16.1.

16.84 The modelled road network with human receptors, and ecological receptors, are presented in Figure 16.1 and 16.2 respectively.

Energy centre emissions

16.85 The Proposed Development includes an energy centre at the Kent Project Site comprising gas boilers with a capacity of 26MW (4no. 6.5MW gas boilers) and NOx emissions of 80 mg/Nm^3 (dry, 3% O2). Each boiler will have an individual flue with diameter of 0.6m, combined into one chimney and discharging at 25m above ground level. The boiler flues have therefore been modelled as a single point source with a calculated combined discharge diameter of 1.2m.

16.86 The impact of emissions from the proposed energy centre has been predicted for relevant assessment years using the ADMS-5 dispersion model. ADMS-5 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. The model has been run to predict the contribution of the proposed energy centre emissions to annual mean (long-term) and the 99.79th percentile of 1-hour mean (short-term) NO_2 concentrations. The emission parameters used in the modelling are set out in Table 16.10.

16.87 Emission data used in the model were provided by the Applicant's energy consultants. Analysis of the actual energy demand indicates that it is not continuous and that there are diurnal and seasonal variations. In order to account for these variations, annual NOx emission rates have been adjusted by a factor of 0.04. However, short-term NOx predictions were based on continuous maximum emissions (0.652 g/s).

Table 16.10: Energy centre emission parameters

Parameter	Value
Combined Discharge Diameter (m)	1.2
Discharge Height (m)	25
Discharge Velocity (m/s)	10.4
Discharge flow rate (Nm^3/hr) @ (120 °C)	42,199
Combined NOx Emission Rate (g/s)	0.652
Exhaust Temperature (°C)	120
Stack Location (X, Y)	560715.2,174843.9

16.88 Entrainment of the plume into the wake of the buildings (building downwash effect) has been taken into account in the model. The building dimensions and flue location have been obtained and simplified for the purposes of dispersion modelling. Stack and building locations and dimensions included in the model are presented in Table 16.11 and Figure 16.3.

Table 16.11: Building input parameters

Building	Central point grid ref. (X,Y)	Height (m)	Length (m)	Width (m)	Angle between North and Length (°)
Energy Centre	560718.2, 174843.9	20.0	34.8	26.9	87.0
Staff Accom1	560274.5, 174867.9	45.0	56.6	203.4	186.8
Staff Accom2	560023.9, 174895.5	45.0	80.3	202.4	5.7
Hotel1	560359.5, 175328.2	43.5	85.3	181.6	80.9
Hotel2	560094.9, 175706.7	47.1	98.8	116.5	44.8
Hotel3	560270.2, 175139.3	59.0	162.1	101.4	102.8
Hotel4	560097.8, 175544.2	49.0	111.1	103.5	207.8

16.89 The location of the modelled flue is shown in Figure 16.3 along with the modelled buildings.

16.90 Following a meteorological sensitivity analysis, hourly sequential meteorological data from London City Airport for 2017 have been used in the point source modelling. This is the meteorological year that resulted in the highest ground level contribution to long-term and short-term NOx concentrations.

16.91 The model was used to predict long-term and short-term NO_x concentrations at the following receptors locations:

- An output grid of 3km x 3km centred at the energy centre stack with a spacing of 10m. The extent of this grid is detailed in Table 16.12. Results at the output grid were used to predict the maximum long-term and short-term process contribution (PC) to ground level NO_2 concentrations and the predicted environmental concentration (PEC). These predictions were used to judge whether the designed stack height would result in PC below the following Environment Agency insignificance criteria
  - i. The long-term process contribution is <1% of the long-term environmental standard;
  - ii. The short-term process contribution is <10% of the short-term environmental standard
- Off-site and on-site human receptor locations considered in the traffic emissions modelling;

- Ecological receptor locations at designated nature conservation sites within the following Environment Agency recommended distances:

    i. National and local designated sites (e.g. local nature reserves and ancient woodlands) within 2km from the stack (as presented in Figure 16.4); and

    ii. European and Internationally designated sites (e.g. SPA, SAC & Ramsar) within 10km from the stack (as presented in Figure 16.5).

Table 16.12: Details of the Modelled Receptor Grid

	Minimum OS Grid Ref.	Maximum OS Grid Ref.	Grid Spacing (m)
X	559215	562215	10
Y	173344	176343	10

Background concentrations

16.92 The background pollutant concentrations across the study area have been defined using the national pollution maps published by Defra[13]. These cover the whole of the UK on a 1x1 km grid and are published for each year from 2018 until 2030. In order to consider the uncertainty associated with future improvements in background air quality, the approach to assessment has been to assume no change in background concentrations from the existing baseline year. Where this assumption indicates a potentially significant impact, results will also be presented with Defra's projected background concentrations.

Terrain data

16.93 Owing to the general slope of the study area being <1:10 in line with ADMS guidance[14], terrain data has not been included in the traffic emissions modelling. A sensitivity test has been carried out for the point source modelling which indicates that inclusion of terrain data does not lead to any significant impact on modelled results.

Model Adjustment and Verification

16.94 The roads within the ADMS model have undergone a detailed adjustment and verification process which followed the methodology set out in Defra's local air quality management technical guidance (LAQM TG(16)) Box 7.14[15].

16.95 Each road has been appraised and adjusted following a detailed review of the road layout using satellite imagery and mapping software.

16.96 The drawn road layout considers;

[13] Defra (2020) Local Air Quality Management (LAQM) Support Website, Available: http://laqm.defra.gov.uk/.
[14] Cambridge Environmental Research Consultant ADMS-Roads User Guide Version 5.0, February 2020
[15] Defra Local Air Quality Management Technical Guidance (TG16), February 2018

- Road width;
- Existing junctions;
- Road links where queuing is expected;

16.97 Speeds on each road link have been supplied by the appointed transport consultant for each scenario; the speed supplied has been reduced on portions of roads close to junctions or where queuing is expected.

16.98 Modelled results have been verified against known monitored values in close proximity of the site. Verification is an iterative process that follows the following key steps:

- identify all roadside monitoring sites within a relevant proximity to road links within the modelled domain;
- appraise monitoring sites using Google Earth[16] and ensure the location and height given in the Annual Air Quality Status Reports are as accurate as possible;
- remove sites that are not suitable for model verification (i.e. located in close proximity to a bus stop, inappropriate diffusion tube siting, poor data capture, etc.);
- compare modelled and monitored NOx concentrations, identify areas and sites where the differences are similar to identify verification zones;
- calculate adjustment factors for each of the identified zones and ensure difference between modelled and monitored NO_2 concentrations are within 25%;

16.99 The verification sites used in the assessment, the modelled road network, and the verification zones established are presented in Figure 16.6. Results from model verification are presented Table 16.13 and 16.14. Appendix 16.2 presents graphs showing modelled NO_x against monitored NO_x values. Results indicate that the model under-predicts road NO_x contribution, and therefore it is necessary to apply an adjustment factor.

Table 16.13: Model verification results

Monitoring Site ID	Modelled road NOx (µg/m^3)	Monitored road NOx (µg/m^3)	% Difference
Bean Interchange	14.0	50.6	-72.3
DA39	8.1	25.8	-68.6
DA49	9.1	31.2	-70.7
DA38	8.6	30.6	-71.8
NAS2	15.4	59.2	-74.0

[16] Google Earth, Available: https://earth.google.com/web/

HL	8.0	22.3	-64.4
ER	16.8	58.0	-71.0
WC	6.8	39.1	-82.7
PBP	4.8	21.6	-77.7
LRSS	7.7	31.0	-75.3
LRG	3.8	22.1	-82.9

16.100 The following adjustment factors have been calculated in each of the identified verification zones:

- verification zone A (South of the river); 3.4934
- verification zone B (North of the river, east); 3.5384
- verification zone C (North of the river, west); 4.8588

16.101 Following LAQM TG16, the uncertainty of the model has been assessed by calculating the Root Mean Square Error (RMSE). Where the RMSE value is above 10 µg/m^3 (higher than 25% of the objective being assessed) the model and all associated inputs and assumptions should be revisited. The RMSE value, after model adjustment, is presented in Table 16.14 and show the model is performing well and within the accepted error margins (i.e. all RMSE values <10).

16.102 ~~The relevant adjustment factor has subsequently been applied to modelled road NO_x. Adjusted NOx is presented in Table 16.14. The same adjustment factor has also been applied to modelled PM_{10} and $PM_{2.5}$ results.~~ Nearby particulate matter monitoring sites have been reviewed as part of the verification process. There are five monitoring sites in proximity to the modelled domain that model PM_{10};

- Thurrock, Grays AURN (TK1)
- Gravesham A2 Roadside (ZG2)
- Gravesham Industrial Background (ZG3)
- Bean Interchange (ZR2)

16.103 Of the above five sites only one can be used for model verification. TK1 is an urban background site, and in a location where the supplied traffic data does not include nearby links. ZG3 is an industrial monitoring site, likely set up due to the heavy industry to the east of Gravesend, so is not appropriate for use as for road emission verification. ZG2 is categorised as a 'roadside' site in the ASR however it is located 72m from the kerb of the nearest road (A2) and at this distance is not appropriate for model verification.

16.104 Given the size of the model, and approach to zonal model verification, verifying PM_{10} concentrations against a single monitoring site is been deemed less robust than using the more location specific NO_x adjustment factors. This is in line with TG16, which states "*The use of one continuous monitor alone to derive the adjustment factor for a model is not*

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recommended as the monitoring site"[17] For these reasons, the relevant adjustment factor has subsequently been applied to modelled ~~road NO_x. Adjusted NOx is presented in Table 16.14. The same adjustment factor has also been applied to modelled~~ PM_{10} and $PM_{2.5}$ results.

Table 16.14: Adjusted modelled results NO_x

Monitoring Site ID	Adjustment Factor	Background (µg/m³)		Adjusted Modelled Road NOx (µg/m³)	Monitored Road NOx (µg/m³)	% Difference after Adjustment	Monitored concentration – Adjusted concentration (µg/m³)	RMSE for each
		NOx	NO2					
Bean Interchange	A; 3.4934	38.3	25.6	48.9	50.6	-3.3	1.7	
DA39	A; 3.4934	42.4	27.7	28.3	25.8	9.6	-2.5	0.8
DA49	A; 3.4934	31.4	21.5	31.9	31.2	2.3	-0.7	
DA38	A; 3.4934	29.5	20.3	30.2	30.6	-1.3	0.4	
NAS2	B; 3.5384	36.4	24.3	54.4	59.2	-8.0	4.8	2.5
HL	B; 3.5384	33.8	22.6	27.8	22.3	24.6	-5.5	
ER	B; 3.5384	34.4	23.2	59.6	57.9	2.8	-1.6	
WC	C; 4.8588	33.3	22.3	32.8	39.12	-16.1	6.3	2.5
PBP	C; 4.8588	33.3	22.3	23.3	21.56	8.2	-1.8	
LRSS	C; 4.8588	37.2	24.2	37.3	31.04	20.2	-6.3	
LRG	C; 4.8588	39.9	25.4	18.3	22.05	-17.1	3.8	

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Model post-processing

Road traffic emissions modelling

~~16.101~~16.105 The model has been used to predict road-NO_x, PM_{10} and $PM_{2.5}$ concentrations (i.e. road contribution) at each human receptor location. These concentrations were adjusted following the verification process set out above. In order to derive NO2 concentrations from modelled NOx, results were processed through the NO_x to NO_2 calculator available on the Defra LAQM Support website[18]. This calculator predicts the component of NO_2 based on the adjusted road-NO_x and the background NO_2.

Energy centre emissions modelling

~~16.102~~16.106 The energy centre emissions modelling (point source modelling) were run to predict the contribution of the proposed boiler emissions to annual mean NOx

[17] Defra Local Air Quality Management Technical Guidance (TG16), *Para- 7.526, pg 7-127* February 2018

[18] Defra NOx to NO_2 calculator v8.1 available at: Background maps. Tools. Local Air Quality Management Support - Defra, UK

concentrations, and to the 99.79th percentile of 1-hour mean NOx concentrations. For the initial screening of the process contributions (PC), the approach recommended by the Environment Agency[19] was used to predict NO_2 concentrations. This assumes that:

- for short-term PCs, assume only 50% of emissions of NOx convert to NO_2; and
- for long-term PCs, assume all NOx convert to NO_2.

Nature conservation sites

~~16.103~~16.107 The model has been used to predict road-NOx concentrations at each nature conservation site.

~~16.104~~16.108 In order to determine nutrient nitrogen deposition at nature conservation sites, deposition velocities and conversion factors have been used in line with IAQM ecological guidance and AQTAG 06 guidance. For determining the acid deposition, the critical load function tool has been used from the APIS website[20].

Odour assessment

~~16.105~~16.109 A qualitative odour risk assessment has been carried out into the potential impact from odour emissions resulting from the operation of the proposed waste water treatment works on future site occupants and visitors. The assessment takes into account the source-pathway-receptor concept, to determine the potential for odour effects to occur. The source-pathway-receptor assessment framework is outlined in Table 16.15.

~~16.106~~16.110 In order to consider the risk of odour impact at individual receptors, the estimates of Source Odour Potential and the Pathway Effectiveness are considered together to predict the risk of odour impact, as shown in Table 16.16. The next step is to estimate the effect of that odour impact on the exposed receptor, taking into account receptor sensitivity, as shown in Table 16.17.

Table 16.15: Source-pathway-receptor qualitative assessment framework (from IAQM odour guidance)

Source Odour Potential	Pathway Effectiveness	Receptor sensitivity
Factors affecting the source odour potential include: • The magnitude of the odour release (taking into account odour-control measures); • How inherently odorous the compounds are; • The unpleasantness of the odour.	Factors affecting the odour flux to the receptor are: • Distance from source to receptor; • The frequency (%) of winds from the source to receptor (or, qualitatively, the direction of receptors from source with respect to prevailing wind);	For the sensitivity of people to odour, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between

[19] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit
[20] http://www.apis.ac.uk/critical-load-function-tool

	• The effectiveness of any mitigation/ control in reducing flux to the receptor; • The effectiveness of dispersion/ dilution in reducing the odour flux to the receptor • Topography and terrain.	high and low sensitivity a receptor lies, taking into account the general principles set out below.
Large Source Odour Potential Magnitude – Larger Permitted processes of odorous nature or large Sewage Treatment Works; materials usage hundreds of thousands of tonnes/m^3 per year; area sources of thousands of m^2. The compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known. Unpleasantness – processes classed as "Most offensive"; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score. Mitigation/control – open air operation with no containment, reliance solely on good management techniques and best practice.	**Highly Effective Pathway for Odour Flux to Receptor** Distance – receptor is adjacent to the source/site; distance well below any official set-back distances. Direction – high frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of source with respect to prevailing wind). Effectiveness of dispersion / dilution – open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.	**High sensitivity receptor** surrounding land where: • users` can reasonably expect enjoyment of a high level of amenity; and • the people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools / education and tourist / cultural.
Medium Source Odour Potential Magnitude – smaller Permitted processes or small Sewage Treatment Works; materials usage thousands of tonnes/m^3 per year; area sources of hundreds of m^2. The compounds involved are moderately odorous. Unpleasantness – processes classed in H4 as "Moderately offensive"; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score. Mitigation/control – some	**Moderately Effective Pathway for Odour Flux to Receptor** Distance – receptor is local to the source. Where mitigation relies on dispersion/dilution – releases are elevated but compromised by building effects.	**Medium sensitivity receptor** Surrounding land where: • users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or • people wouldn't reasonably be expected to be present here continuously or

mitigation measures in place, but significant residual odour remains.		regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Small Source Odour Potential Magnitude – falls below Part B threshold; materials usage hundreds of tonnes/m^3 per year; area sources of tens m^2. The compounds involved are only mildly odorous, having relatively high ODTs where known. Unpleasantness – processes classed as "Less offensive"; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score. Mitigation/control – effective, tangible mitigation measures in place (e.g. BAT, BPM) leading to little or no residual odour.	**Ineffective Pathway for Odour Flux to Receptor** Distance – receptor is remote from the source; distance exceeds any official set-back distances. Direction – low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind). Where mitigation relies on dispersion/ dilution – releases are from high level (e.g. stacks, or roof vents >3m above ridge height) and are not compromised by surrounding buildings	**Low sensitivity receptor** – surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial, farms, footpaths and roads.

Table 16.16: Risk of odour impact at receptor locations

		Source odour potential		
		Small	**Medium**	**Large**
Pathway effectiveness	**Highly effective**	Low risk	Medium risk	High risk
	Moderately effective	Negligible risk	Low risk	Medium risk
	Ineffective	Negligible risk	Negligible risk	Low risk

Table 16.17: Likely magnitude of odour effect at the specific receptor location

Risk of odour impact	Receptor sensitivity		
	Low	**Medium**	**High**
High risk	Minor adverse effect	Moderate adverse effect	Major adverse effect
Medium risk	Negligible effect	Minor adverse effect	Moderate adverse effect
Low risk	Negligible effect	Negligible effect	Minor adverse effect
Negligible risk	Negligible effect	Negligible effect	Negligible effect

Vessel emissions

~~16.107~~16.111 Owing to the uncertainties associated with modelling vessel emissions, a qualitative risk assessment has been carried out to determine the potential impact from vessel emissions generated by the Proposed Development, taking into account the preliminary estimated vessel movements.

Determining significance

~~16.108~~16.112 The impact of the Proposed Development will be considered in relation to relevant Air Quality Objectives (AQOs). The effect significance will be determined in accordance with the IAQM's significance criteria. IAQM significance criteria is detailed in Table 16.18.

Table 16.18: 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

~~16.109~~16.113 With regards to short term impacts, the framework for describing significance is presented in Table 16.19. It should be noted that assessment of short-term impacts is made without the need to take into account background or baseline conditions. This is due to the fact that on an annual average basis, background concentrations will be a much smaller quantity than the peak concentration from a substantial plume and it is the contribution that is used as a measure of the impact, not the overall concentration.

Table 16.19: Impact Descriptors for Individual Receptor Locations (short term)

Long-term average concentration at receptor in assessment year.	Impact descriptor
<10% of AQAL	Negligible
10-20% of AQAL	Minor
20-50% of AQAL	Moderate
>50% of AQAL	Major

~~16.110~~16.114 The overall significance of the air quality impact, whether beneficial or adverse, is considered holistically taking into account of a number of factors. Tables 16.18 and 16.19 set 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.

~~16.111~~16.115 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.

~~16.112~~16.116 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 be proposed in order to avoid significant effects.

~~16.113~~16.117 For impacts on terrestrial biodiversity receptors, the IAQM ecological guidance recommends adopting the EA's approach, which describes the process contribution (PC) as being insignificant when less than 1% of the long-term environmental standard.

~~16.114~~16.118 Once the impact has been quantified, the EA's 1% threshold is used as a precautionary screening criterion and where effects are found to be above this threshold, consideration will be given to the PEC and the ecologist will be consulted to determine possible adverse effects on the site.

Assessment assumptions and limitations

~~16.115~~16.119 There are a number of factors that will contribute to uncertainty associated with the modelling predictions, including the traffic and emissions data model inputs which will have inherent uncertainty associated with them. There is also additional uncertainty owing to the model simplifying real world conditions into a series of algorithms.

~~16.116~~16.120 In order to reduce this uncertainty, model verification has been carried out for the assessment of traffic emissions by comparing modelled and monitored concentrations, which will ensure a good degree of confidence in modelled results for the existing baseline year. For future years there will inevitably be a greater level of uncertainty owing to future trends in air quality conditions, as well as the uptake and performance of more stringent vehicle emission standards within the vehicle fleet. Therefore, in order to address the uncertainty in future air quality conditions, a conservative approach has been taken that assumes there will be no improvement in background concentrations from 2018, for all future assessment years. With regards to future vehicle emissions, studies[2122] indicate that Defra's emission factor toolkit (v.10) provides an accurate prediction of the most likely future vehicle emissions reductions and may even under-predict the rate of vehicle emissions reduction.

~~16.117~~16.121 For energy centre emissions, a number of sensitivity tests have been carried out including meteorological year, meteorological station and the use of terrain in the model, with the assessment based on parameters at each receptor that leads to the highest predicted concentration.

~~16.118~~16.122 This approach will provide a reasonable worst-case assessment of the likely impact from the proposed development.

BASELINE CONDITIONS

~~16.119~~16.123 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)

~~16.120~~16.124 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.

~~16.121~~16.125 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 Kent 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 16.7.

[21] AQC Performance of Defra's Emission Factor Toolkit 2013 – 2019, February 2020
[22] AQC Comparison of EFT v10 with EFT v9, September 2020

Air quality monitoring

~~16.122~~16.126 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 are shown in Figures 16.8-16.11. Monitoring data for NO_2 and PM_{10} from 2016-2019 is presented in Table 16.20 and 16.21.

~~16.123~~16.127 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), along the M25 (site ID: DA97, IBIS) 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 limits at the Kent Project Site below Swanscombe Marshes and continues west towards central London.

Table 16.20: Nearby NO_2 monitoring results (2016-2019)

Site ID	Site type	Monitoring type	Annual mean NO_2 concentration (µg/m^3)			
			2016	2017	2018	2019
DA01	Roadside	Diffusion tube	39.6	33.7	37.7	34.3
DA07	Urban Background	Diffusion tube	24.7	21.8	24.8	23.2
DA10	Roadside	Diffusion tube	38.7	35.1	35.6	31.8
DA16	Roadside	Diffusion tube	**48.8**	**43.1**	**41.4**	**41.1**
DA17	Roadside	Diffusion tube	35.6	30.4	33.7	30.0
DA18	Urban Background	Diffusion tube	26.1	25.3	25.8	26.3
DA20	Roadside	Diffusion tube	**46**	38.1	**43.3**	36.1
DA21	Roadside	Diffusion tube	36.1	32.5	34.5	32.2
DA24	Roadside	Diffusion tube	38.6	33.5	36.3	32.3
DA25	Urban Background	Diffusion tube	37.1	33.7	35.1	30.8
DA34	Roadside	Diffusion tube	**44.6**	39	**42.2**	37.6
DA35	Roadside	Diffusion tube	38.6	35.3	37.5	34.0
DA36	Roadside	Diffusion tube	**40.6**	34.3	37.8	34.9
DA38	Roadside	Diffusion tube	39.9	37.2	35.4	33.4
DA39	Roadside	Diffusion tube	**41**	36.6	**40.2**	36.8
DA41	Roadside	Diffusion tube	**42.7**	38.7	38.8	36.7
DA43	Roadside	Diffusion tube	**58.2**	**53**	**57.9**	**54.6**
DA47	Roadside	Diffusion tube	38.3	34.8	37.0	34.8
DA48	Roadside	Diffusion tube	38.7	33.9	34.7	30.8
DA49	Roadside	Diffusion tube	39.9	36.3	36.8	37.0
DA50	Roadside	Diffusion tube	**47.6**	**42**	**41.3**	37.9
DA53	Urban Background	Diffusion tube	20.7	19.8	19.9	20.0
DA54	Urban Background	Diffusion tube	26.6	24.8	26.7	25.6
DA56	Urban Background	Diffusion tube	27.4	24.1	25.4	24.7
DA60	Roadside	Diffusion tube	37.2	33.8	36.9	32.9

DA61	Roadside	Diffusion tube	**46.6**	**40.9**	**45.7**	**45.2**
DA62	Roadside	Diffusion tube	**44**	**43.8**	**41.1**	39.4
DA63	Urban Background	Diffusion tube	34.4	30	32.6	30.9
DA67	Roadside	Diffusion tube	29	27.3	27.2	25.3
DA68	Roadside	Diffusion tube	36.8	30.5	29.5	30.0
DA69	Roadside	Diffusion tube	**43.9**	34.4	32.9	32.4
DA70	Roadside	Diffusion tube	38.1	33.5	34.8	31.2
DA72	Roadside	Diffusion tube	**41.8**	36.1	38.4	35.2
DA78	Roadside	Diffusion tube	37.7	33.9	39.1	35.4
DA79	Roadside	Diffusion tube	36.3	32.8	34.5	32.1
DA83	Urban Background	Diffusion tube	33.4	30.1	33.5	30.2
DA84	Roadside	Diffusion tube	**51.2**	**49**	**45.2**	**43.7**
DA85	Roadside	Diffusion tube	31.6	30.2	32.8	30.8
DA86	Urban Background	Diffusion tube	35.8	34.7	33.3	32.7
DA87	Roadside	Diffusion tube	**40.2**	33.9	35.8	32.1
DA89	Roadside	Diffusion tube	32.2	28.8	28.7	26.3
DA90	Roadside	Diffusion tube	35.2	32.5	37.2	30.7
DA91	Roadside	Diffusion tube	33.6	33.3	33.4	32.6
DA92	Roadside	Diffusion tube	**44.3**	**41.6**	**42.5**	35.2
DA93	Roadside	Diffusion tube	**42.9**	**40.3**	**41.0**	38.2
DA94	Roadside	Diffusion tube	36.6	36.2	35.3	33.0
DA95	Roadside	Diffusion tube	**43.8**	37.9	36.7	33.8
DA96	Roadside	Diffusion tube	**46.9**	**42.2**	**41.8**	**41.8**
DA97	Roadside	Diffusion tube	-	35.3	**46.4**	**44.3**
DA98	Roadside	Diffusion tube	-	-	-	27.2
ZR1	Roadside	Automatic	38	34	36	32
ZR2/ZR3	Roadside	Automatic	**57**	**55**	**49**	**46**
Gravesham A2	Roadside	Automatic	30	32	30	29
GR13	Roadside	Diffusion tube	38.0	**44.0**	**56.8***	**54.2***
GR19	Industrial	Diffusion tube	23.6	22.8	27.3*	27.4*
GR24	Roadside	Diffusion tube	**41.8**	**42.9**	**54.7***	**50.2***
GR31	Roadside	Diffusion tube	**56.6**	**43.2**	**51.7***	**51.5***
GR39	Roadside	Diffusion tube	**48.3**	34.1	**43.2***	**41.2**
GR40	Roadside	Diffusion tube	**55.8**	**41.3**	**54.4***	**51.1***
GR45	Roadside	Diffusion tube	27.0	26.8	32.6*	34.5*
GR47	Roadside	Diffusion tube	**40.7**	**41.9**	**54.7***	**50.5***
GR52	Roadside	Diffusion tube	33.4	33.2	**43.8***	38.4*
GR58	Roadside	Diffusion tube	38.8	39.5	**45.3***	**44.7***
GR61	Roadside	Diffusion tube	35.4	34.5	**42.8***	**41.4***
GR62	Roadside	Diffusion tube	30.6	31.2	37.0*	36.2*
GR66	Roadside	Diffusion tube	30.6	31.0	38.5*	37.2*
GR72	Background	Diffusion tube	24.4	25.2	28.8*	28.8*
GR90	Roadside	Diffusion tube	30.9	31.2	38.2*	-

GR96	Roadside	Diffusion tube	30.5	30.8	39.0*	37.0*
GR98	Roadside	Diffusion tube	33.1	32.0	**40.4***	39.1*
GR112	Roadside	Diffusion tube	33.6	34.3	**41.9***	**42.0***
GR118	Roadside	Diffusion tube	31.9	32.5	**42.0***	**41.0***
GR119	Roadside	Diffusion tube	**40.0**	**49.2**	**64.4***	**58.3***
GR122	Roadside	Diffusion tube	31.6	35.9	**43.5***	**43.5***
GR123	Roadside	Diffusion tube	25.5	26.1	28.9*	31.0*
GR124	Roadside	Diffusion tube	31.5	32.7	36.6*	36.5*
GR125	Roadside	Diffusion tube	33.1	32.7	38.6*	39.1*
GR127	Roadside	Diffusion tube	28.7	29.9	36.3*	35.7*
GR128	Roadside	Diffusion tube	34.9	29.6	37.3*	37.4*
GR129	Roadside	Diffusion tube	28.3	29.0	33.4*	33.4*
GR130	Roadside	Diffusion tube	29.2	29.1	36.8*	36.8*
GR131	Roadside	Diffusion tube	26.2	25.6	30.1*	31.1*
GR132	Roadside	Diffusion tube	25.3	24.8	28.4*	28.6*
GR133	Roadside	Diffusion tube	33.2	36.9	**43.7***	**42.6***
GR134	Roadside	Diffusion tube	33.6	31.4	39.5*	39.6*
GR135	Roadside	Diffusion tube	**41.7**	**46.8**	**54.0***	**51.6***
GR136	Roadside	Diffusion tube	34.8	35.8	**47.4***	**44.0***
GR139	Roadside	Diffusion tube	-	37.6	36.7*	**40.0***
GR140	Roadside	Diffusion tube	-	-	**45.9***	**45.3***
GR143	Roadside	Diffusion tube	-	-	**44.1***	**43.6***
GR145	Roadside	Diffusion tube	-	-	39.8*	36.0*
ACHL	Roadside	Diffusion tube	-	35.8	32.7	-
AVHS	Roadside	Diffusion tube	37.3	35.2	35.6	-
AVSL	Roadside	Diffusion tube	**41.01**	**42.0**	**40.7**	-
CC	Intermediate	Diffusion tube	-	22.8	25.6	-
CR	Intermediate	Diffusion tube	32.6	31.8	30.9	-
DR	Roadside	Diffusion tube	30.1	28.0	26.4	-
ER	Roadside	Diffusion tube	**51.8**	**49.7**	**49.7**	-
ERFA	Roadside	Diffusion tube	-	33.8	32.4	-
ERFB	Roadside	Diffusion tube	-	34.5	31.4	-
ERTM	Roadside	Diffusion tube	-	35.5	37.5	-
FRC	Intermediate	Diffusion tube	33.2	31.8	30.6	-
GRPL	Intermediate	Diffusion tube	-	33.0	32.5	-
HD	Roadside	Diffusion tube	-	34.9	32.7	-
HL	Roadside	Diffusion tube	33.9	34.3	33.7	-
HR	Roadside	Diffusion tube	31.5	32.1	30.3	-
IBIS	Urban Background	Diffusion tube	**49.1**	**46.4**	**45.3**	-
JC	Urban Background	Diffusion tube	**48.6**	**46.7**	**49.5**	-
JRP	Urban Background	Diffusion tube	27.6	25.3	26.4	-
LRARN	Roadside	Diffusion tube	32.0	33.2	31.4	-
LRARMN	Roadside	Diffusion tube	**45.6**	**40.9**	39.6	-
LRARMS	Roadside	Diffusion tube	**43.6**	39.2	37.5	-

LRARS	Roadside	Diffusion tube	31.1	30.7	25.8	-
LRSS	Roadside	Diffusion tube	39.6	**41.9**	39.2	-
LRG	Roadside	Diffusion tube	38.9	38.3	36.2	-
LT	Roadside	Diffusion tube	**53.7**	**56.0**	**54.7**	-
LYD	Urban Background	Diffusion tube	30.8	31.4	29.9	-
NAS1	Roadside	Diffusion tube	33.5	32.9	32.9	-
NAS2	Roadside	Diffusion tube	**56.0**	**52.6**	**51.3**	-
NC	Intermediate	Diffusion tube	-	36.5	33.8	-
PBP	Roadside	Diffusion tube	37.8	36.8	33.1	-
PBPA	Roadside	Diffusion tube	37.8	36.8	33.0	-
PIH	Intermediate	Diffusion tube	-	32 .0	35.14	-
PRS	Roadside	Diffusion tube	35	31.5	34.4	-
PS	Urban Background	Diffusion tube	25.7	26.1	25.4	-
SRG	Roadside	Diffusion tube	30.9	28.7	29.6	-
THA	Urban Background	Diffusion tube		30.8	34.3	-
THB	Urban Background	Diffusion tube		30.2	35.7	-
TILA	Roadside	Diffusion tube	**40.8**	**40.9**	38.0	-
TILB	Roadside	Diffusion tube	39.7	37.6	**42.4**	-
TILC	Roadside	Diffusion tube	39.0	**40.2**	37.8	-
TILD	Roadside	Diffusion tube	36.9	36.3	35.0	-
TK1	Urban Background	Automatic	27.9	28.2	24.8	-
TL	Roadside	Diffusion tube	35.7	35.0	32.9	-
TSR	Urban Background	Diffusion tube	28.0	28.4	26.8	-
WES	Roadside	Diffusion tube	31.8	30.0	29.5	-
WC	Roadside	Diffusion tube	**50.18**	**40.1**	**41.08**	-
WCFA	Intermediate	Diffusion tube	-	31.0	32.7	-
WT	Roadside	Diffusion tube	**41.1**	39.1	38.2	-

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

Table 16.21: Nearby PM10 monitoring results (2016-2019)

Site ID	Site type	Monitoring type	Annual mean PM10 concentration (µg/m³)			
			2016	2017	2018	2019
ZR1	Roadside	Automatic	33	25	27	32
ZR2/ZR3	Roadside	Automatic	27	28	32	28
Gravesham A2	Roadside	Automatic	19	17	15	15
TK1	Urban Background	Automatic	17.3	18.1	18.9	-

Background air quality

~~16.124~~16.128 The Defra website includes estimated background air pollution data for NO_x, NO_2 PM_{10}, and $PM_{2.5}$ for each 1km by 1km OS grid square. Background pollutant concentrations are modelled from the reference year of 2017 based on ambient monitoring and meteorological data and includes projections for future years up to 2030.

~~16.125~~16.129 Predicted background concentrations for 2018 across the study area are presented

in Figure 16.12, 16.13, 16.14 and 16.15.

~~16.126~~16.130 Nitrogen deposition rates have been obtained from the APIS website for the identified ecological receptors and are presented in Table 16.23.

Human receptors

~~16.127~~16.131 Existing human receptors located within the study area are presented in Appendix 16.1 and Figure 16.16, 16.17 and 16.18. All human receptors have been modelled at 1.5m, as a worst-case assumption, to represent average breathing height.

Ecological receptors

~~16.128~~16.132 Ecological receptors located within the study area, along with relevant critical loads and existing nitrogen deposition rates are presented in Table 16.22 and Figure 16.2. Where sites contain more than one habitat, the habitat of highest sensitivity to nutrient nitrogen deposition is presented (i.e. the habitat with the lowest minimum critical load).

Table 16.22: Ecological receptors

Ecological Receptor Name	Designation	Habitat (most sensitive)	Within 200m of road exceeding 1,000 AADT?	Within 2km (national and local designated) / 10km (international/ European designated) of point source?	Nitrogen Deposition (kgN/ha/yr)	Critical Load (kg n / ha / yr) min-max	Acid Dep as Nitrogen (keq / Ha / yr)	Critical Load (keq / ha / yr) min - max
Botany marshes	Local Wildlife Site	Fen, Marsh, Swamp	N	Y	15.4	10-15	N/A	N/A
Alkerden Lane, Swanscombe	Local Wildlife Site	Broadleaved, Mixed and Yew Woodland	N	Y	27.3	10-20	1.8	0.142-8.408
Ebbsfleet Marsh	Local Wildlife Site	Fen, Marsh, Swamp	N	Y	15.4	10-15	N/A	N/A

Ecological Receptor Name	Designation	Habitat (most sensitive)	Within 200m of road exceeding 1,000 AADT?	Within 2km (national and local designated) / 10km (international/ European designated) of point source?	Nitrogen Deposition (kgN/ha/yr)	Critical Load (kg n / ha / yr) min-max	Acid Dep as Nitrogen (keq / Ha / yr)	Critical Load (keq / ha / yr) min - max
Thames Estuary and Marshes	SPA/RAMSAR	Fen, Marsh and Swamp	N	Y	14.6	15-30	N/A	N/A
Cobham Hall Wood	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	27.2	10-20	1.9	0.357-2.929
Coombegreen Wood	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	28.7	10-20	2.0	0.357-2.923
Darenth Wood	SSSI/Ancient Woodland	Broad-leaved, mixed and yew woodland - acidophilous Quercus-dominated woodland.	Y	N	27.3	10-15	1.8	0.142-1.344
Disused Hospital	Local Wildlife Site	Calcareous grassland	Y	N	16.0	15-25	1.1	0.856-4.856
Hangmans Wood	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	29.3	10-20	2.0	0.142-1.74
Hobbs Hole	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	27.2	10-20	1.9	0.357-2.929
Jackson Wood	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	28.7	10-20	2.0	0.357-2.923

Ecological Receptor Name	Designation	Habitat (most sensitive)	Within 200m of road exceeding 1,000 AADT?	Within 2km (national and local designated) / 10km (international/ European designated) of point source?	Nitrogen Deposition (kgN/ha/yr)	Critical Load (kg n / ha / yr) min-max	Acid Dep as Nitrogen (keq / Ha / yr)	Critical Load (keq / ha / yr) min - max
Chadwell Wood	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	26.5	10-20	1.8	0.142-1.74
Oakwood	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	29.3	10-20	2.0	0.357-2.055
Parkhill Wood	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	27.3	10-20	1.8	0.142-1.338
Rams Wood	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	29.4	10-20	1.9	0.142-8.759
Ebbsfleet Marsh	Local Wildlife Site	Fen, Marsh and Swamp	Y	Y	15.4	15-30	1.1	N/A
The Thrift	Ancient Woodland	Broad-leaved, mixed and yew woodland	Y	N	27.3	10-20	1.8	0.142-1.338
Swanscombe Peninsula	SSSI	Fen, Marsh, Swamp	N	Y	15.4	10-15	N/A	N/A

LIKELY SIGNIFICANT ENVIRONMENTAL EFFECTS OF THE PROPOSAL

Construction dust and emissions

~~16.129~~16.133 The main 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') are dust deposition and elevated particulate matter concentrations. The following activities will have the potential to lead to air quality effects:

- Site preparation and clearance works, including demolition of existing structures, enabling works, installation of fencing and barriers around the Kent and Essex sites, vegetation clearance and excavation, and land remediation/management;

- Earthworks, including topsoil and subsoil stripping and storage, bulk earthworks and deep excavations;

- Main construction works, including construction of onsite structures and buildings, including office buildings, waste and recycling facilities, site infrastructure and advance landscape/planting works;

- Construction traffic and the transport of materials to and from the Kent and Essex sites.

~~16.130~~16.134 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 entrances. Surrounding receptors sensitive to construction impacts are presented in Figure 16.19.

~~16.131~~16.135 An overview of the potential dust emission magnitude, area sensitivity and risk of dust impacts is detailed below.

Dust emission magnitude

Demolition

~~16.132~~16.136 A number of existing buildings and hard standing will be demolished from the Kent Site. It is estimated that approximately 69,085m^3 of materials will be demolished on the Kent Site, therefore the dust emission magnitude for demolition will be large.

Earthworks

~~16.133~~16.137 Proposed earthworks will include topsoil and subsoil stripping and storage, bulk earthworks and deep excavations. In line with the contaminated land management strategy (Doc ref: 6.2.18.9), current preliminary estimates indicate that substantial volumes of earthworks (some 860,000m^3 of cut and 490,000m^3 of fill) will be required for the construction of the Proposed Development. The dust emission magnitude for earthworks will therefore be large.

Construction

~~16.134~~16.138 Whilst pre-manufactured modularised construction methods will be used where possible, owing to the use of an onsite concrete batching plant, and the overall scale of construction proposed, the dust emission magnitude for construction will be large.

Trackout

~~16.135~~16.139 Whilst it is currently envisioned that at least 80% of construction materials will be transported by river, it is estimated that there will be approximately 67 outward HGV movements per day. The dust emission magnitude for trackout will therefore be large.

Sensitivity of the area

~~16.136~~16.140 The Proposed Development is located over a wide area, with a range of surrounding receptors within 350m of the Kent and Essex sites. Surrounding receptors include residential properties, schools, industrial areas, nationally and locally designated ecological sites, non-designated ecological sites, cultural heritage assets including listed building and scheduled monuments. An overview of surrounding sensitive receptors is presented in Figure 16.19.

~~16.137~~16.141 Owing to the number and proximity of surrounding sensitive receptors, the surrounding area is determined to be of high sensitivity.

Risk of dust impacts (without mitigation)

~~16.138~~16.142 An overview of the risk of dust impacts, taking into account dust emission magnitude and area sensitivity is presented in Table 16.23. The risk of dust impact is anticipated to be high risk for all activities.

Table 16.23: Risk of construction dust impact

Activity	Dust Emission Magnitude	Area sensitivity	Risk of dust impact
Demolition	Large	High	High Risk
Earthworks	Large		High Risk
Construction	Large		High Risk
Trackout	Large		High Risk

Construction traffic emissions

~~16.139~~16.143 The impact of emissions from construction traffic generated during the peak construction year (2023) has been assessed at a number of existing and cumulative scheme human receptors and results are presented in Appendix 16.3. Based on the assumption that there is no change in existing background air quality conditions, annual mean concentrations of NO_2 exceed the air quality objective at 25 of 118 modelled. Concentrations of PM_{10} and $PM_{2.5}$ meet their relevant objectives at all modelled receptors. The impact from construction traffic emissions is predicted to be negligible at all modelled receptor locations.

Operational impact assessment

~~16.140~~16.144 In order to consider the operational impact associated with the proposed development, the impact from both traffic emissions and energy centre emissions has been considered at surrounding human and ecological receptors. Owing to the distance between modelled receptors and the proposed energy centre and the very small maximum process contribution from energy centre emissions (see paragraph 16.150), results from the traffic and energy centre modelling have only been combined in the immediate vicinity of the point source, at proposed onsite receptors. Predicted concentrations at these onsite receptors therefore include the contribution from both traffic and energy centre emissions.

Human receptors

~~16.141~~16.145 The impact of emissions from operational road traffic generated by the development has been assessed at existing, proposed and cumulative scheme human receptor locations, with predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ for each assessment scenario presented in Appendix 16.3.

~~16.142~~16.146 For the 2024 assessment scenario, based on the assumption that there is no change in existing background air quality conditions, annual mean NO_2 concentrations are predicted to exceed the air quality objective at 20 of 165 modelled receptors. Concentrations of PM_{10} and $PM_{2.5}$ meet their relevant objectives at all modelled receptors. Results indicate that there is predicted to be a moderate adverse impact at one human receptor (R80) for the 2024 assessment scenario for annual mean NO_2. This impact is predicted on the assumption that there is no improvement in existing background air quality conditions. Utilising Defra's projected background concentrations would reduce the predicted impact at this receptor location to negligible. All other modelled receptors are predicted to experience a negligible impact during this assessment scenario.

~~16.143~~16.147 For the 2028 assessment scenario, based on the assumption that there is no change in existing background air quality conditions, annual mean NO_2 concentrations are predicted to exceed the air quality objective at 6 of 165 modelled receptors. Concentrations of PM_{10} and $PM_{2.5}$ meet their relevant objectives at all modelled receptors. The impact from traffic emissions for the 2028 assessment year is predicted to be negligible at all modelled receptor locations.

~~16.144~~16.148 For the 2038 assessment scenario, based on the assumption that there is no change in existing background air quality conditions, annual mean NO_2 concentrations are predicted to exceed the air quality objective at 3 of 165 modelled receptors. Concentrations of PM_{10} and $PM_{2.5}$ meet their relevant objectives at all modelled receptors. The impact from traffic emissions for the 2028 assessment year is predicted to be negligible at all modelled receptor locations.

~~16.145~~16.149 With regards to onsite receptors, all proposed receptors are predicted to meet all relevant air quality objectives, taking into account both traffic and energy centre emissions. The maximum annual mean NO_2 contribution from energy centre emissions at

proposed onsite receptors is 0.03µg/m^3, which represents a negligible impact.

~~16.146~~16.150 With regards to the impact of energy centre emissions the maximum PC and PEC to long term and short term NO_2 concentrations is presented in Table 16.24. As the maximum long term PC is below 1% of the annual mean air quality objective, and the maximum short term PC is below 10% of the hourly mean objective, the impact from energy centre emissions can be ruled insignificant. Contour maps showing the predicted impact on long term and short term NO_2 are presented in Appendix 16.4.

Table 16.24: Maximum PC and PEC from energy centre emissions for long term and short term NO^2

Maximum Annual mean NO_2 (µg/m^3) (560815, 174903)			Maximum 99.79th percentile NO_2 (µg/m^3) (560795, 174933)		
PC	Background Concentration	PEC	PC	Background Concentration	PEC
0.3	19.2	19.5	17.7	38.3	56.0

Ecological receptors

~~16.147~~16.151 The impact of emissions from road traffic and energy centre emissions has been predicted at designated nature conservation sites (ecological receptors) for comparison with the critical level for ambient NOx, and critical loads for nutrient nitrogen and acid deposition. The maximum impact as percentages of the critical level and critical loads at each ecological site are presented in Appendix 16.5.

~~16.148~~16.152 In terms of the critical load for acid deposition, the contribution from the Proposed Development is predicted to be less than 1% of the minimum critical load at all ecological sites sensitive to acid deposition, and therefore the impact on acid deposition can be ruled insignificant.

~~16.149~~16.153 In terms of the critical load for nutrient nitrogen deposition, the contribution from the Proposed Development is predicted to exceed 1% of the minimum critical load at the following ecological sites:

- Swanscombe Peninsula
- Coombegreen Wood
- Darenth Wood
- Parkhill Wood
- Ebbsfleet Marsh
- The Thrift

~~16.150~~16.154 These exceedances are owing to traffic emissions, and therefore in order to determine the extent of the exceedance of 1% of the minimum nutrient nitrogen critical load, nitrogen deposition has been predicted at 10m transects at these sites and are presented in Figures 16.20 – 16.24. It should be noted that the PEC exceeds the minimum

critical load both with and without the development in place.

~~16.151~~16.155 For the ambient NOx critical level, the contribution from the proposed development is predicted to exceed 1% of the critical level at the following ecological sites:

- Swanscombe Peninsula
- Ebbsfleet Marsh
- Darenth Wood
- The Thrift
- Coombegreen Wood
- Parkhill Wood
- Rams Wood
- Disused Hospital
- Cobham Hall Wood
- Hobbs Hole
- Jackson Wood

~~16.152~~16.156 For these sites that exceed 1% of the critical level, the PEC exceeds the critical level both with and without the development in place. In line with IAQM guidance, details of these exceedances to the 1% critical load and critical level threshold has been provided to the project ecologist in order to determine the impact on the integrity of the habitat at each site.

EU compliance assessment

~~16.153~~16.157 In order to comply with the NPS NN, it is necessary to consider whether the development would affect the UK's ability to comply with the Air Quality Directive by carrying out an EU compliance risk assessment. The need for an EU compliance risk assessment requires information from Defra's Pollution Climate Mapping (PCM) model which includes roads that are modelled by Defra to report compliance with the EU Air Quality Directive. Once the PCM model has been obtained, the road links lying within the affected road network for the project will be identified. It is very likely that several roads included in in the PCM model will coincide with the affected road network and a compliance assessment will therefore be required.

~~16.154~~16.158 The EU compliance risk assessment considers the air quality impacts on areas that have qualifying features that meet Defra's interpretation of the EU Air Quality Directive, which include public access (e.g. footpath) and sensitive receptors (e.g. residential properties, schools, hospitals) that are within 15m of the running lane / kerbside, but are not within 25m of a junction. Predicted modelled NO_2 concentrations at areas that have qualifying features will need to be validated against the PCM model outputs.

~~16.155~~16.159 Initial modelling results at sensitive receptors indicate that the impact of the project is negligible. Once the data in Defra's PCM model has been considered we will seek to complete the EU compliance assessment and confirm compliance with the EU Air Quality Directive.

Vessel emissions risk assessment

~~16.156~~16.160 In line with the Navigational Risk Assessment (NRA), the following assumptions have been made with regards to anticipated vessel movements for logistics and passenger ferries:

- 10 no of barge movements per day during the construction phase. It is noted that during the operational phase the number of barge movements is anticipated to reduce.
- 27 no of passenger vessel movements per day between upstream and London Resort (extension of existing route)
- 42 no of passenger vessel movements per day between London Resort and Tilbury (new shuttle service)

~~16.157~~16.161 The locations of proposed jetties in relation to onsite and offsite sensitive receptor locations is presented in Figure 16.25.

~~16.158~~16.162 In line with the NRA, it is assumed that there will be 2,000 barge movements per year during construction. An approximate estimate for the percentage increase of freight movements is based on the assumed vessel movements identified in the NRA ranging between 20,000 to 30,000 per year. As such, the percentage increase per year would range between 7 – 10% increase per year during the construction phase, which will reduce during operational phase.

~~16.159~~16.163 The Port of London Authority Air Quality Strategy[23] includes details of a dispersion modelling study quantifying the impact of emissions from Tier II engine vessels at sensitive receptor locations adjacent to the River Thames. This study makes the assumption that receptors are located 90m from the vessel, due to the width of the river along a typical vessel journey. The modelling study predicted an annual mean NOx contribution at the point of exposure of 0.08µg/m^3. Assuming a 100% conversion to NO_2, this represents approximately 0.2% of the AQO for NO_2.

~~16.160~~16.164 In line with the NRA, there is predicted to be an increase in vessel movements of up to 10% resulting from the Proposed Development. It is therefore anticipated that the increase in vessel emissions resulting from the proposed development would lead to an increase in concentrations of approximately 0.008µg/m^3, which represents a negligible impact. It should be noted that this is on the basis of receptors being located 90m from the emission source, however owing to the width of the river in the vicinity of the proposed development, this is likely to be a worst-case assumption. On this basis, it is therefore concluded that emissions from vessel movements generated by the proposed development will not be significant.

Odour impact risk assessment

~~16.161~~16.165 The Proposed Development includes provision for a waste water treatment works (WWTW) which will have the potential to give rise to odour emissions once operational.

[23] Port of London Authority *Air Quality Strategy* 2018

The proposed location for the WWTW is adjacent to an existing leachate treatment plant (see Figure 16.26), and the WWTW has been sited so as to ensure the risk of any odour impact is minimised.

~~16.162~~16.166 Whilst the design of the WWTW is yet to be finalised, it is anticipated that standard measures of odour control will be implemented such as:

- good housekeeping and raw material handling practices;
- control and minimisation of odours from residual materials and waste;
- maintaining effluent aeration other than in processes which are specifically anaerobic;
- avoiding anaerobic conditions;
- minimising septicity; and
- selecting process steps that present least risk of odour.

~~16.163~~16.167 In order to determine the potential for odour effects to occur, consideration has been given to the source-pathway-receptor concept, taking into account the odour potential of the source and the pathway effectiveness in order to determine the risk of odour impact, and then considering the sensitivity of existing and proposed receptors in the vicinity of the WWTW along with the risk of odour impact to determine the magnitude of odour effect at each receptor.

~~16.164~~16.168 In line with IAQM odour guidance, as the WWTW will be relatively small and there will be effective mitigation in place it is anticipated that the WWTW will have a medium odour potential.

~~16.165~~16.169 The nearest existing sensitive receptors in the vicinity of the WWTW include a residential block and nursery located approximately 1,100 metres to the north east (downwind) of the WWTW, in Thurrock. Owing to this distance, it is anticipated that the pathway will be ineffective, and therefore the risk of odour impact is expected to be of negligible risk at these receptors.

~~16.166~~16.170 The existing receptors will be of high sensitivity to odour impacts, and therefore taking into account the risk of odour impact, the magnitude of odour effect at these existing receptors is likely to be negligible.

~~16.167~~16.171 The nearest onsite receptor locations (where visitors will have access to) are located approximately 420m south west (upwind) of the WWTW. Owing to this distance and the direction of the prevailing south-westerly wind, it is anticipated that the pathway will be in effective, and therefore the risk of odour impact is expected to be low risk.

~~16.168~~16.172 Onsite receptors (resort visitors) are considered to be of high sensitivity to odour impacts as they are expected to enjoy a high level of amenity; and therefore taking into account the risk of odour impact, the magnitude of odour effect at the proposed receptor locations is likely to be slight adverse.

~~16.169~~16.173 It can therefore be concluded that the proposed WWTW would be unlikely to give rise to significant odour effects with the implementation of standard odour control

mitigation measures.

PROPOSED MITIGATION

Construction

~~16.170~~16.174 Following the 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.
- 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 detailed in the IAQM construction guidance document. The DMP should include monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections.

Site management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. Make the complaints log available to the local authority when asked
- Record any exceptional incidents that cause dust and 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

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the relevant local authorities 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. Baseline monitoring should commence 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.

- Fully 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.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel for construction workers (public transport, cycling, walking, and car-sharing).

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

- No bonfires or any burning of waste materials.

Demolition

- Soft strip inside buildings before demolition (retaining walls and windows in the rest

of the building where possible, to provide a screen against dust.

- Ensure effective water suppression is used during demolition operations. 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).

Construction traffic

~~16.171~~16.175 No significant impacts have been identified in terms of construction traffic, therefore no further mitigation measures deemed necessary.

Operation

Traffic and energy centre emissions

~~16.172~~16.176 No significant impacts have been identified on existing or proposed human receptors as a result of traffic and energy centre emissions during the operation of the Proposed Development, therefore no mitigation measures are required.

~~16.173~~16.177 With regards to designated nature sites, the need for mitigation will be determined following the ecologist's judgement on whether there is a likely significant impact on the integrity of a habitat, as a result of the predicted ambient NOx and nitrogen deposition.

Odour

~~16.174~~16.178 A potential slight adverse impact has been identified at onsite receptors owing to odour emissions, whilst this is not considered significant in terms of EIA, it is recommended that standard odour abatement measures are incorporated into the design of the WWTW in order to ensure a satisfactory level of amenity for onsite occupants.

Vessel emissions

~~16.175~~16.179 No significant effects have been identified in terms of vessel emissions, and therefore no mitigation measures are required.

RESIDUAL ENVIRONMENTAL EFFECTS

Construction

~~16.176~~16.180 With implementation of recommended construction mitigation measures, to be secured through the construction environmental management plan (CEMP) it is anticipated that residual effects will be insignificant.

Operation

~~16.177~~16.181 With regards to human receptors, as no significant effects have been identified during the Proposed Development's operation, the residual effects can be ruled insignificant. With regards to effects on designated nature sites, the need for mitigation

and any subsequent residual effects will be determined following judgement by the ecologist on the impact on the integrity of the habitat at sites were a significant impact cannot be ruled out.

CUMULATIVE AND IN-COMBINATION EFFECTS

Construction

~~16.178~~16.182 IAQM guidance indicates that with appropriate mitigation measures in place, the impact from construction dust will be not significant. Guidance also suggests that cumulative effects may occur from sites within 500m of one another. In line with proposed mitigation measures, the contractor should hold regular liaison meetings with other high-risk construction sites within 500m of the Site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.

~~16.179~~16.183 It is assumed that an appropriate assessment of potential construction effects will have been carried out at cumulative schemes and necessary mitigation will have been identified. Mitigation for this Proposed Development will therefore compliment the mitigation identified for the other cumulative developments and ensure overall impacts are negligible.

~~16.180~~16.184 Any residual cumulative impacts should be mitigated through open communication with nearby construction sites, a recommended measure within the mitigation measures sections.

Operation

~~16.181~~16.185 As all cumulative schemes have been included within the traffic data for the Proposed Development, the cumulative effects during operation is considered inherently within the assessment.

~~16.182~~16.186 The potential for in-combination effects has been considered at designated European sites, the only European site within 200m of the road network is Thames Estuary and Marshes SPA/Ramsar, which is located adjacent to the proposed Lower Thames Crossing. This crossing is currently in the process of being designed and therefore owing to the introduction of such a significant highways scheme, will need to be assessed under appropriate assessment, taking into account the detailed scheme design and ventilation shafts. However, as the increase in traffic resulting from the proposed London Resort development on this road link is predicted to be 30 AADT (well below the 1,000 AADT DMRB criteria), any air quality impacts can be ruled insignificant at this site.

CLIMATE CHANGE

~~16.183~~16.187 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 during the construction phase. However, based on the anticipated peak construction year of 2023, it is considered that the assessment carried out will remain fit for purpose and mitigation measures proposed for a high-risk site would ensure no significant impacts occur.

~~16.184~~16.188 Climate change may affect the need for heating and cooling within the Proposed Development, demand for which would be met predominantly by the proposed heat pumps, and therefore would not be likely to lead to a change in combustion plant emissions that have been considered within this assessment, therefore no significant effects would be expected.

SUMMARY AND CONCLUSIONS

~~16.185~~16.189 In order to determine the potential impact of the Proposed Development on air quality, the following has been considered:

- Dust and particulate matter emissions (PM_{10}/$PM_{2.5}$) from plant and equipment used during the construction phase;
- NOx and PM_{10} and $PM_{2.5}$ emissions from road traffic generated during the construction and operational phases;
- NOx emissions from combustion plant associated with the Proposed Development;
- Emissions from river traffic and vessel movements generated during the construction and operational phases; and
- Odour emissions from the waste water treatment plant.

~~16.186~~16.190 With regards to construction dust, a construction dust risk assessment has been carried out which has determined that the Proposed Development represents a high risk in terms of the potential impact. Best practice mitigation measures have therefore been recommended for implementation, based on this level of risk to ensure that emissions during construction are minimised, any residual effects would be insignificant.

~~16.187~~16.191 The impact from construction road traffic emissions generated during the peak construction year has been assessed using dispersion modelling software to predict the impact at surrounding sensitive receptors in the vicinity of roads predicted to experience a change in traffic flows resulting from the construction of the proposed development. The impact of construction traffic emissions is predicted to be negligible at all considered receptors.

~~16.188~~16.192 The impact of operational road traffic generated by the proposed development has been predicted using dispersion modelling for a number of assessment years. Using the worst case assumption that there is no change in existing background air quality conditions, one receptor location is predicted to experience a moderate adverse impact owing to operational traffic generated by the Proposed Development for the 2024

assessment scenario. Should background air quality conditions improve in line with Defra's projections, the predicted impact at this receptor would be negligible. The impact at all remaining receptors for all assessment years is predicted to be negligible, using the worst case assumption that there is no change in existing background air quality conditions.

~~16.189~~16.193 The impact from emissions associated with the proposed energy centre has been predicted using dispersion modelling, and owing to the predominantly emission free heating strategy which utilises heat pumps, the contribution from energy centre emissions is shown to be very small and can be ruled insignificant in line with Environment Agency guidance.

~~16.190~~16.194 The impact from traffic and energy centre emissions has also been predicted at designated nature conservation sites in order to determine the potential impact in terms of nitrogen and acid deposition (critical loads) and ambient NOx concentrations (critical level). For energy centre emissions, the contribution at all designated sites is predicted to be below 1% of both the critical loads and critical level and can therefore be ruled insignificant. A number of sites exceed the 1% threshold for critical load of nitrogen deposition and critical level of ambient NO_x concentrations, and therefore the impact on the integrity of the habitat is discussed in the ecology chapter.

~~16.191~~16.195 In order to determine the potential for odour effects to occur from the proposed WWTW, a qualitative assessment of odour emissions has been carried out, which has identified a potential slight adverse impact at proposed onsite receptors. Odour effects at offsite receptors are predicted to be negligible. With the adoption of standard odour mitigation techniques for the WWTW, no significant effects are expected.

~~16.192~~16.196 The potential effects from vessel emissions associated with the proposed development has been assessed qualitatively, taking into account the likely increase in vessel movements associated with the development and locations of proposed jetties. Owing to the distance between source and receptor, the impact from vessel emissions is deemed to be negligible and therefore not significant.

LIST OF APPENDICES

- Appendix 16.1 - Receptor locations
- Appendix 16.2 - Verification graphs showing modelled NOx concentrations against monitored NOx concentrations
- Appendix 16.3 - Modelling results (Human Receptors)
- Appendix 16.4 - Contour maps of long term and short-term impact on NO2 from energy centre emissions
- Appendix 16.5 - Modelling results (Ecological Receptors)