Riverside Energy Park

Environmental Statement

Chapter 7: Air Quality

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7 Air Quality

7.1 Introduction

7.1.1 This Chapter presents the findings of the assessment of the likely significant effects of the Proposed Development with respect to air quality. The purpose of this Chapter is to describe and evaluate the likely air quality impacts of the Proposed Development considering relevant national, regional and local guidance and regulations as well as relevant European Union (EU) guidance and directives.

7.1.2 This Chapter has been prepared by Peter Brett Associates LLP (PBA). In accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the Infrastructure EIA Regulations 2017), a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this Environmental Statement is provided in **Appendix A.2.**

7.1.3 REP will have potential implications for local air quality principally from the flue gases emitted through the combustion processes from the Energy Recovery Facility (ERF) and Anaerobic Digestion facility. Furthermore, there will be emissions associated with the construction and demolition phases of the Proposed Development and the transport of materials to and from the REP site by river and road during both construction and operational phases.

7.2 Legislation, Policy, Guidance and Standards

Legislation

7.2.1 Ambient air quality is regulated through European Directives that set limit values on the concentrations of key pollutants. The most recent of these is the Air Quality Directive 2008/50/EC on cleaner air for Europe. This sets air quality 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. The Ambient Air Directive (AAD) Limit Values are for sulphur dioxide (SO_2), nitrogen dioxide (NO_2), oxides of nitrogen (NO_x), particulate matter (PM_{10} and $PM_{2.5}$), lead (Pb), benzene (C_6H_6), and carbon monoxide (CO) are listed below in **Table 7.1**.

7.2.2 The Air Quality Standards Regulations 2010 (Statutory Instrument, 2010, No.1001) (hereafter referred to as the Air Quality Regulations) implement the requirements of Directive 2008/50/EC. The Air Quality Regulations limit values are numerically the same as the National Air Quality Objective (NAQO) values but differ in terms of compliance dates, locations where they apply and the legal responsibility for ensuring that they are complied with.

7.2.3 The AAD limit values are applicable at all locations except:

- 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.

7.2.4 Target values have been set out in the same way as limit values. They should be attained where possible by taking all necessary measures not entailing disproportionate costs. If emissions are significant in relation to these standards, additional mitigation is required, for example by carrying out a cost benefit analysis.

Terrestrial Biodiversity Sites

7.2.5 European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) requires member states to introduce a range of measures for the protection of habitats and species. The Conservation of Habitats and Species Regulations 2017 (Statutory Instrument, 2017, 1012) (the Habitats Regulations), transposes the Directive into law in England and Wales. Special Areas of Conservation (SACs) are designated under these regulations, as are Special Protection Areas (SPAs); with these classified under the Council Directive 2009/147/EC on the Conservation of Wild Birds. These Sites form a network termed 'Natura 2000'.

7.2.6 The Habitats Regulations primarily provide measures for the protection of European Sites and European Protected Species, but also require local planning authorities to encourage the management of other features that are of major importance for wild flora and fauna.

7.2.7 The Habitats Regulations require the Competent Authority, which in this case will be the Secretary of State, to evaluate whether the development is likely to give rise to a significant effect on a European Site. Where this is the case, the Competent Authority has to carry out an 'appropriate assessment' in order to determine whether the development will adversely affect the integrity of a European Site.

7.2.8 Sites of national nature and geological conservation importance may be designated as Sites of Special Scientific Interest (SSSIs). SSSIs have been re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs (in England and Wales) were introduced by the Countryside and Rights of Way (CROW) Act 2000. If a development is *"likely to damage"* a SSSI, the CROW Act requires that a relevant conservation body (i.e. Natural England) is consulted. The CROW Act also provides protection to local nature conservation sites, which can be particularly important in providing 'stepping stones' or 'buffers' to SSSIs and

European Sites. In addition, the Environment Act (1995) and the Natural Environment and Rural Communities Act (2006) both require the conservation of biodiversity.

Industrial Emissions Directive

7.2.9 Control of industrial emissions from large scale industrial plant is governed by the Industrial Emissions Directive (2010/75/EU) (IED). In England and Wales, the requirements of IED were transposed into legislation by The Environmental Permitting (England and Wales) (Amendment) Regulations 2013 which came into force on the 27 February 2013.

7.2.10 The IED incorporated the requirements of seven previous directives, including the Waste Incineration Directive (WIncD) (2000/76/EC). The design and operation of all thermal treatment plants must ensure compliance with Emission Limit Values (ELVs) set out in the IED. The ELVs applicable to the ERF that forms part of the Proposed Development are shown in **Table 7.1**.

Table 7.1: IED Emission Limit Values (mg/Nm^3)

Substance	Daily Mean Emissions[a] (mg/Nm^3)	Half-hourly Mean Emissions[a]	
		100^{th} percentile	97^{th} percentile
Total dust (Particles)	10	30	10
Nitrogen Oxides (NO and NO_2)	200	400	200
Sulphur Dioxide	50	200	50
Carbon Monoxide	50	100 [b]	150 [c]
Hydrogen Fluoride	1	4	2
Hydrogen Chloride	10	60	10
Total Organic Carbon (TOC)	10	20	10
Group I metals – Cd and Tl [(d)]	0.05	-	-

Substance	Daily Mean Emissions[(a)] (mg/Nm^3)	Half-hourly Mean Emissions[(a)]	
		100th percentile	97th percentile
Group II metals – Hg [(d) (e)]	0.05	-	-
Group III metals – Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V [(d)]	0.50	-	-
Dioxins and Furans [(f)]	0.1 ng I-TEQ/Nm^3	-	-

a. Emissions are mg/Nm^3. Normalised to 273 K, 101.3 kPa, dry, and 11% O_2
b. 100th percentile of half-hourly average concentrations in any 24-hour period
c. 95th percentile of ten-minute average CO concentrations
d. Average over a sample period between 30 minutes and a maximum of 8 hours
e. Average over a sampling period of 6 to 8 hours and calculated by multiplying with their toxic equivalence factor

Draft Waste Incineration Directive BAT Reference Document (BREF)

7.2.11 A draft Waste Incineration Directive BREF has been published (European Parliament, 2017). This document sets out current Best Available Techniques (BAT) for reducing pollution from waste incineration plants and includes a number of BAT-AELs (Best Available Techniques - Air Emission Limits). Once finalised, the BAT-AELs would need to be incorporated into the Environmental Permit for the Proposed Development to be issued by the Environment Agency (EA). The relevant BAT–AELs for new plant are set out in the **Table 7.2**, below. Although this document is currently in draft form, given the timeline for the Proposed Development, it is likely that these revised limits will be in place prior to the ERF coming into operation. The assessment of emissions from the ERF has therefore been based on these BAT-AELs where they are lower than the IED emission limits. In order to be conservative, the upper range of the BAT-AEL has been used.

Table 7.2: Best Available Techniques – Air Emission Levels (mg/Nm^3)

Substance	Daily Mean Emissions [(a)] (mg/Nm^3)	Half-hourly Mean Emissions [(a)] (mg/Nm^3)
Total dust (Particles)	2 – 5	30
Nitrogen Oxides (NO and NO_2)	50 – 120	400

Substance	Daily Mean Emissions [(a)] (mg/Nm^3)	Half-hourly Mean Emissions [(a)] (mg/Nm^3)
Sulphur Dioxide	10 – 30	200
Carbon Monoxide	10 – 50	150
Hydrogen Fluoride	< 1	4
Hydrogen Chloride	2 – 6	60
Total Volatile Organic Carbon (TVOC)	3 – 10	20
Cadmium and Thallium	0.01 – 0.02	-
Mercury	0.005 – 0.02	0.035[c]
Other metals [b]	0.05 – 0.3	-
Dioxins and Furans	< 0.01 – 0.06 ng WHO-TEQ/Nm^3	-
Ammonia	10	-
Benzo(a)pyrene (PaHs)	0.21[d] µg/m^3	-

a. Emissions are mg/Nm^3. Normalised to 273 K, 101.3 kPa, dry, and 11% O_2
b. The lower range is appropriate where Selective Catalytic Reduction is used and the upper range is appropriate where Selective Non-Catalytic Reduction is used. Other metals consist of antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni) and vanadium (V). The highest recorded emission concentration of B[a]P from the EA's public register was 0.105 ug/m^3, or 0.000105 mg/m^3 (dry, 11% oxygen, 273K).
c. Taken from BREF
d. This has been multiplied by a safety factor of two (i.e. to give 0.21 ug/m^3), which is assumed to be the emission concentration for the Proposed Development.

7.2.12 In both **Table 7.1** and **7.2** there are daily and half-hourly mean emission limit values. The daily mean emission limits set the emissions that will occur for the majority of the time and have therefore been used for the assessment of the impacts of emissions from ERF. There will however, be short periods where the emissions could be higher over a half-hourly period, albeit that the ERF will be constrained to the daily emission limit values. For those pollutants with allowable short-term emissions, an assessment has also been undertaken against relevant short-term assessment levels.

Medium Combustion Plant Directive (MCPD)

7.2.13 Directive 2015/2193/EU of the European Parliament and of the Council on the limitation of emissions of certain pollutants into the air from medium combustion plants has been implemented in England and Wales by The Environmental Permitting (England and Wales) (Amendment) Regulations 2018 (Statutory

Instrument, 2018, 110) (EP Regulations). The EP Regulations set emission limits for combustion plant to be used for the generation of power from the Anaerobic Digestion facility. **Table 7.3** provides the emission limit values for gas engines.

Table 7.3: Medium Combustion Plant Emission Limit Values for Engines (mg/Nm^3)

Substance	Gaseous fuels other than natural gas (mg/Nm^3)[a]
Sulphur Dioxide (SO_2)	40
Oxides of Nitrogen (NO_x)	190

a. Normalised to 273 K, 101.3 kPa, dry, and 15% O_2

National Planning Policy and Strategies

National Policy Statements

7.2.14 As outlined in **Chapter 2**, the relevant National Policy Statements (NPS) provide the primary basis for decisions by the Secretary of State on development consent applications for nationally significant infrastructure projects.

7.2.15 **Table 7.4** below identifies the relevant requirements of NPSs:

Table 7.4: Relevant requirements of NPSs

Requirement of NPS EN-1, Overarching National Policy Statement for Energy	Response within this ES
Paragraph 5.2.1: *"Infrastructure development can have adverse effects on air quality. The construction, operation and decommissioning phases can involve emission to air which could lead to adverse impacts on health, on protected species and habitats, or on the wider countryside. Air emissions include particulate matter (for example dust) up to a diameter of ten microns (PM_{10}) as well as gases such as sulphur dioxide, carbon monoxide and nitrogen oxides (NOx). Levels for pollutants in ambient air are set out in the Air Quality Strategy which in turn embodies European Union [EU] legal requirements. The Secretary of State for the Environment, Food and Rural*	The air quality effects during construction, operation and decommissioning have been assessed (within Section 7.9) for impacts on human health and terrestrial biodiversity. The effects of all relevant pollutants have been assessed, where applicable against values set out in the Air Quality Strategy.

Requirement of NPS EN-1, Overarching National Policy Statement for Energy	Response within this ES
Affairs is required to make available up to date information on air quality to any relevant interested party".	
Paragraph 5.2.2: *"CO_2 emissions are a significant adverse impact from some types of energy infrastructure which cannot be totally avoided (even with full deployment of CCS technology). However, given the characteristics of these and other technologies, as noted in Part 3 of this NPS, and the range of non-planning policies aimed at decarbonising electricity generation such as EU ETS (see Section 2.2 above), Government has determined that CO_2 emissions are not reasons to prohibit the consenting of projects which use these technologies (paragraph 5.2.2)."* *Any ES [Environmental Statement] on air emissions will include an assessment of CO_2 emissions, but the policies set out in Section 2, including the EU ETS, apply to these emissions. The IPC does not, therefore need to assess individual applications in terms of carbon emissions against carbon budgets and this section does not address CO_2 emissions or any Emissions Performance Standard that may apply to plant."*	An assessment of CO_2 emissions is not considered relevant to this assessment which considered potential impacts on air quality on sensitive receptors from pollutants. A qualitative assessment of Greenhouse Gases, including CO_2 is included in **Chapter 15**.
Paragraph 5.2.4: *"Design of exhaust stacks, particularly height, is the primary driver for the delivery of optimal dispersion of emissions and is often determined by statutory requirements. The optimal stack height is dependent upon the local terrain and meteorological conditions, in combination with the emission characteristics of the plant. The EA will*	Noted. The stack height has been chosen in accordance with EA requirements.

Requirement of NPS EN-1, Overarching National Policy Statement for Energy	**Response within this ES**
require the exhaust stack height of a thermal combustion generating plant, including fossil fuel generating stations and waste or biomass plant, to be optimised in relation to impact on air quality. The [decision maker] need not, therefore, be concerned with the exhaust stack height optimisation process in relation to air emissions, though the impact of stack heights on landscape and visual amenity will be a consideration."	
Requirement of NPS EN-3, Overarching National Policy Statement for Renewable Energy Infrastructure	**Response within this ES**
Paragraph 2.5.39: *"CO_2 emissions may be a significant adverse impact of biomass/waste combustion plant. Although an ES on air emissions will include an assessment of CO_2 emissions, the policies set out in Section 2.2 of EN-1 will apply. The [decision maker] does not, therefore need to assess individual applications in terms of carbon emissions against carbon budgets and this section does not address CO_2 emissions or any Emissions Performance Standard that may apply to plant.*	Noted, see above.
Paragraph 2.5.39: *"In addition to the air quality legislation referred to in EN-1 the Waste Incineration Directive (WID) is also relevant to waste combustion plant. It sets out specific emission limit values for waste combustion plants."*	The limits imposed on pollutant emissions by the draft WID have been taken into account.

7.2.16 It is considered that this Chapter fully addresses the requirements of the NPSs as outlined above in **Table 7.4**.

7.2.17 A discussion on the following National, Regional and Local policy relevant to this Chapter is located in **Appendix A.3**.

- Revised National Planning Policy Framework (NPPF) (2018);
- National Planning Policy for Waste (NPPW) (2014); and
- Planning Practice Guidance (PPG) (online resource).

Regional Planning Policy and Strategies

- The London Plan (2016);
- London Environment Strategy (2018); and
- Mayor of London's Supplementary Planning Guidance on Construction Dust.

Emerging Regional Planning Policy and Strategies

- Draft London Plan showing Minor Suggested Changes (2018).

Local Planning Policy and Strategies

- Bexley Unitary Development Plan (UDP) (2004) Saved Policies (2012);
- Bexley Core Strategy (2012);
- London Borough of Havering (LBH) Core Strategy and Development Control Policies Development Plan Document (2008);
- London Borough of Barking and Dagenham (LBBD) Core Strategy (2010);
- Royal Borough of Greenwich (RBG) Core Strategy with Detailed Policies (2014); and
- Dartford Development Policies Plan (2017).

Air Quality Guidance and Standards

The Air Quality Strategy

7.2.18 In 1997, the government produced its first Air Quality Strategy setting out an analysis of existing air quality for eight key pollutants. This was successively updated with the most recent version published in 2007. The Air Quality Strategy (2007) establishes the policy framework for ambient air quality management and assessment in the UK (DEFRA, 2007). The primary objective is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Strategy sets out the National Air Quality Objectives (NAQOs) and Government policy on achieving these objectives.

7.2.19 Where a NAQO is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.

7.2.20 The Local Air Quality Management Technical Guidance 2016, issued by the Department for Environment, Food and Rural Affairs (DEFRA), provides advice for Local Authorities as to where the NAQOs apply (LAQM.TG(16)); DEFRA, 2016a). These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year). Thus, for example, annual mean objectives apply at the façades of residential properties, whilst the 24-hour objective (for PM_{10}) would also apply within the garden. They do not apply to occupational, indoor or in-vehicle exposure. The NAQOs for these pollutants are set out in the **Table 7.5.**

Air Quality Objective Levels

7.2.21 The air quality standards which include those as set in the Air Quality Regulations as well as the Ambient Air Directive Limit Values and Target Values have been summarised in the **Table 7.5** below. Where there are several objectives relating to the same matter across these documents, the most stringent has been used in the assessment and quoted in the table.

Table 7.5: Air Quality Objective Levels

Substance	Averaging period	Objective	Standard
1,3-butadiene	Running annual	2.25 µg/m^3	Air Quality System (AQS) Objective
Arsenic	Annual	6 ng/m^3	AAD Target Value
Benzene	Annual	5 µg/m^3	AQS Objective/AAD Limit Value
Cadmium	Annual	5 ng/m^3	AAD Target Value
Carbon Monoxide	8-hour running mean	10 mg/m^3 maximum daily value	AQS Objective/AAD Limit Value
Lead[a]	Annual	0.25 µg/m^3	AQS Objective
Nickel	Annual	20 ng/m^3	AAD Target Value

Substance	Averaging period	Objective	Standard
Nitrogen Dioxide (NO_2)	1-hour mean	200 µg/m^3 not to be exceeded more than 18 times a year	AQS Objective/AAD Limit Value
	Annual	40 µg/m^3	AQS Objective/AAD Limit Value
Particulate Matter (PM_{10})	24-hour	50 µg/m^3 not to be exceeded more than 35 times a year	AQS Objective/AAD Limit Value
	Annual	40 µg/m^3	AQS Objective/AAD Limit Value
Particulate Matter ($PM_{2.5}$)	Annual	25 µg/m^3 (changing to 20 µg/m^3 in 2020)	AAD Limit Value
Polyaromatic hydrocarbons (PAH)	Annual	0.25 ng/m^3	AQS Objective
	Annual	1 ng/m^3 of benzo(a)pyrene (BaP) total content within the PM_{10} fraction	AAD Target Value
Sulphur Dioxide (SO_2)	15 minutes	266 µg/m^3 not to be exceed more than 35 times a year	AQS Objective
	1-hour	350 µg/m^3 not to be exceeded more than 24 times a year	AQS Objective/AAD Limit Value
	24-hour	125 µg/m^3 not to be exceeded more than 3 times a year	AQS Objective/AAD Limit Value

a) The AAD Limit Value of Lead is 0.5 µg/m^3

Vegetation and Ecosystem Objectives

7.2.22 Objectives for the protection of vegetation and ecosystems have been set by the UK Government and were to have been achieved by 2000. Further, a target value for ozone was also set for January 2010. These objectives and targets are summarised in **Table 7.6** and are the same as the EU AAD limit values. The objectives only strictly apply (a) more than 20 kilometres (km) from an agglomeration (about 250,000 people), and (b) more than 5 km from Part A industrial sources, motorways and built up areas of more than 5,000 people. However, Natural England has adopted a more precautionary approach and applies the objective to all internationally designated conservation Sites and SSSIs. For the assessment of road schemes, the Highways Agency follows this approach and requires an assessment of the effects of road traffic emissions on nature conservation sites (Designated Sites) within 200 m of a road. When pollutant concentrations exceed a critical level, it is considered that there is a risk of harmful effects.

Table 7.6: Vegetation and Ecosystem Objectives (Critical Levels)

Pollutant	Averaging Period	Objective
Oxides of Nitrogen (NO_x) as NO_2	Annual mean	30 µg/m^3
Sulphur dioxide	Annual mean and winter average	20 µg/m^3

Critical Loads

7.2.23 Critical loads for nitrogen deposition onto sensitive ecosystems have been specified by United Nations Economic Commission for Europe (UNECE). They are defined as the amount of pollutant deposited to a given area over a year, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. Exceedance of a critical load is used as an indication of the potential for harmful effects to occur.

Environment Agency Guidance

7.2.24 The Environment Agency air emissions risk assessment guidance for environmental permitting (EA, 2018) provides information on additional Environmental Assessment Levels (EALs) against which the impacts of combustion emissions can be assessed. Relevant Environment Assessment Levels for pollutants that are likely to be emitted are provided in the following paragraphs for both human health and terrestrial biodiversity receptors.

Human Health

7.2.25 **Table 7.7** contains relevant EALs for the protection of human health.

Table 7.7: EALs for the Protection of Human Health

Pollutant	Averaging Period	EAL
Carbon Monoxide (CO)	1-hour mean	30 mg/m^3
Hydrogen Fluoride (HF)	1-hour mean	160 $\mu g/m^3$
	Monthly mean	16 $\mu g/m^3$
Hydrogen Chloride (HCl)	1-hour mean	750 $\mu g/m^3$
Ammonia (NH3)	1-hour running mean	2,500 $\mu g/m^3$
	Annual mean	180 $\mu g/m^3$
Cadmium (Cd)	Annual mean	5 ng/m^3
Thallium (Tl)	1-hour mean	30 $\mu g/m^3$
	Annual mean	1 $\mu g/m^3$
Mercury (Hg)	1-hour mean	7.5 $\mu g/m^3$
Antimony (Sb)	1-hour running mean	150 $\mu g/m^3$
	Annual mean	5 $\mu g/m^3$
Arsenic (As)	Annual mean	3 ng/m^3
Lead (Pb)	Annual mean	0.25 $\mu g/m^3$
Chromium (Cr III)	1-hour mean	150 $\mu g/m^3$
	Annual mean	5 $\mu g/m^3$
Chromium (Cr VI)	Annual mean	0.2 ng/m^3
Cobalt (Co)	Annual mean	0.2 $\mu g/m^3$
Copper (Cu)	1-hour mean	200 $\mu g/m^3$
	Annual mean	10 $\mu g/m^3$
Manganese (Mn)	1-hour mean	1,500 $\mu g/m^3$
	Annual mean	0.15 $\mu g/m^3$
Vanadium (V)	1-hour mean	1 $\mu g/m^3$
	Annual mean	5 $\mu g/m^3$

7.2.26 **Table 7.8** contains relevant EALs for terrestrial biodiversity receptors.

Table 7.8: EALs for the Protection of Vegetation and Ecosystems

Pollutant	Time Period	EAL
Ammonia (NH_3)	Annual mean (lichens or bryophytes)	1 µg/m^3
	Annual mean	3 µg/m^3
Sulphur Dioxide (SO_2)	Annual mean (lichens or bryophytes)	10 µg/m^3
	Annual mean	20 µg/m^3
Oxides of Nitrogen (NO_x) as NO_2	24-hour mean	75 µg/m^3
	Annual mean	30 µg/m^3
Hydrogen Fluoride (HF)	24-hour mean	5 µg/m^3
	Weekly mean	0.5 µg/m^3
Benzene	1-hour mean	195 µg/m^3

Port of London Authority

7.2.27 The Port of London Authority (PLA) published their Air Quality Strategy for the Tidal Thames in June 2018. The Strategy provides challenging targets to reach over the next 25 years, in particular a reduction of NO_X and PM's by 50%, whilst still growing activity within the Port of London.

7.2.28 The Strategy proposes a total of 19 actions which will be implemented over the next five years. The achievement of these actions will require partnership working with operators, central and regional government, statutory authorities and riparian boroughs.

Emerging Guidance and Standards

Draft Clean Air Strategy

7.2.29 Consultation on the draft Clean Air Strategy 2018 ended on the 14 August 2018. The draft Clean Air Strategy outlined the government's ambitions relating to reducing overall air pollution in, and set out a direction for future air quality policies and goals. There were no changes proposed to NAQOs that would have implications for the assessment undertaken in this ES.

7.3 Consultation

7.3.1 Specific key comments relevant to the assessment of air quality received during the assessment process are presented in **Table 7.9** below, along with how these have been responded to in this ES.

Table 7.9: Summary of Key Consultation Responses in Relation to Air Quality

Reference	Comment	Response
SoS Scoping Opinion		
Section 4.2 – ID 2	The Applicant is recommended to discuss with the relevant councils whether this information for baseline is sufficient or whether site specific surveys are necessary.	The baseline was discussed and agreed with the relevant councils of London Borough of Bexley (LBB) and London Borough of Havering (LBH).
Section 4.2 – ID 3	If there is a potential for a significant effect on the AQMAs and their Action Plans, this should be assessed within the ES.	As demonstrated in Section 7.9 of the ES, there are no significant effects on the AQMAs and therefore by definition, their Action Plans.
Section 4.2 – ID 4	Given that the existing Riverside Resource Recovery Facility (RRRF) is operational, the Inspectorate considers that its emissions should be considered within the environmental baseline.	The emissions from the RRRF have been considered in the baseline (Section 7.5).
Section 4.2 – ID 5	The ES should explain and justify the ‘conservative’ emissions scenario to be used within the assessment.	Section 7.4 describes the reasonable worst-case scenario considered in the assessment.
Section 4.2 – ID 6	The Scoping Report does not propose a methodology for the Human Health Risk Assessment (HHRA). The methodology should be clearly described within the ES.	Section 7.5 provides the assessment methodology for the Human Health Risk Assessment.
Section 4.2 – ID 7	The Scoping Report does not identify a study area for the assessment of combustion effects on human receptors or for the assessment of dust and odour effects. These should be identified and justified within the ES.	The study area has been defined and justified in Section 7.5.
LBB response on Scoping Opinion (dated 21st Dec 2017)		

Reference	Comment	Response
	The background maps have been shown to be inaccurate for the Bexley area. There is a preference therefore that Bexley measured urban background measurements must be used instead of figures available on the modelled background maps provided by DEFRA.	Background maps have been adjusted using the following automatic urban background stations: BX1 (Slade Green), BX2 (Belvedere Primary School), BQ7 (Bexley Business Academy), and BG2 (Scrattons Farm). The methodology for the assessment was provided to LBB for comment and confirmation received on 26 April 2018 that it was acceptable.
	As part of this process clarification may also need to be sought from the Greater London Authority on whether an additional 'air quality neutral' (AQN) assessment is required for a development of this type.	The AQN principles concern residential/commercial development for which appropriate benchmarks have been developed. There are no comparison benchmarks for this type of facility and it would not be possible to develop such benchmarks as each industrial facility is different. The Greater London Authority (GLA) Sustainable Design and Construction SPG (2014) states that: *"This policy applies to all major development in Greater London"*, however, the footnote to this states: *"Except where the development is required to apply to the Environment Agency for a permit under the Environmental Permitting Regulations, as air quality will be addressed separately under that process for these developments"* An air quality neutral assessment is therefore not required in the context of REP.

Reference	Comment	Response
	Will the proposed CHP be able to demonstrate compliance with the Mayor's Draft Environmental Strategy policy. The policy prevents emissions from CHP exceeding those of an ultralow NO_x gas boiler.	The draft policy relates to energy centres used to heat/power residential/commercial schemes; hence the comparison to the NO_x emission standards for gas boilers (which can also be used to provide heat for such premises). The proposed CHP engine would burn biogas from the anaerobic digestion process to create renewable energy and it is not possible for a boiler to do this. Emissions from the CHP engine would be compliant with the requirements of the Medium Combustion Plant Directive (MCPD).
	Air quality assessment and dispersion modelling will need to take into account the topography of the proposed site and surrounding area.	A digital terrain dataset was used for the assessment of emissions from the adjacent RRRF (Section 36 C Electricity Act submission, Appendix C, para 5.8) and it was concluded that it doesn't influence the dispersion and ground level concentrations to any significant extent. Therefore, the modelling has been undertaken assuming level terrain.
	Worst case approach should be modelled to include the additional vehicles movements that would be covered by barge shipments.	Reasonable worst case scenarios of traffic are assumed in two assessments: 1. assumed that all of the operational traffic would be by road; and 2. alternatively, all by river.
	Take into account the dispersion modelling the multiple tall structures in the immediate area of the site.	Section 7.5 describes the dispersion modelling methodology and the rationale of the Main REP Buildings. Tall structures are taken into account where they can influence the dispersion of pollutants from the exhaust stacks in accordance

Reference	Comment	Response
		with guidance provided by the air quality model software provider.
	Stack calculations should be included in the air quality assessment. Dispersion modelling should include different stack height scenarios.	Section 7.5 provides for a reasonable worst-case assessment (i.e. shortest stack height) for informing the EIA. The stack height has been justified by reference to the predicted impacts with a worst case stack height and therefore different stack height scenarios have not been assessed.
LBB response (dated 26th April 2018)		
	Your proposed scope/methodologies/receptor locations and met data sources are considered acceptable and we are content for you to proceed accordingly.	Noted.
LBH response on Scoping Opinion (dated 28th December 2017)		
	Early involvement and consultation with LBH prior to commencement to agree on the methodology which will be followed (location of receptors, baseline conditions, operating scenarios).	LBH have been contacted regarding the approach to the assessment and the methodology. Their response is set out below in this table.
	Havering's HV1 Rainham Automatic Monitoring Station is located less than 4 km from the site. We would therefore recommend that this monitoring station is included.	Rainham is a roadside monitoring site so it has been used for verification of road traffic emissions as appropriate.
	The proposed residential developments along A1306 New Road (between Dover's Corner and Beam Park Development) should also be considered at the stage of	This specific location has been used in the assessment as a receptor point (receptor R15).

Reference	Comment	Response
	identification of specific sensitive receptor locations.	
LBH consultation response (dated 27th April 2018)		
	In principle we agree with the proposed methodology. In terms of the contents of the air quality assessment, we would expect it **i.** to model the baseline conditions (existing and future without development), including background data, choice of baseline year, sampling period, data capture and adjustments applied to the data. **ii.** model the future impacts (with the development) taking account of operating scenarios (including worst case scenarios), **iii.** assess the impacts and **iv.** provide mitigation measures (if required). With regard to the construction phase we would expect a Dust Risk Assessment, as per your methodology below.	The assessment in the ES has included these elements. Section 7.5 discusses the Assessment Methodology, Section 7.7 lists the baseline conditions, Section 7.9 assesses the likely impacts and Sections 7.8 and 7.11 describe mitigation measures.
	With regard to the monitoring data you are proposing to use, can you please explain why the Rainham (HV1) station will be used for the road modelling verification only? Havering has also diffusion tubes at Blewitts Cottages (New Road), Rainham Tesco and Rainham Village School, the data of which could be useful. Please let us know your views.	HV1 has been used to verify the model due to availability of 2017 data. Rainham Tesco has not been used for verification of the traffic model as it is located adjacent to a bus stop. Given the difficulty in accurately representing conditions at this location due the bus wait times and stopping and starting, this is not considered an appropriate location for model verification. Appropriate traffic data is not available to be able to include Rainham Village School for model verification.
	We have no objections to the assessment scenarios set out below. As mentioned in the scoping	Noted, cumulative effects and other sources of contaminants

Reference	Comment	Response
	report, the cumulative effects need to be taken into account and the assessment should consider the other potentially significant sources of pollutants in the vicinity (e.g. REP and RRRF operating simultaneously).	have been included in the assessment (Section 7.10).
	We have no objections to the topography and the proposed use of meteorological data from London City Airport. We are happy with the selected locations of ecological receptors. With regard to the human receptors, could you please briefly explain the rationale behind the selected locations so that we make sure that the most sensitive receptors will be considered? Also our view is that specific receptors should be at height representative (e.g. of above 1st floor).	Human receptors have been chosen based on a number of criteria given the complicated nature of the assessment. For emissions from the combustion processes from REP, receptors were chosen based on the results of preliminary modelling of the dispersion from the flues. The closest / most affected receptors were selected, and additionally, receptors that were included in the previous modelling work for RRRF. Receptors have also been included at a range of compass points from the facility in order to ensure that we capture all of the impacts. Nearby roads were also taken into account as receptors close to existing roads are more sensitive to changes in air quality from other sources; and therefore, where there were busy roads close to an area of concern, a receptor close to the road was chosen. Where receptors were included in the previous assessment for RRRF, the heights used are those that were previously considered. For additional receptors, consideration was given to the dominant pollution source for the particular receptor (i.e. where busy roads form part of the baseline, the road source is likely to have a greatest influence on the concentrations at the

Reference	Comment	Response
		receptor). We have also placed receptors at varying heights on some tall buildings that may be impacted by emissions from REP in order to ensure that the reasonable worst case total concentration is predicted for the particular location under consideration. For road and river traffic impacts, receptor locations have been chosen where the impacts are greatest.
LBH consultation response (dated 14th May 2018)		
	Requested confirmation of radius of impacts	For the impacts of emissions from the ERF, the model output grid for human health receptors is 4 km^2, approximately centred on the REP site. The output grid more than covers the extent of the area where impacts from the ERF emissions are potentially significant. Internationally and nationally designated sites are considered up to 15 km from the ERF stack. For the impacts of road traffic, the area will be where the changes in traffic are significant in accordance with IAQM criteria. River traffic routes have been considered for the river traffic assessment to identify receptor locations. For the anaerobic digestion combustion, the area considered is in the immediate vicinity of the REP site.
	We have no objections to the proposed approach. Looking at your receptor locations, have you included Rainham Village Primary School (Upminster Road	It is confirmed that Brady Primary School included (R6) and Rainham Village Primary School (R22) have been included as receptors for the EIA.

Reference	Comment	Response
	South) and Brady Primary School (Wennington Road)?	
	Recommend to include Rainham Village Primary School	Rainham Village Primary School has been included as an additional receptor (R22).
Greater London Authority response on Scoping Opinion (dated 7th March 2018)		
	It is proposed that the transport impacts are only to be modelled where there is a change in AADT of more than 1,000 vehicles. This seems like a very high number: the indicative standard in the IAQM guidance (which is referenced) is to assess all roads where there is a change in heavy duty vehicles (HDV) flows of >25 AADT. We recommend this guidance is followed and all roads with this level of change are modelled.	The IAQM guidance (including the criterion of a change in HDV flows of >25 Annual Average Daily Traffic (AADT)) has been used in relation to human health receptors. The criterion of a change in AADT of >1,000 vehicles has been used to screen the need for an assessment of road traffic effects on sensitive terrestrial biodiversity sites.
	Combustion processes: the report should clearly specify exactly which combustion processes are included (it should include the MSW incineration, C&I thermal treatment and the combustion of AD gas.)	These have been included. See Section 7.5.
	The transport section indicates that dust and dirt from transport will be dealt with in the Air Quality section, but it has not been included. This must be included.	The assessment of dust effects from track-out during construction has been considered in Section 7.9.
	Similarly, the report indicates that a proportion of the construction and operational phase freight movements will be by river. These must be included in the air quality assessment.	An assessment of the effect of air quality related to river transport is included in Section 7.9.
	The list of pollutants considered seems acceptable.	Noted.

Reference	Comment	Response
	The methodology is generally acceptable, but as well as assessing the sources separately all sources should be assessed in a single model (i.e. not by just adding together the outputs of the separate models). This will allow for the full effects of the proposal to be modelled.	Due to the nature of the models, it is not possible to include all sources in the same model, however, similar source types have been modelled in a single model i.e. major point sources have been modelled together within the UK Atmospheric Dispersion Modelling System (ADMS) and road sources have been modelled together with ADMS Roads. The results at specific receptor locations have then been summed as appropriate to obtain the Predicted Environmental Concentration (PEC). As the combustion emissions from the Anaerobic Digestion facility and ERF are exhausted through stacks of different orders of magnitude in height, they have been modelled separately.
	In terms of pollutant emission rates from the combustion processes: this is not detailed in the scoping report but we would like to see a commitment to modelling at the maximum emission limits that would be allowed under the permitting rules.	For the ERF, the pollutant emission rates have been calculated from the emission concentration limits set out within the draft Waste Incineration Directive BREF (2017) and IED. For the anaerobic digestion facility combustion, emission limits from the Medium Combustion Plant Directive have been used. These are maximum limits permitted and therefore represent reasonable worst case emission values.
	In terms of assessing whether the impacts of the development are	Draft Policy SI1 does not provide any significance criteria against

Reference	Comment	Response
	acceptable the emerging London Plan and the standards set out in policy SI1 should be referred to. It is not sufficient to rely on the IAQM guidance alone (for one thing this does not define terms such as "significant" or "acceptable"). Similarly, the assessment should not rely on the DfT Interim Advice Notes for assessing impact from a development that is not solely a transport scheme.	which to judge the acceptability of effects, especially as to how this relates to areas of poor air quality. As the IAQM guidance does provide clear significance criteria for both point source and road traffic effects, it is considered appropriate to use this in conjunction with appropriate EA criteria. The DfTs Interim Advice Notes have not been used.
	It is proposed that the transport impacts are only to be modelled where there is a change in AADT of more than 1,000 vehicles. This seems like a very high number: the indicative standard in the IAQM guidance (which is referenced) is to assess all roads where there is a change in HDV flows of >25 AADT. We recommend this guidance is followed and all roads with this level of change are modelled.	The IAQM guidance (including the criterion of a change in HDV flows of >25 AADT) has been used in relation to human health receptors. The criterion of a change in AADT of >1,000 vehicles has been used to screen the need for an assessment of road traffic effects on sensitive terrestrial biodiversity sites.
RBG consultation response (dated 19th December 2017)		
	The applicant will need to demonstrate that there is no air quality impact to RB Greenwich.	The results of the assessment have demonstrated no significant impacts on air quality, including in the RBG.
	RBG would recommend that the following is considered: a. The Mayor's Draft Environment Strategy is proposing that in areas which exceed legal air quality limits, the policy should prevent emissions from energy production plant, including from CHP that would exceed those of an ultralow NO_x gas boiler.	a) The draft policy concerns CHP plant providing heat and power to domestic or commercial facilities. Emissions from the CHP engine can be made equivalent to those from an ultralow NO_x gas boiler by the provision of additional abatement systems, thereby demonstrating compliance with the possible requirement. The assessment within the ES has

Reference	Comment	Response
	Would the proposed CHP have to comply with this policy requirement if it is adopted? Will the CHP be able to demonstrate compliance with this possible requirement? b. The air quality assessment and dispersion modelling will need to take into account the topography of the proposed site and surrounding areas. RB Greenwich is situated at a higher ground level as compared to the proposed site. c. if the infrastructure for the delivery of waste by barge is not already in place, then RBG would like the assessment to take a precautionary worst case approach by including the additional vehicles movements that would be covered by the barge shipments. This is to cover the eventuality that the infrastructure is not constructed and all waste movements are conducted by land. Similarly, the same approach should be taken if the applicant proposes to use the river way to ship materials to and from site during the construction phase of the project. d. With regards to the barges, RBG would recommend LB Bexley liaise with the Port of London Authority to assess what boats/technology can be used to limit emissions from this source. For example, using hybrid boats over diesel and magnetic docking mechanisms to prevent idling engines. e. With regards to the abatement product, is the 3% air pollution residues a weekly, monthly or yearly output? f. The document states that there are multiple tall structures in the immediate area of the site; these	been undertaken on the basis that additional abatement systems are not installed. b) The dispersion modelling has taken into account topography where it will have a significant impact on the modelling results. The differences in elevation are not significant in terms of the predicted ground level concentrations, which is evidenced by the modelling results at different elevations in Section 7.9. c) The infrastructure is already in place to enable delivery of waste by barge, but the assessment has considered all waste by barge or all waste by road (Section 7.9). A similar approach has been used for the construction assessment. d) Noted. e) The 3% is related to the throughput of the installation and would therefore be pro-rata on the weekly, monthly or annual throughput. f) Tall structures have been taken into account where they influence the dispersion of pollutants, in accordance with advice provided by the model software supplier. g) London Atmospheric Emissions Inventory (LAEI) data has been used as appropriate for the assessment of road traffic impacts. h) Stack calculations are included, Section 7.5. i) The stack height has been modelled at the lowest level in

Reference	Comment	Response
	need to be taken into account in the dispersion modelling as they may impact on the dispersion from the proposed unit. g. LAEI data when available should always be used over DEFRA data as it is specific to London. h. Stack calculations should be included in the air quality assessment. i. The dispersion modelling should include different stack height scenarios. j. Modelling should account for dispersion near waterways as RBG believe they also impact on pollution dispersion.	accordance with the limits of deviation. This provides a reasonable worst case assessment as the highest maximum ground level concentrations are predicted. j) It is not considered that the presence of the river would have a significant impact on dispersion from REP. There are impacts associated with coastal sites, but this is not applicable in the scenario of a riverside location in a large urban area. The main impact on dispersion from the local area will be the assumed surface roughness as this influences the turbulence of the wind as it moves over the earth's surface. A surface roughness for parkland / open suburbia has been used in the modelling.
RBG Response (dated 10th May 2018)		
	I have now had the chance to review available information. Your response to the comments in Observation 1 and Observation 2 is acceptable. I have no other comments and look forward to future submissions for the site.	Noted
Dartford Borough Council Response (dated 22nd December 2017)		
	The impact of increased traffic on air quality in the wider area should be considered, particularly on the AQMAs at Dartford Crossing (A282: Dartford Tunnel Approach Road) and Dartford town centre which will be impacted on by increase traffic using the strategic road network	The impact of road traffic has been considered where the increase is significant, in accordance with IAQM guidance. The results are provided in Section 7.9.

Reference	Comment	Response
	and diverting traffic if there is congestion.	
	Air quality issues arising from the increase in vehicular traffic during both construction and operation should also be addressed and this should include traffic impacts as set out above.	The air quality impacts of both construction and operation have been considered in Section 7.9
	The Council is willing to assist and provide further information to the applicant with regard to the air quality issues at these AQMA and on the local and strategic road network.	Noted.
	The Council would draw PINS attention to the fact that the Port of London Authority is also currently consulting on its own Air Quality Strategy for the Tidal Thames, which should be taken into account in any assessment.	The Applicant has consulted with the Port of London Authority as detailed in the Consultation Report (**Document Reference 5.2**).
Section 42 Consultation Responses		
Natural England (dated 1st August 2018)		
	Recommended modelling of emissions from flaring of anaerobic digestion gases.	The NO_x emission rate from flaring will be lower than that from the gas engine, and will be released at a higher temperature and from a higher stack. The impact of emissions from the flaring will therefore be lower than that of those from the gas engine. Operation of the gas engine and flare will be exclusive, i.e. the flare would only operate when the gas engine wasn't available. The gas engine impacts have been modelled assuming that it operates all year round and therefore this provides a

Reference	Comment	Response
		reasonable worst case assessment.
	Recommended production of a contour of nitrogen deposition instead of single predictions per receptor location.	This has been provided in **Figure 7.11** for forest deposition (which is higher than for grassland).
	Recommended production of a contour of acid deposition instead of a single prediction per receptor location.	This has been provided in **Figure 7.12** for forest deposition (which is higher than for grassland).
London Borough of Bexley (dated 26th July 2018)		
	The PEIR finds that the main effects during construction of the development include the potential generation of dust and that this can be controlled through standard mitigation techniques. Whilst there will be additional traffic associated with the construction phase of the development, the report finds that the additional traffic volumes are unlikely to lead to significant air quality effects. Furthermore, the construction traffic levels are said to be less than the operational traffic levels which have been modelled in the assessment of operational effects and which have been shown to not have significant impact on the environment. No undue odour impacts are expected and there have been no complaints received by the Applicant for the RRRF since it opened in 2011. The main air quality effects from the development will be from emissions from the Energy Recovery Facility. These are not found to be significant in terms of impact on	Noted.

Reference	Comment	Response
	human health or ecological receptors. The effects have also been considered in conjunction with emissions from the existing RRRF and Crossness Sewage Sludge Incinerator and no exceedances of relevant assessment levels have been predicted. Furthermore, there are not expected to be any significant effects from the emissions from the Anaerobic Digestion Facility. Waste would be delivered to REP by river or road or both. The transport of waste is not anticipated to give rise to significant effects on air quality. The methodologies undertaken and conclusions of these reports are considered to be acceptable. It is noted that further assessment work will be undertaken the results of which will be identified within the finalised Environmental Statement that will accompany the formal DCO application.	
Bexley Natural Environment Forum (dated 30th July 2018)		
	It is mentioned that Cory has looked at the combined air quality effects of Incinerators 1, 2 and the Thames Water Sludge facility, but it is not made plain whether or not this has been set within the context of wider London air quality data and problems. We are concerned about the deposition of nitrates etc. on the Crossness LNR and sites over the river such as at Rainham Marshes.	The impacts of RRRF, ERF and Crossness Sludge Powered Generator have been modelled together and the predicted concentrations added to baseline levels and loads. The results have been reported in **Appendix C.2.2**.
Dartford Borough Council (dated July 2018)		
	The initial assessment indicates the traffic generation by the	The air quality impacts from road traffic emissions have been

Reference	Comment	Response
	development is likely to be low and with the improvement in emissions there is likely to be negligible. However, this is something that will need to be assessed fully following the detailed assessment taking into account the Council's requests with regard to modelling of an incident on the road network. The impact of increased traffic on air quality in the wider area should be considered, particularly on the AQMAs at Dartford Crossing (A282: Dartford Tunnel Approach Road) and Dartford town centre which will be impacted on by increase traffic using the strategic road network and diverting traffic if there is congestion.	assessed where the changes in traffic are significant. The assessment is on an annual average basis, as annual mean NO_2 concentrations are the most significant. Compliance with short term objectives are assessed in comparison to the annual mean objective, as explained in the ES Chapter. The impact of increased traffic has been considered where the increase in traffic is significant (this excludes the Dartford Crossing). However, an incident on the road network will cause temporary changes in traffic which will not impact upon the annual mean traffic flows and predicted annual mean concentrations within the assessment. Incidents on the road network will therefore not change the significance of the predicted air quality effect.
Greater London Authority (dated 30th July 2018)		
	London Plan Policy 7.14 and draft London Plan Policy SI1 seek to improve air quality across London and limit exposure to poor air.	Draft Policy SI1 requires that development should not: a) Lead to further deterioration of poor air quality b) Create new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits c) Reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality d) Create unacceptable risk of high levels of exposure to poor air quality.

Reference	Comment	Response
		As demonstrated in this ES, the development complies with these policy requirements.
	There are different pollutants to consider and the PEIR has not fully assessed cumulative impacts. Emissions from CHP need to comply with draft London Plan policies.	The Applicant considers that the cumulative impacts of both traffic and operational emissions have been fully assessed. It is not appropriate to incorporate both traffic and operational emissions within the same model, due to the requirement to verify the road traffic model. In both cases, ADMS software has been used; and the cumulative impacts at individual residential receptor locations have been assessed: i.e. a background element, a road transport element (where appropriate), the contribution from REP and the contribution from other significant point sources have been considered. The Applicant is aware of Policy SI3 on Energy Infrastructure and the requirement to use low-emission CHP. This is deemed not to include gas engines, including CHP from anaerobic digestion. These emissions can be made equivalent to an ultralow emission gas fired boiler, but the ES assessment has been based on compliance with MCPD limits.
	Emissions at BREF note limits are best case and not worst case.	In terms of the use of the BREF note emission limit values for the assessment, BREF notes set out the maximum emissions that would be allowable from the installation under Environmental Permitting in line with current technology. In accordance with EU Directives, the EA would need to apply such emission

Reference	Comment	Response
		limits to the operation of the ERF. The use of the BREF note emission limits represents the worst case emissions that could occur, as the ERF would not be allowed to operate with higher emissions, not the 'best case scenario'. Indeed, in order to ensure that the ERF stays within Environmental Permit limits, actual operating emissions will be less than the BREF note values, but this report evaluates the environmental impact of the emissions assuming that it will operate at the maximum emission limits that will apply in operation in accordance with a worst case assessment approach.
	The assessment has not considered receptor locations north of the river.	The locations of the impact of emissions from the ERF are clear in the data set out in the ES. This report assesses the impacts at relevant receptor locations in Rainham, in the London Borough of Havering.
	The concentrations of arsenic, nickel and NO_2 are high, as shown in the isopleth's.	**Figure 7.7** is an isopleth of the maximum annual mean NO_2 concentration from the ERF from the 5-years' worth of data modelled assuming that the ERF operates at the maximum emission limits all year round. The predicted annual mean concentration ranges from 0.4 to 0.6 µg/m^3 in Rainham. Specific receptor locations have been chosen in Rainham Town Centre (reference **Figure 7.3.1**) where the cumulative impacts of emissions from the ERF, road traffic emissions, background concentrations and other point sources are evaluated. The

Reference	Comment	Response
		predicted concentrations are shown in **Appendix C.2**, Table C2.2.9. Receptors 7, 18, 20 and 22 represent Rainham Town Centre. The maximum predicted environmental concentration is 29.0 µg/m^3 at Receptor 7. There is therefore no risk of non-compliance with air quality strategy objectives or EU Limit Values in Rainham Town Centre. Both the Arsenic and Nickel isopleths show that whilst predicted concentrations are very low in absolute terms, they are above levels which are potentially significant and therefore one needs to take into account the existing baseline concentrations to which the ERF contribution is added. As with the annual mean NO_2 concentrations, the assessment levels apply at locations of relevant exposure. Taking into account baseline concentrations, the maximum annual mean Arsenic predicted environmental concentrations are approximately 38% of the assessment level, and the maximum annual mean Nickel predicted environmental concentrations are approximately 50% of the assessment level.
	The development will prevent housing in allocated development areas.	The Bexley Riverside Opportunity Area lies along the south bank of the river. As shown in Figure 7.7 (and the other isopleths), the maximum impacts of emissions from the ERF occur to the north and east of this area. The highest predicted annual mean NO_2 concentrations on the south bank of the river are less than 2 µg/m^3 in an already industrialised

Reference	Comment	Response
		area which would not be suitable for housing. Even if housing were to be located in this location, baseline concentrations would be similar to those in Rainham and therefore there would be no exceedances of air quality strategy objectives or EU Limit Values. The London Riverside Opportunity Area covers the northern bank of the river and the predicted concentrations are lower than immediately adjacent to the REP site. Again, if housing were to be located within this industrialised area, there would be no exceedances of air quality strategy objectives or EU Limit Values. The predicted concentrations within the Thamesmead & Abbey Wood Opportunity Area are lower than immediately adjacent to the site and are negligible. Overall, the impacts of the proposed ERF would not impact on the future delivery of housing growth in these areas.
	A more detailed assessment is required of the impacts of road and river transport.	The assessment of road and river transport are described in Section 7.9.
	The impact assessment has used optimistic emissions and the impacts are unacceptable.	As noted previously, the emission limits used in the assessment are the maximum that would be allowable by an environmental permit and are therefore worst case, and not optimistic as stated. In terms of the stated criteria in the GLA response, the development is acceptable in that there is no risk to compliance with legal air quality limits and

Reference	Comment	Response
		impacts from road and river transport are acceptable.
	The health impacts of pollutants such as heavy metals need to be assessed.	The health impacts of emissions of heavy metals are acceptable as shown in **Appendix C.3**. Public Health England's (previously Health Protection Agency) position on air pollution impacts of municipal waste incinerators was that whilst it was not possible to rule out adverse health effects from well-regulated facilities with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable.
	The use of biogas from the AD plant by injecting into the gas grid is acceptable.	In terms of the use of gas generated by the anaerobic digestion process, the response indicates that this would be acceptable to the GLA if the gas were injected into the grid. The development proposals also include for the use of the gas in vehicles on site, which is regarded as also being acceptable. The ES has shown the impacts of the use of the gas in CHP engines as a worst case, but we note the SI3 policy requirement regarding low NO_x CHP.
London Assembly Environment Committee (dated 30th July 2018)		
	Incineration also contributes to air pollution. In our report, we found that London's EfW incinerators emit over 2,000 tonnes of NO_x per year, 4 per cent of London's total. Many other pollutants, including chlorine, arsenic and mercury are also emitted from EfW facilities.	The ES has shown that the effects of the emissions of these pollutants are not significant.

Reference	Comment	Response
Port of London Authority (dated 17th July 2018)		
	Within Chapter 7 of the PEIR the applicant states under paragraph 7.5.55 that "*a qualitative assessment of emissions from operational river vessel movements has been undertaken which has not identified that significant effects are likely*". Whilst this is noted the PLA recommends that the applicant makes very clear in the Air Quality chapter of the Environmental Statement the work they have undertaken to reach this conclusion including measures the applicant is implementing to reduce existing emissions as referenced in the PLA's Air Quality Strategy (2018).	The impacts of river traffic are provided in Section 7.9, taking account of the PLA Air Quality Strategy. Measures to reduce existing emissions are discussed in Section 7.11.
Public Health England (dated 27th July 2018)		
	We are generally satisfied with the proposed methodology. We look forward to commenting on the detailed quantitative and cumulative assessments proposed.	Noted.
	The air quality impact assessment should include evaluation of the combined impact from all emission sources on short and long-term air quality (i.e. a combined assessment of the operational traffic (road and shipping) emissions, installation (stack and fugitive) emissions, and emissions from nearby facilities). Each component should not be assessed in isolation, and, for example, if detailed assessment of traffic emissions (road or ship) is screened out, their contribution to the installation's overall air quality impacts should be included.	The air quality impacts from combined emission sources have been evaluated where they are not insignificant. Long term and short term impacts have been predicted, including baseline concentrations. Where a source/component is screened out as having an insignificant impact, it is on the basis that it will have an insignificant impact alone or in combination with other sources, and therefore has not been included in the cumulative assessment. Where sources/components can contribute to the total impact at a

Reference	Comment	Response
		receptor, they have been considered.
	There are public health benefits in reducing public exposures to non-threshold pollutants (such as particulate matter and nitrogen dioxide) below air quality standards: as such, we recommend consideration of mitigation measures that reduce public exposures to pollutant levels as low as reasonably practicable, and that the applicant's proposed air quality management plan recognises this important principle.	The emissions from the ERF have been assessed in line with Best Available Techniques, which defines the inherent mitigation measures required to reduce emission.
	We note that the emissions from the proposed development will be controlled via an Environmental Permit issued by the Environment Agency. PHE will be consulted as part of the permitting process and will provide more detailed comments and opinion at that time.	Noted.
	The documents submitted have identified that construction mitigation measures will be outlined within the Code of Construction Practice (CoCP) and associated plans (e.g. air quality and dust management plan (AQDMP)). It is expected that such plans will be developed and further details will be provided for comment at the application stage.	An outline CoCP has been submitted with the DCO application (**Document Reference 7.4**). The final CoCP will be submitted to and approved by the relevant planning authority at detail design as secured in a Requirement of the Draft DCO (**Document Reference 3.1**).

7.4 Reasonable Worst Case Parameters Used for Assessment

7.4.1 The potential construction, operation and decommissioning effects of the Proposed Development have been considered on a worst-case basis. For the transport of materials and waste to and from the REP site, separate assessments have been undertaken assuming that all of the transport occurs by road, or all of the transport occurs by river. The traffic data which has been used to derive the emission rates to be used in the air quality model automatically incorporates the worst-case traffic scenarios as discussed in Section 4 of **Chapter 6**.

7.4.2 Realistic maximum emission rates have been calculated from process design parameters for the ERF provided by the Applicant. For the Anaerobic Digestion facility, emissions have been calculated based on typical emission parameters for gas engines and those set out within the Medium Combustion Plant Directive.

7.4.3 For the operation of the ERF it is assumed that there are no maintenance or shut down periods and the source is emitting for 100% of the time. The emission rates have been calculated assuming that the source is emitting at full load at BAT maximum emission limit value. The modelling has been based on a fuel throughput of 805,920 tonnes per annum (tpa) which is greater than the nominal tonnage of 655,000 tpa and is therefore considered to be a robust and conservative assessment.

7.4.4 For the Anaerobic Digestion facility, the potential exists for the biogas to be used to power vehicles within REP site operational workings, or be burned in a gas engine. Of the two options, burning the biogas in a gas engine would provide a worst-case impact in terms of emissions (modelled as being emitted 100% of the time) and this has therefore been assessed. Emissions from operational REP site traffic (excluding vehicles delivering material to and from the REP site), will not be significant in themselves, the potential use of biogas for fuel would mean that the vehicles would have lower emissions than conventional diesel or petrol powered vehicles.

7.4.5 The modelling of emissions from the ERF and Anaerobic Digestion facility has been completed using 5-years of meteorological data and the maximum results reported for any of the five years modelled.

7.4.6 Buildings have been included in the model defined by the maximum parameters of the building envelope termed as Rochdale Envelope (see **Chapter 3**) which is likely to overestimate the effects of buildings on dispersion, thereby leading to higher maximum pollutant concentrations. A stack height of 90 m (93 m Above Ordnance Datum (AOD)) is assumed for the modelling of emissions from the ERF. This is lower than the maximum parameter height of 113 m AOD and therefore is the worst case in terms of air quality, as the lower stack would lead to higher maximum ground level concentrations.

7.4.7 The location of the ERF emission stacks has been modelled approximately within the centre of Work area number 1A (iii) (**Document Reference 2.4**). Lateral variations in the stack location within those limits will marginally change the results, but the differences will be insignificant as the most important consideration is the relative massing of the buildings in relation to the height of the stack.

7.4.8 For the assessment of the effects of persistent organic pollutants, the Human Health Risk Assessment (HHRA) is based on the results of the dispersion modelling.

7.4.9 For the assessment of road traffic emissions, future year model inputs have been based on 2022 emissions factors and background concentrations, whilst utilising traffic flows for 2024. The model has been verified against 2017 monitoring data. This is considered to provide an appropriately conservative assessment taking into account the uncertainties regarding future vehicle emission factors.

7.4.10 For pollutants not associated with road traffic emissions, future projections are less well developed and historic measurements are limited. It is, however, expected that tightening limits and developments in technology will result in a reduction in emissions of these pollutants over time. As projections have not been developed, for the purposes of this assessment non-road emissions have been considered without taking future reductions into account.

7.4.11 For this assessment, the conversion of NO_x to NO_2 has been estimated using the worst-case assumptions set out in Environment Agency (EA) guidance (see Section 7.5).

7.5 Assessment Methodology and Significance Criteria

Study Area

7.5.1 The study area has been defined separately for the construction, operation and decommissioning phases of the Proposed Development, considering the likely spatial extent of impacts on human health and terrestrial biodiversity receptors.

Construction/Decommissioning

7.5.2 The extent of the area assessed for likely significant effects from vehicle emissions during the construction and decommissioning phases (both on and off-site) of REP has been determined by using the indicative screening criteria from the IAQM Guidance[1] 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.

7.5.3 The modelling network is shown in **Appendix C.1**.

7.5.4 A qualitative assessment of emissions to air quality from vessel movements on the River Thames has been undertaken covering the likely routes that the barges would take, from Wandsworth Reach to Tilbury Docks, including Barking Creek.

[1] Moorcroft and Barrowcliffe. et al. (2017). ‘Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London

7.5.5 The impact of construction dust emissions has been assessed in accordance with guidance issued by the Institute of Air Quality Management[2], with the following distances defining the study area of a construction site:

- human health receptors within 350 metres (m) of the boundary of the REP site, or 50 m of the routes used by construction vehicles on the public highway, and within 500 m of the REP site entrance, including the Electrical Connection route options; and

- terrestrial biodiversity receptors within 50 m of the boundary of the REP site or 50 m of the routes used by construction vehicles on the public highway, within 500 m of the REP site entrance, including the Electrical Connection route options.

Operation/Maintenance

7.5.6 The study area for river and road traffic during the operation of the Proposed Development has been defined in the same manner as for the construction phase; i.e. where changes to the number of road or river traffic movements is likely to lead to a significant increase in emissions.

7.5.7 The study area for combustion emissions from REP is defined by the distances over which significant effects may occur:

- For human health receptors, an initial study area of 10 km from REP has been considered. Human health receptor locations were chosen where the impacts of emissions were likely to be greatest as identified by the initial dispersion modelling, taking into account the effect of variations in baseline concentrations and the need to include receptors within all compass points of the REP site.

- Internationally designated terrestrial biodiversity sites (SAC, SPA, and Ramsar sites) and nationally designated biodiversity sites (SSSI) within 15 km of the REP site; and

- Locally designated nature sites within 2 km (ancient woodland, local wildlife sites, Sites of Importance for Nature Conservation (SINCs) and national and Local Nature Reserves (LNR)).

7.5.8 The potential effects of air quality from operation of the Electrical Connection route, which is not dependent on the final route chosen, is scoped out of the assessment because operation of the Electrical Connection is unlikely to lead to significant emissions to air.

7.5.9 The impact of dust and odour during the operational phase has been considered qualitatively for a study area within the immediate vicinity of the REP site.

[2] Holman *et al*. (2014). 'Assessment of dust from demolition and construction', Institute of Air Quality Management, London.

Baseline Data Collection

7.5.10 Information on existing air quality has been obtained by collating the results of monitoring carried out by LBB, London Borough of Barking and Dagenham (LBBD), and LBH for pollutants such as NO_2, PM_{10} and $PM_{2.5}$. Background pollutant concentrations for other pollutants have been gathered from published data and national monitoring networks.

7.5.11 Air quality varies spatially in accordance with the presence of specific pollutant sources. For road traffic emissions, the impacts are highest closest to the road source. For receptors close to road sources, and which may be impacted by combustion emissions from REP, modelling of road traffic emissions has been used to obtain representative baseline concentrations. Traffic data taken from the London Atmospheric Emissions Inventory (LAEI) has been used for this road modelling.

7.5.12 Similarly, where baseline concentrations are affected by other local emission sources and the impacts of the ERF and Anaerobic Digestion combustion are likely to be significant, the impact of the local industrial emissions has been modelled.

Assessment

Construction Dust Methodology and Assessment Criteria

7.5.13 The Mayor of London's London SPG for control of dust and emissions based on the IAQM guidance requires an Air Quality and Dust Risk Assessment (AQDRA) to be submitted at the time of a planning application. The AQDRA generally covers all the physical activities for each phase of construction works (demolition, earthworks, construction, and track-out) which may result in dust generation. It is an assessment of risk in order to identify appropriate mitigation. It is not, per se, an assessment of the significance of effects. The IAQM guidance states that with appropriate mitigation in place, the effects of dust emissions are deemed to be not significant.

7.5.14 According to the SPG, an assessment of the risk of dust impacts is required if there is a human receptor within 350 m or a terrestrial biodiversity receptor within 50 m of the boundary of a construction site, or any defined receptor within 50 m of route(s) used by construction vehicles on the public highway, up to 500 m from the entrance.

7.5.15 If the development cannot be screened out, an AQDRA is undertaken based on:

- The scale and nature of the construction and demolition works which determine the potential of dust emission magnitude categorised as small, medium, or large.
- The sensitivity of the area to dust impacts which is defined as low, medium, or high sensitivity.

7.5.16 **Table 7.10** (taken from the SPG, paragraphs 4.27 to 4.33) shows examples for different activities which can be used as criteria for quantifying the dust emission magnitude.

Table 7.10: Risk Criteria for Dust Emission Magnitude

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

Large	Medium	Small
Construction		
▪ total building volume >100,000 m^3, or ▪ piling, or ▪ on-site concrete batching, or ▪ sandblasting	▪ total building volume 25,000 m^3 – 100,000 m^3, or ▪ potentially dusty construction material (e.g. concrete), or ▪ on-site concrete batching	▪ total building volume <25,000 m^3, or ▪ construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout		
▪ >50 HDV (>3.5 t) trips in any one day ▪ potentially dusty surface material (e.g. high clay/silt content) ▪ unpaved road length >100 m	▪ 10-50 HDV (>3.5 t) trips in any one day ▪ moderately dusty surface material (e.g. high clay content) ▪ unpaved road length 50 m – 100 m (e.g. high clay content)	▪ <10 HDV (>3.5 t) trips in any one day ▪ surface material with low potential for dust release ▪ unpaved road length <50 m

7.5.17 To define the sensitivity of the area containing human or ecological receptors several factors are considered which include; the sensitivity, proximity and number of receptors as well as the local background concentrations of PM_{10}. Additionally, the local conditions, history and concurrent dust generating activities are considered when determining the sensitivity of the area. The receptor sensitivity area is categorised as set out below.

High Sensitivity Areas

7.5.18 These locations are where people or property would be expected to be present continuously for long durations such as dwellings, hospitals, schools, and care homes. Locations such as museums, long term car parks, and car show rooms are considered high sensitivity areas due to the impact of dust soiling.

7.5.19 Locations with an international or national designation and designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species such as vascular species e.g. a SAC designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.

Medium Sensitivity Areas

7.5.20 People or property would be expected to be present continuously for extended periods. These are locations where people exposed are workers, and exposure is over a period relevant to the air quality objective for PM_{10} e.g. offices and shops.

7.5.21 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 e.g. a SSSI with dust sensitive features.

Low Sensitivity

7.5.22 People or property would be expected to be present for limited periods of time and human exposure is transient e.g. playing fields, parks, farmland, footpaths, short term car parks, roads, and shopping streets.

7.5.23 Locations with a local designation where the features may be affected by dust deposition. An indicative example is a LNR with dust sensitive features.

7.5.24 **Table 7.11**, **Table 7.12** and **Table 7.13** (taken from the SPG (SPG Tables 4.2, 4.3 and 4.4)) show how the sensitivity of the area within the specified distances from the source may be determined for dust soiling, human health and ecosystem impacts respectively.

Table 7.11: 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 7.12: Sensitivity of the area to human health impacts

Area Sensitivity	Annual Mean PM_{10} concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m³	>100	High	High	Medium	low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	< 24 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	< 24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

Table 7.13: Sensitivity of the area to ecological impacts

Receptor Sensitivity	Area Sensitivity	
	<20 m from the source	<50 m from the source
High	High	Medium
Medium	Medium	Low
Low	Low	Low

7.5.25 Based on the dust emission magnitude (**Table 7.10**) and the area sensitivity (**Table 7.11** to **7.13**), the risk of dust impacts is then determined (**Table 7.14**), taking into account professional judgement.

Table 7.14: Risk of Dust Impacts

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

7.5.26 More than one of these activities may occur on a construction site at any one time. It is important to consider cumulative effects when defining the risk category and if more than one activity occurs at any one time, the level of risk automatically moves to the higher category.

7.5.27 The significance criteria are based on the IAQM guidance. The guidance recommends that no assessment of the significance of effects is made without mitigation in place. Appropriate mitigation is secured by DCO requirements through the CoCP. With mitigation in place, the effect of construction dust relating to a development is deemed to be not significant (Section 7.8).

Transport Emissions Methodology

7.5.28 Road transport emissions during construction and operational phases which are assessed as being potentially significant, have been predicted using dispersion modelling. For the assessment of road traffic emissions, predictions have been carried out using the ADMS-Roads dispersion model (v4.1.1). The model requires the user to provide various input data, including the Annual Average Daily Traffic (AADT) flow, the proportion of HDVs, road characteristics and the vehicle speed. It also requires meteorological data. Traffic emissions were calculated using the Emission Factor Toolkit (EFT) v8.0.1 which is the most recent available.

7.5.29 Traffic speeds were based on local speed restrictions, taking into account congestion and proximity to junctions. Traffic data used for this assessment has been summarised in **Appendix C.1**. The modelling has been verified against 2017 monitoring data, as this was the most recent available at the time of the assessment.

7.5.30 The following scenarios have been modelled:

- 2017 existing baseline – for model verification;
- future baseline with committed developments due to be operational by the time REP is anticipated to be under construction in 2021 and without the Proposed Development (DM); and
- future with committed developments and with the Proposed Development (DS).

7.5.31 The same modelling methodology was used to determine the road traffic contribution to baseline concentrations where the human health receptors for the assessment of impacts from the ERF are close to road sources. For this assessment, traffic data from the London Atmospheric Emissions Inventory has been used.

River Transport Emissions Methodology

7.5.32 The Air Quality Strategy for the Tidal Thames (Port of London Authority, 2018) provides information on the air quality impacts of vessel movements on the River Thames. This data has been used, along with estimates of the change in vessel movements associated with REP, to assess the impact of REP river vessel movements on local air quality.

Combustion Emissions Methodology

7.5.33 The ADMS 5 model was used for the modelling of the dispersion of exhaust gases during operation of the ERF and the Anaerobic Digestion facility.

ERF

7.5.34 The ADMS 5 model calculates time averaged ground level concentrations over any set of distances from the source. A 4 km by 4 km Cartesian grid with 40 m spacing[3] was used to predict the maximum predicted contribution to ground level concentrations. The pollutant concentrations were also predicted at specific human and terrestrial biodiversity receptor locations.

[3] There is a difference between study area and the area over which significant effects occur. In order, to identify the MaxGLC, a smaller grid has been used.

7.5.35 The model requires inputs for:

- Building effects;
- Nature of the Surface;
- Physical characteristics of the emissions; and
- Meteorology.

7.5.36 Buildings can influence the dispersion of pollutants from sources and can increase the maximum predicted ground level concentrations. The main effect of a building is to entrain pollutants into the cavity region in the immediate leeward side of the building, bringing them rapidly down to ground level. Therefore, concentrations near the building are increased but further away concentrations are decreased.

7.5.37 The buildings that are nearest (or attached) to the sources have been considered in the model. Buildings located horizontally within the distance equivalent to five stack heights of the stack and taller than approximately a third of the stack height have been included, in accordance with advice from the software provider.

7.5.38 Buildings have been simplified and taken to be the maximum size of the building envelope for which development consent would be sought (i.e. the Rochdale Envelope). The modelled buildings are therefore larger than the building that would be constructed in practice and would therefore have a greater impact on dispersion of pollutants, leading to higher maximum ground level concentrations. The building parameters used for the modelling are shown in the **Table 7.15** and the buildings are presented in **Figure 7.1**. In addition, for sensitivity testing, modelling has also been undertaken of a ‘stepped’ building configuration which is the likely form of REP to be constructed. The stepped building configuration is also shown in **Figure 7.1**.

Table 7.15: Parameters of the buildings

Building	Coordinates	Length (m)	Width (m)	Height above Ground (m)
Main REP Building	549458, 180667	201	102	62
Anaerobic Digestion facility	549390, 180615	88	45	40
Ancillary Process Building	549540, 180618	111	115	35

RRRF Building	549691, 180650	145	77	37

7.5.39 Terrain around the REP site is relatively flat and is unlikely to influence the dispersion of pollutants. Previous modelling of the area has been run with, and without a digital terrain dataset and it was concluded that running the models with the terrain data does not influence the dispersion and ground level concentrations. For this reason, it has not been included in this model.

7.5.40 The nature of the surface may impact the dispersion of pollutants. The surface roughness length is a representation of the disruption of airflow close to the ground due to obstructions and protuberances, such as buildings, trees and hedges. To account for the surrounding nature of the application site a surface roughness length of 0.5 m has been used, as recommended by the software provider for parkland, open suburbia.

7.5.41 Emissions of NO_x from combustion sources include both NO_2 and NO, with the majority being in the form of NO. In ambient air, NO is oxidised to form NO_2, and it is NO_2 which has the greater health impacts. For this assessment, the conversion of NO to NO_2 has been estimated using the worst-case assumptions set out in Environment Agency (EA) guidance[4], namely that:

- For the assessment of long term (annual mean) impacts at receptors, 70% of NO_x is NO_2; and
- For the assessment of short term (hourly mean) impacts at receptors, 35% of NO_x is NO_2.

7.5.42 The oxidation of NO to NO_2 is not, however, an instantaneous process and where the maximum impacts occur within up to 1 km of the stacks (as will be the case at REP), the EA assumptions lead to a conservative assessment.

7.5.43 The dispersion model requires input relating to the emissions. It is assumed that there are no maintenance or shut-down periods and the source is emitting for 100% of the time at the BAT maximum permitted emission limit values **Tables 7.16** and **Table 7.17** provide the source parameters and emission rates used for the assessment of emissions from the ERF. The emission rates in g/s are for both flues combined.

7.5.44 Group 3 metal stack emissions have been calculated using the case specific screening approach within the Guidance on Releases from waste incinerators[5]. Table A1 within the guidance contains a summary of 34 measured concentrations of metals between 2007-2015 at 18 municipal waste incinerators

[4] Conversion Ratios for NO_x and NO_2, Air Quality Modelling and Assessment Unit, Environment Agency

[5] Guidance on assessing group 3 metal stack emissions from incinerators version 4, Environment Agency, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/532474/LIT_7349.pdf, 24/04/2018

and waste wood co-incinerators in the UK. The maximum values have been used to calculate the emissions.

Table 7.16: Source parameters for ERF

Parameter	Flue 1	Flue 2
Discharge Location (m)	549461, 180749	549455, 180749
Stack height (m)	90	
Internal Stack Diameter (m)	2.2	
Flue gas velocity (m/s)	19.585	
Oxygen (wet) (%v/v)	5.0	
Oxygen (dry) (%v/v)	6.4	
Moisture Content (%v/v)	21.4	
Temperature (degree C)	120	
Actual flow rate each (Am^3/s)	74.45	
Normalized flow rate, dry, 11% oxygen each (Nm^3/s)	59.54	

Table 7.17: Pollutant emission rates used in this Assessment

Pollutant	Daily Emission Limit Value[a] (mg/Nm^3)	Emission Rate from proposed ERF stack (g/s)
Ammonia	10	1.19
Benzene [b]	10	1.19
Benzo(a)pyrene [c]	2.1×10^{-4}	2.5×10^{-5}
Carbon monoxide	50	5.95
Dioxins and Furans	6.0×10^{-8}	7.14×10^{-9}
Hydrogen chloride	6	0.71
Hydrogen fluoride	1	0.12
Oxides of Nitrogen (NO_x)	120	14.3
Particulates (PM_{10})	5	0.60
Particulates ($PM_{2.5}$)	5	0.60

Pollutant	Daily Emission Limit Value[a] (mg/Nm^3)	Emission Rate from proposed ERF stack (g/s)
Sulphur dioxide	30	3.57
Group 1 metals		
Mercury	0.020	2.38×10^{-3}
Group 2 metals		
Cadmium [d]	0.020	2.382×10^{-3}
Thallium [d]	0.020	2.382×10^{-3}
Group 3 metals		
Antimony [e]	0.012	1.37×10^{-3}
Arsenic [e]	0.025	2.98×10^{-3}
Chromium (Total) [e]	0.092	0.011
Chromium III [f]	0.3	0.036
Chromium VI [e]	1.30×10^{-4}	1.55×10^{-5}
Cobalt [e]	5.60×10^{-3}	6.67×10^{-4}
Copper [e]	0.029	3.45×10^{-3}
Lead [e]	0.050	5.99×10^{-3}
Manganese [e]	0.060	7.14×10^{-3}
Nickel [e]	0.220	0.026
Vanadium [e]	6.00×10^{-3}	7.14×10^{-4}

[a] Daily BAT AEL (as currently drafted) or maximum measured concentrations from EA Guidance for group 3 metals
[b] Assuming all TVOC is Benzene
[c] Assuming all PAH as Benzo(a)Pyrene
[d] Assuming the metal occurs at 100% of the total emissions limit of its group, thus ensuring the worst case is modelled
[e] Maximum measured concentrations from Table A1 Appendix A of guidance on assessing group 3 stack emissions from incinerators
[f] Chromium III emissions are based on the worst-case assumption [d], above. The emission rate used is higher than that used for Total Chromium for which a more accurate emission rate is available, however, information on the proportion of Chromium III in Total Chromium emissions is not available and therefore the worst-case emissions rate was used.

7.5.45 The model utilises a meteorological dataset that contains hourly values for wind speed, wind direction, and atmospheric stability to compute the dispersion of the emissions.

7.5.46 The assessment has used the 5-year (2013 – 2017) meteorological data set for London City Airport. Wind roses for the modelled data are provided in **Figure 7.2**.

7.5.47 The London City Airport meteorological station is the closest meteorological station to the site (approximately 7 km to the west). A sensitivity test was also completed by comparing the results using meteorological data from London

Heathrow and London Gatwick. The results of the modelling using the different meteorological stations were found to be similar.

7.5.48 The dry deposition velocities and conversion factors for NO_2, NH_3, SO_2, and HCl were taken from the EA's guidance document AQTAG 06[6] and are set out in **Table 7.18a**.

Table 7.18a: Deposition Velocities Used in Calculations

Substance	Habitat	Dry Deposition Velocity (mm/s)	Conversion µg/m²/s to kgN/ha/yr	Conversion µg/m²/s to keq/ha/yr
Nitrogen dioxide (NO_2)	Grassland	1.5	96.0	6.84
	Woodland	3.0		
Sulphur dioxide (SO_2)	Grassland	12.0	-	9.84
	Woodland	24.0		
Ammonia (NH_3)	Grassland	20.0	259.7	18.5
	Woodland	30.0		
Hydrochloric acid (HCl)	Grassland	25.0	-	8.63
	Woodland	60.0		

7.5.49 In accordance with the EA's guidance document, only the wet deposition of HCl was considered in the assessment and in accordance with their methodology, it was assumed to be twice the calculated dry deposition. The acid deposition of HCl was added to that of SO_2 for comparison with the critical load function.

7.5.50 Baseline air quality in the vicinity of REP is influenced by the presence of other point sources. The following point sources were included in a combined model to estimate the predicted environmental concentrations from point source contributions:

- RRRF, Belvedere; and
- Crossness Sewage Sludge Incinerator.

[6] 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)

7.5.51 These sources have been considered here as they are located within the vicinity of REP where the predicted concentrations of nitrogen dioxide from REP are above the level of potential significance. The parameters used for modelling are provided in **Appendix C.2.**

Anaerobic Digestion Combustion

7.5.52 Biogas generated by the anaerobic digestion of waste may be burned in a CHP engine or burnt in a flare when the CHP engine is unavailable. The CHP engine is anticipated to operate for approximately 8,000 hours per year. The biogas will be burnt in a flare when the biogas engine is unavailable, and this is estimated to be between 200 and 400 hours per year.

7.5.53 The emissions from the flare will not have a significant impact on the environment due to the limited operating hours. The emissions from the biogas engine have been modelled assuming that the engine is operational all year round (8,760 hours per year) which will account for the impact of emissions from the flare. The emission parameters from the assumed biogas engine are shown in **Table 7.19**.

Table 7.19: Source parameters for Biogas Engine

Parameter	Model set-up
Discharge Location (m)	549391, 1807594
Stack height (m)	8
Internal Stack Diameter (m)	0.64
Flue gas velocity (m/s)	10
Oxygen (wet) (%v/v)	10
Moisture Content (%v/v)	10
Temperature (degree C)	450
Actual flow rate each (Am^3/s)	3.24
Normalized flow rate, dry, 5% oxygen (Nm^3/s)	0.754
NO_x emission concentration, 5% oxygen (mg/Nm^3)	500
NO_x emission rate (g/s)	0.38

7.5.54 The CHP engine exhaust is located in the south west corner of the REP site and the exhaust stack is lower than the Main REP Building. As such, the pollutants will disperse in the immediate vicinity of the stack. Pollutant concentrations have therefore been predicted for a receptor grid covering 400 m west to east and 400 m north to south, with a grid spacing of 40 m.

7.5.55 When the CHP engine is unavailable, the biogas would be flared in a 14 m high enclosed ground flare. The flare is estimated to operate between 200 and 400 hours per year. The exhaust gas temperature would be 850°C, with a calculated NO_x emission rate of approximately 0.12 g/s (equivalent to 150 mg/Nm^3). The flare emissions are therefore lower than from the CHP engine, and would be released at a higher temperature and from a higher stack. The impact of the flare emissions would therefore be lower than for the CHP engine. As the impacts of the CHP engine have been assessed assuming year-round operation, then this would more than account for the impact of the emissions from the flare.

Emissions from Transport and Combustion Assessment Criteria

7.5.56 There is no official guidance in the UK on how to assess the significance of air quality effects from a proposed development. The approach[7] developed by the IAQM and Environmental Protection UK (EPUK) has been used to assess the impact on human health receptors as this is the industry standard approach.

7.5.57 In this assessment, the impacts of emissions to air are assessed against the threshold concentrations implied by the limit values and the air quality objectives referred collectively as Air Quality Assessment Levels (AQALs) as listed below:

- The Ambient Air Directive Limit Values;
- Ambient Air Directive and 4th Daughter Directive Target Values;
- UK Air Quality Strategy Objectives; and
- Environmental Assessment Levels.

7.5.58 Further details of these are set out in Section 7.2 above.

7.5.59 The first step is to describe the magnitude of the impact of a given pollutant at a specific location including the point of maximum impact as a fraction of the relevant assessment criterion as set out in **Table 7.20.**

[7] Moorcroft and Barrowcliffe. et al. (2017). 'Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London. Available at http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf accessed: 15/02/2018

Table 7.20: Impact Magnitude for changes in relation to the AQAL

Magnitude	Annual Mean Concentration
Very Large	Increase of > 9.5% of the AQAL
Large	Increase of > 5.5% - 9.5% of the AQAL
Medium	Increase of >1.5% - ≤5.5% of the AQAL
Small	Increase of >0.5% - ≤1.5% of the AQAL
Imperceptible	Increase of ≤ 0.5% of the AQAL

7.5.60 The predicted change in annual mean concentration is then considered in relation to the total concentration, i.e. including the baseline concentration in accordance with **Table 7.21**. The total concentration including the impact of all relevant pollutant sources is termed the Predicted Environmental Concentration.

Table 7.21: Impact descriptors relative to Ambient Air Quality for Annual Average Concentrations

PEC as & of AQAL	Change in Concentration				
	Imperceptible	Small	Medium	Large	Very Large
> 109.5 %	Negligible	Moderate	Major	Major	Major
>102.5% - ≤109.5%	Negligible	Moderate	Moderate	Major	Major
>94.5% - ≤102.5%	Negligible	Minor	Moderate	Moderate	Major
>75.5% - ≤94.5%	Negligible	Negligible	Minor	Moderate	Moderate
≤75.5%	Negligible	Negligible	Negligible	Minor	Moderate

7.5.61 For short-term concentrations (i.e. those averaged over an hour or less) the IAQM guidance states that baseline concentrations are less important because the peak concentrations attributable to the source and the baseline are not additive. **Table 7.22** provides the assessment criteria for short term impacts.

Table 7.22: Impact descriptors relative to Ambient Air Quality for Short Term Impacts

Process Contribution (PC)		Impact Severity
Impact Descriptor	**% of AQAL**	
Large	> 50.5 %	Major
Medium	>20.5% - ≤50.5%	Moderate
Small	>10.5% - ≤20.5%	Slight
Negligible	≤10.5%	Negligible

7.5.62 The IAQM guidance states that the assessment of significance should be based on professional judgement, taking into account factors including:

- the number of properties affected by minor, moderate or major air quality impacts and a judgement on the overall balance;
- the magnitude of the changes and the descriptions of the impacts at the receptors i.e. **Table 7.20** to **Table 7.22** findings;
- whether or not an exceedance of an objective or limit value is predicted to arise in the operational study area where none existed before or an exceedance area is increased;
- the uncertainty, comprising the extent to which worst-case assumptions have been made; and
- the extent to which an objective or limit value is exceeded.

7.5.63 For impacts on terrestrial biodiversity receptors, the IAQM guidance recommends adopting EA guidance for environmental permitting. For environmental permitting, EA guidance describes the following process contribution (PC) as being insignificant when undertaking a screening assessment of emissions to air:

- the short-term PC is less than 10% of the short-term environmental standard; and
- the long-term PC is less than 1% of the long-term environmental standard.

7.5.64 Where a PC is above the screening criteria, it should be added to an estimate of the baseline concentration to provide the Predicted Environmental Concentration (PEC). Where a PC causes a breach of the relevant assessment level, and the PC is the significant causal factor for the breach then the PC is unlikely to be acceptable and further controls are likely to be required on the operation of the installation to mitigate the impact (i.e. further mitigation to reduce emissions or the consideration of the need for a higher stack).

7.5.65 The emissions on terrestrial biodiversity receptors can be considered insignificant in accordance with the EA guidance if:

- The short-term PC at SPAs, SACs, SSSI, and Ramsar sites is less than 10% of the short-term standard;
- The short-term PC at local nature sites is less than 100% of the short-term standard;
- The long-term PC at SPAs, SACs, SSSI, and Ramsar is less than 1% of the long-term environmental standard; and
- The long-term PC at local nature sites is less than 100% of the long-term environmental standard.

7.5.66 Nitrogen and acid deposition within the terrestrial biodiversity receptors have been calculated from the maximum predicted concentration using the approach in EA guidance AQTAG06. The predicted deposition rate is compared against the site relevant critical loads.

Human Health Risk Assessment

7.5.67 Whilst many pollutants disperse readily in the environment, there are a number which are persistent and these can build up in the environment, having a potential impact on the health of those exposed in the long term. Exposure pathways can be direct (e.g. inhalation) or indirect (e.g. through the food chain). As health effects can develop over a number of years, assessment is made on a lifetime basis. Pollutants that are of concern as being persistent are metals, dioxins, furans and PCBs.

7.5.68 The assessment of these long term risks has been carried out using the US Environmental Protection Agency's (EPA) Human Health Risk Assessment protocol using the commercially available Industrial Risk Assessment Protocol (IRAP) software. This model calculates the total lifetime exposure via direct and indirect pathways for an individual at different locations and diets which reflect diets based on produce grown at the location in question (termed 'farmer') or a largely imported diet ('resident'). The model then calculates the associated health risks. As there is no equivalent UK model, this approach is considered to be appropriate.

7.6 Assumptions and Limitations

7.6.1 There are many components that contribute to the uncertainty in predicted concentrations. The models used in this assessment are dependent upon the traffic and emission data inputs which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

7.6.2 A disparity between national road transport emissions projections and measured annual mean concentrations of nitrogen oxides and NO_2 has been identified in recent years. Whilst projections forecast a significant decrease in both annual mean nitrogen oxides and NO_2 concentrations from road traffic emissions, at many monitoring sites, levels have remained relatively stable, or have shown a slight increase.

7.6.3 The complete development traffic modelling has been based on 2022 emission factors and background concentrations (EFT v.8), whilst utilising forecast traffic flows for 2024. The model has been verified against 2017 monitoring data. This is considered to provide an appropriately conservative assessment taking into account the uncertainties regarding future vehicle emission factors and further information regarding emissions factors for roads models is provided in **Appendix C.1.**

7.7 Baseline Conditions and Receptors

General

7.7.1 Pollutant concentrations within the study area will be subject to a high degree of spatial variability, particularly those associated with road traffic emissions or emissions from other local point sources. Where a receptor within the assessment is close to a major road, the effects of emissions from the road have been modelled to obtain a more realistic assessment of the baseline concentration, to which the contribution of the development has been added.

7.7.2 Similarly, where baseline concentrations are affected by other local emission sources and the impact of the ERF and Anaerobic Digestion combustion are likely to be significant, the impact of the local industrial emissions has been modelled.

7.7.3 The summary of the closest and most representative automatic monitoring stations is provided in **Table 7.23a.** In addition, the three local authorities operate an extensive network of diffusion tubes, measuring annual average concentrations of NO_2.

Table 7.23a: Local Authority Automatic Monitoring Stations Close to the Proposed REP

Monitoring Site	Local Authority	Site Reference Grid	Data Capture 2017	Site Type	Pollutants Measured
Slade Green (BX1)	LBB	551864, 176379	95%	Automatic Suburban background	NO_2, O_3, PM_{10}, $PM_{2.5}$ and SO_2
Belvedere Primary School (BX2)	LBB	549980, 179064	98%	Automatic Urban background	NO_2, PM_{10}, $PM_{2.5}$

Monitoring Site	Local Authority	Site Reference Grid	Data Capture 2017	Site Type	Pollutants Measured
Bexley Business (BQ7)	LBB	548465, 179469	98%	Automatic Urban background	NO_2, O_3, PM_{10}, $PM_{2.5}$
Scrattons Farm (BG2)	LBBD	548043, 183320	93%	Automatic Suburban	NO_2, PM_{10}
Rainham (HV1)	LBH	553110, 182517	100%	Automatic Roadside	NO_2, PM_{10}, $PM_{2.5}$

Nitrogen Dioxide

7.7.4 Nitrogen dioxide is critical in determining the overall impact of an industrial process as it is associated strongly with combustion processes and is present in UK atmospheres at concentrations which are close to and above air quality standards. A summary of the concentration of NO_2 measured at the local monitoring sites are presented in **Table 7.24a** below:

Table 7.24a: Local Authority Monitoring NO_2 Concentrations (2014 – 2017)

Monitoring Site	Annual Mean µg/m³				Number of hours hourly mean > 200 µg/m³			
	2014	2015	2016	2017	2014	2015	2016	2017
Slade Green (BX1)	27	26	25	25	0	0	0	0
Belvedere Primary School (BX2)	27	24	29	28	0	0	0	0
Bexley Business (BQ7)	23	22	24	21	0	0	0	0
Scrattons Farm (BG2)	31	29	32	29	0	0	0	0
Rainham (HV1)	35	32	34	34	0	0	0	0
Objective	**40**				**18**			

7.7.5 The values show that for the locations shown above, the NO_2 concentrations are compliant with the limit values and meet the national air quality objectives. As expected the station at Rainham indicates the highest value as it is a roadside monitoring location, however, concentrations measured at this location are still below the relevant objectives.

Particulate Matter

7.7.6 Particulate matter is a term used to describe all suspended solid matter. Sources of particles in the air include road transport, construction, and industrial processes. Chemical processes in air also lead to the formation of particles. There are two measures of particulate matter for which data are generally available; particulate matter with an aerodynamic diameter of less than 10 µm known as PM_{10} and particulate matter with an aerodynamic diameter of less than 2.5 µm known as $PM_{2.5}$.

7.7.7 A summary of the concentrations of particulate matter measured at the respective monitoring locations are provided in the **Tables 7.25a** and **Table 7.26a** below:

Table 7.25a: Local Authority Monitoring PM_{10} concentrations (2014 – 2017)

Monitoring Site	Annual Mean µg/m³				Number of Daily Mean Concentrations > 50 µg/m³			
	2014	2015	2016	2017	2014	2015	2016	2017
Slade Green (BX1)	15	14	18	17	0	1	3	3
Belvedere Primary School (BX2)	17	14	14	14	6	1	3	0
Bexley Business (BQ7)	19	18	15	17	6	2	5	2
Scrattons Farm (BG2)	20	21	20	19	6	4	4	4
Rainham (HV1)	19	18	19	18	3	3	6	4
Objective	**40**				**35**			

Table 7.26a: Local Authority Monitoring $PM_{2.5}$ concentrations (2014 – 2017)

Monitoring Site	$PM_{2.5}$ Annual Mean µg/m^3			
	2014	2015	2016	2017
Slade Green (BX1)	16	15	11	8
Rainham (HV1)	12	11	12	12
Objective	**25 (20 in 2020)**			

7.7.8 Monitored concentrations are below the relevant objectives.

7.7.9 Maps of annual mean background concentrations of the four key pollutants (NO_x, NO_2, PM_{10} and $PM_{2.5}$) are produced and are updated periodically by DEFRA[8] for the purposes of the LAQM Regulations. They provide the estimates for present and future concentrations and are presented as 1 km x 1 km grid square averages. The most recent version of the background maps was recently released in November 2017 and provide estimates for 2015 – 2030.

7.7.10 These background maps have been calibrated against measured local background concentrations for Bexley to provide a better estimate of the influence of any local sources. As an example, the 2017 and 2024 background concentrations for grid square 549000, 180000 are presented below in the **Table 7.27a.**

Table 7.27a: DEFRA Background Map Estimates for Concentrations at the REP site (grid square 549000, and 180000)

Pollutant	2017	Adjusted 2017	2024[a]	Adjusted 2024
NO_x	22.4	29.5	17.5	23.0
NO_2	16.0	21.1	12.8	16.9
PM_{10}	14.4	14.8	13.9	14.4
$PM_{2.5}$	9.6	8.7	9.1	8.3

[a]2022 background concentrations have been used to represent 2024 conditions due to uncertainty in future emissions. This is considered to be a reasonable worst case approach.

Other Pollutants

[8] Department of the Environment, Food and Rural Affairs (DEFRA) (2017). 2015 Based Background Maps for NOx, NO_2, PM_{10} and $PM_{2.5}$. Available: http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

7.7.11 Other than the NO_2 and Particulate matter, the pollutants considered in the assessment are from the IED as follows:

- Sulphur dioxide (SO_2);
- Carbon Monoxide (CO);
- Hydrogen fluoride (HF);
- Hydrogen chloride (HCl);
- Total organic carbon (TOC) as benzene;
- Dioxins and furans (PCDD/Fs); and
- Trace metals: cadmium (Cd), thallium (Tl), mercury (Hg), antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), Nickel (Ni), and vanadium (V).

7.7.12 Emissions of ammonia (NH_3) and Polycyclic Aromatic Hydrocarbons (PAHs) have also been considered.

7.7.13 DEFRA provides an interactive mapping facility[9], which displays an estimated annual mean concentration of some additional pollutants including Arsenic, Benzene, BaP, Cadmium, Carbon Monoxide, Lead, and Nickel. Furthermore, monitoring networks that measure other pollutants and measurements from these monitoring sites can provide information on background concentrations of specific pollutants where more detailed pollutant modelling information is not available. **Table 7.28** shows the background concentrations used in this assessment. Although rounded values are provided below, unrounded concentrations have been used in the assessment. The appropriate conversion factor for each averaging period has been used in accordance the EA guidance.

Table 7.28: Summary of background concentrations selected for use in the assessment

Pollutant	Averaging Time	Background Concentration
Ammonia	Annual [a]	2 µg/m^3
	Hourly	4 µg/m^3
Antimony	Annual [b]	1 ng/m^3
	Hourly	2 ng/m^3
Arsenic	Annual [c]	1 ng/m^3
Benzene	Annual [c]	0.6 µg/m^3
Cadmium	Annual [c]	0.25 ng/m^3

[9] https://uk-air.defra.gov.uk/data/gis-mapping

Pollutant	Averaging Time	Background Concentration
Carbon monoxide	Annual [d]	0.5 mg/m^3
	8 Hour	1 mg/m^3
Chromium	Annual [c]	2 ng/m^3
	Hourly	3 ng/m^3
Chromium VI	Annual [j]	0.3 ng/m^3
Cobalt	Annual [c]	0.1 ng/m^3
Copper	Annual	11 ng/m^3
	Hourly	21 ng/m^3
Hydrogen chloride	Annual [e]	1 µg/m^3
	Hourly [e]	2 µg/m^3
Hydrogen fluoride	Annual [e]	0.5 µg/m^3
	Hourly [e]	1 µg/m^3
Lead	Annual [c]	11 ng/m^3
Manganese	Annual [c]	5 ng/m^3
	Hourly	11 ng/m^3
Mercury	Annual [f]	2 ng/m^3
	Hourly	3 ng/m^3
Nickel	Annual [c]	1 ng/m^3
PAH	Annual [d]	0.2 ng/m^3
Sulphur dioxide	Annual [i]	2 µg/m^3
	Daily	3 µg/m^3
	Hourly	5 µg/m^3
	15-minute	6 µg/m^3
Thallium	Annual	0.25 ng/m^3
Vanadium	Annual	1 ng/m^3
	Hourly	2 ng/m^3
Dioxins and Furans	Annual [e]	8.0 fg/m^3

a) Background Measurements are taken from London Cromwell 2 for 2016
b) Background Measurements are taken from Detling Station for 2013
c) Background Measurements are taken from Chadwell St Mary for 2016
d) Background Measurements are taken from London Marylebone for 2016
e) Background concentrations assumed as those within the ES chapter prepared for the site extension in 2014.
f) Background Measurements are taken from Chilbolton Observatory for 2016
g) Max Location DEFRA background concentration calibrated against local background monitoring as discussed in Table 7.22

h) Background Measurements are taken from London Marylebone for 2016)
i) Max Location DEFRA background concentration calibrated against locally measured concentration at Rush Green
j) A report by US Department of Health suggests that in ambient air, 10%-20% of the chromium present occurs as Cr(VI) so 20% have been used

Conversion to various averaging times:
1-hour mean concentrations have been estimated by multiplying the annual mean by a factor of 2 in accordance with the EA guidance
24-hour mean concentrations have been estimated by multiplying the 1-hour mean by a factor of 0.59 in accordance with the EA guidance
8-hour mean concentrations have been estimated by multiplying the 1-hour mean by a factor of 0.7 in accordance with the EA guidance
15-minute mean concentrations have been estimated by multiplying the 1-hour mean by a factor of 1.34 in accordance with theEA guidance

Human Receptors

7.7.14 The human health receptors in the vicinity of REP are listed in **Table 7.29a** and shown in **Figure 7.3.1**.

Table 7.29a: Human Receptors within the vicinity of the Proposed REP

ID	Easting	Northing	Height (m)	Description
R1	548447	179561	1.5	The Business Academy
R2	549598	179653	1.5	Belvedere Park housing development
R3	547979	179883	1.5	St. Katherine's Road
R4	553700	180981	1.5	Wennington Road, Rainham
R5	548054	181106	1.5	Cherbury Close, Thamesmead
R6	553036	181752	1.5	Brady Primary School, Rainham
R7	552255	182069	1.5	Wennington Road/Anglesey Drive
R8	550720	182179	1.5	CEME Innovation Centre, Marsh Way
R8B	550841	182170	1.5	
R9	546451	182314	1.5	George Carey CofE Primary School
R10	547209	182983	1.5	Sovereign Road, Barking
R11	550873	182892	1.5	Spencer Road, South Hornchurch
R12	548137	183305	1.5	Shaw Gardens, near Scrattons Farm
R13	549389	183528	1.5	Marsh Green Primary School, Dagenham
R14	548856	183584	1.5	St. Peter's Primary School, Dagenham

ID	Easting	Northing	Height (m)	Description
R15	550577	182914	1.5	Beam Park Residential Development
R16	548203	179699	1.5	Education Facility
R16B	548177	179598	1.5	
R17	548067	181170	1.5	Lytham Close
R18A 1st	552137	182050	4.5	Celtic Farm Road
R18B 4th	552137	182050	13.5	
R19A 1st	549736	179858	4.5	Clydesdale Way
R19B 6th	549736	179858	18	Clydesdale Way
R20A GF	552160	182011	1.5	Capstan Drive
R20B 5th	552160	182011	16.5	
R21	547743	183541	0	Scrattons Terrace
R22	552403	182326	1.5	Rainham Village Children's Centre
R23	550740	178649	1.5	5 Corinthian Road
R24	551583	177400	1.5	24 South Road
R25	551621	177360	1.5	41 Guild Road
R26	547291	151297	1.5	Voyagers Close
R27	555056	175662	1.5	Cornwall Road

Terrestrial Biodiversity Receptors

7.7.15 The nitrogen and sulphur emissions from the stack of the ERF can lead to acid deposition and have the potential to impact the richness and diversity of ecological sites. In this assessment, the potential concentrations and deposition of air pollutants from REP have been assessed against the following environmental criteria; critical loads for nitrogen deposition and acid deposition, and critical levels for NO_x, SO_2, HF, and NH_3. Critical loads provide a threshold of pollutant levels at which point exceedance is likely to result in habitat damage. In this assessment, the results of emissions from REP have been compared to current baseline deposition levels.

7.7.16 DEFRA's MAGIC website was used to identify the International and Nationally designated sites within 15 km of REP's stack and the LNRs within 2 km. In addition, locally designated sites were identified within 2 km of REP stack. Existing nitrogen and acid deposition rates within the study area were determined from the Air Pollution Information System (APIS) website[10]. The locations assessed in this study are set out in **Table 7.30** below and shown in **Figure 7.4.1 and 7.4.2**. The eastings and northings refer to the point of maximum impact due to the emissions from REP.

Table 7.30: Terrestrial Biodiversity Receptors within the vicinity of the REP site

Site Name and Designation	Dist. From stack (km)	Easting	Northing	Main Habitat Type
International and Nationally Designated Sites				
Inner Thames Marshes (SSSI) / Rainham Marshes (SSSI/LNR)	2.0	551372	181256	Neutral Grassland
Ingrebourne Marshes (SSSI/LNR)	3.1	552072	182506	Fen, marsh and swamp
Oxleas Woodlands (SSSI)	6.6	544722	176156	Broadleaved, mixed and yew woodland
Purfleet Chalk Pits (SSSI)	6.9	555972	178556	Geological
Wansunt Pit (SSSI)	7.1	551497	173932	Geological
Gilbert's Pit (Charlton) (SSSI)	7.8	541872	178756	Geological
Hornchurch Cutting (SSSI)	8.4	554672	187356	Geological
West Thurrock Lagoon & Marshes (SSSI)	8.8	557272	176756	Littoral Sediment

[10] Air Pollution Information System (APIS) (2017). 'Site relevant critical loads'. Available at: http://www.apis.ac.uk/

Site Name and Designation	Dist. From stack (km)	Easting	Northing	Main Habitat Type
Ruxley Gravel Pits (SSSI)	10.5	547572	170406	Standing open water and canals
Lion Pit (SSSI)	10.6	559772	178256	Geological
Epping Forest (SSSI)	10.7	540475	186543	Acid Grassland
Grays Thurrock Chalk Pit (SSSI)	11.4	560772	179106	Broad-leaved, mixed and yew woodland
Darenth Wood (SSSI)	11.4	557972	173106	Broad-leaved, mixed and yew woodland
Swanscombe Skull Site (SSSI/NNR)	12.1	559772	174356	Geological
Epping Forest (SAC)	12.2	539772	188106	Broadleaved, mixed and yew woodland
Hainault Forest (SSSI)	12.4	548065	193119	Broad-leaved, mixed and yew woodland
Farningham Wood (SSSI/LNR)	12.8	553722	168706	Broad-leaved, mixed and yew woodland
Baker's Hole (SSSI)	13.2	561072	174506	Geological
Hangman's Wood & Deneholes (SSSI)	13.7	563122	179456	Broad-leaved, mixed and yew woodland
Curtismill Green (unit 4) (SSSI)	14.9	553222	195206	Neutral Grassland
Thorndon Park (all units) (SSSI)	15.0	560222	191156	Broad-leaved, mixed and yew woodland
Locally Designated Sites				
Crossness (LNR)	0.8	549322	179956	Neutral Grassland Scrub and Rough Grassland
M041	0.03	549429	180755	Coastal and Floodplain Grazing Marsh
BxBI02	0.3	549686	180510	Standing Open Water and Canals
HvBI18	0.9	549898	181533	Rivers and Streams
B&DB103	0.9	550010	181463	Standing Open Water and Canals
BxBII25	0.9	548524	180780	Standing Open Water and Canals
BxBI14	1.1	548405	181084	Acid grassland
BxL07	1.3	548135	180661	Wood-Pasture & Parkland
BxBII02	1.4	548806	179546	Standing Open Water and Canals

Site Name and Designation	Dist. From stack (km)	Easting	Northing	Main Habitat Type
BxL16	1.5	547975	180475	Broadleaved, Mixed and Yew Woodland
Thamesmead East (Bexley)	1.6	547855	181089	Standing Open Water and Canals
M031	1.6	551066	181078	Rivers and Streams
BxBII26	1.6	550642	179604	Standing Open Water and Canals
BxB103	1.9	549683	178875	Broadleaved, Mixed and Yew Woodland
M039	2.0	551360	181215	Coastal and Floodplain Grazing Marsh
B&DBI07	2.0	548079	182156	Rivers and Streams
Lesnes Abbey (LNR)	2.0	548850	178871	Broadleaved, Mixed and Yew Woodland

7.7.17 Estimates of existing background levels and loads within the specified habitat locations were obtained from the APIS[11] website and are provided in the **Table 7.31a** below. The sites for which the habitats had been designated on the basis of their geological interest only or are not sensitive to air pollution (i.e. littoral sediment) have not been included as they are not sensitive to acid or nitrogen deposition.

Table 7.31a: Current Deposition Rates at the Specific Terrestrial Biodiversity Receptors

Site Name	NO_x (µg/m^3)	SO_2 (µg/m^3)	NH_3 (µg/m^3)	Nitrogen deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)	
					Nitrogen	Sulphur
International and Nationally Designated Sites						
Inner Thames Marshes/ Rainham Marshes (SSSI/LNR)	40.9	2.3	2.4	16.94	1.21	0.19
Oxleas Woodlands (SSSI)	33.8	1.5	2.1	28.28	2.02	0.2
Epping Forest (SSSI)	39.2	0.4	1.6	18.3	1.28	0.17

[11] Air Pollution Information System (APIS) (2017). 'Site relevant critical loads'. Available at: http://www.apis.ac.uk/

Site Name	NO_x (µg/m³)	SO_2 (µg/m³)	NH_3 (µg/m³)	Nitrogen deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)	
					Nitrogen	Sulphur
Epping Forest (SSSI/SAC)	45.4	1.7	2.8	19.7	2.46	0.21
Ingrebourne Marshes (all units) (SSSI/LNR)	33.6	2.3	2.4	16.94	Not sensitive	
Thorndon Park (all units) (SSSI)	21.2	1.5	1.7	27.58	1.97	0.19
Hainault Forest (SSSI)	22.9	2.8	1.8	26.46	1.89	0.18
Curtismill Green (unit 4) (SSSI)	29.4	0.3	1.8	16.4	1.17	0.15
Grays Thurrock Chalk Pit (SSSI)	36.9	3.5	1.5	24.2	1.73	0.25
Hangman's Wood & Deneholes (SSSI)	28.9	3.5	1.5	24.22	1.73	0.25
Darenth Wood (SSSI)	33.4	2.0	1.6	26.32	1.88	0.22
Farningham Wood (SSSI/LNR)	33.6	2.0	1.7	28.70	2.05	0.23
Locally Designated Sites						
Crossness (LNR)	37.5	1.6	2.0	16.38	1.17	0.18
BxB103	31.7	1.6	2.03	28.4	2.03	0.21
M039	40.9	2.3	2.37	16.9	1.21	0.19
M031	na	na	na	na	na	na
B&DB103	na	na	na	na	na	na
HvBI18	na	na	na	na	na	na
B&DBI07	na	na	na	na	na	na
Thamesmead East (Bexley)	na	na	na	na	na	na
BxL07	31.8	1.9	3.13	34.4	2.46	0.24
BxBII02	na	na	na	na	na	na
BxL16	35.4	1.9	3.13	34.4	2.46	0.24

Site Name	NO_x (µg/m³)	SO_2 (µg/m³)	NH_3 (µg/m³)	Nitrogen deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)	
					Nitrogen	Sulphur
Lesnes Abbey Wood (LNR)	31.4	1.6	2.03	28.4	2.03	0.21
M041	28.8	1.9	3.13	19.3	1.38	0.2
M041	28.8	1.9	3.13	19.3	1.38	0.2
BxBI14	33.3	1.9	3.13	19.3	1.38	0.2
BxBI02	na	na	na	na	na	na
BxBII26	na	na	na	na	na	na
BxBII25	na	na	na	na	na	na
BxB103	31.7	1.6	2.03	28.4	2.03	0.21
M039	40.9	2.3	2.37	16.9	1.21	0.19
M031	na	na	na	na	na	na
B&DB103	na	na	na	na	na	na

Baseline Evolution

7.7.18 **Appendix A.4** provides a full list of schemes which are likely to be built out prior to the construction of the Proposed Development. Where relevant, these schemes therefore form part of the ‘future baseline’ scenario and have been taken account of in the assessment of likely significant impacts from the Proposed Development (construction and operation) presented in Section 7.9.

7.7.19 Concentrations of the number of pollutants (particularly relating to road traffic emissions) are anticipated to decline over time based on background mapping and emission factor projections. This is because new vehicles complying with the Euro 6/VI emissions standard will replace older vehicles which have higher emissions. Reduction in the demand for space heating as new buildings become more energy efficient will also reduce background pollutant concentrations. In addition, low emission technology is being continuously developed and uptake of these technologies is expected to result in a noticeable improvement in air quality.

7.7.20 Background concentration estimates for the future years are available for some of the pollutants as described above. Concentrations for the opening year of REP have been used where available. For the assessment of road traffic emissions, 2022 emissions factors and background concentrations have been used in conjunction with 2024 traffic data to represent 2024 conditions as discussed in Paragraph 7.4.8.

7.7.21 Modelled baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$ which are related to road traffic emissions, are shown in **Table 7.32a,** below. This confirms that concentrations of all three pollutants will reduce over this period. Furthermore, although there are exceedances of the NO_2 objective predicted in 2017 (shown in **bold** in **Table 7.32a**), there are no exceedances in 2024. No exceedances are predicted in either year for particulate matter.

Table 7.32a: Baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$ in 2017 and 2024

Receptor	NO_2		PM_{10}		$PM_{2.5}$	
	2017	2024	2017	2024	2017	2024
R1	24.6	19.8	15.9	15.4	9.3	8.9
R2	31.3	24.4	17.2	16.6	10.7	10.1
R3	25.9	20.7	16.7	16.2	9.6	9.1
R4	26.4	20.8	17.3	16.7	10.2	9.7
R5	26.3	21.6	15.7	15.2	9.1	8.7
R6	22.5	18.2	16.2	15.7	9.6	9.1
R7	36.5	28.0	18.3	17.6	12.2	11.4
R8	34.6	26.6	18.1	17.4	10.8	10.2
R8B	37.5	28.6	18.8	18.1	11.7	10.9
R9	26.1	20.6	16.6	16.0	9.5	9.1
R10	23.7	18.9	16.3	15.8	9.4	9.0
R11	**42.3**	31.7	20.0	19.2	13.1	12.2
R12	33.3	25.1	18.5	17.8	10.6	10.1
R13	37.3	29.0	18.7	18.0	11.1	10.4
R14	**43.3**	31.7	20.2	19.5	12.9	12.0
R15	37.8	28.7	18.6	17.9	11.4	10.8
R16	24.3	19.7	15.8	15.4	9.3	8.9
R16B	27.5	21.7	16.5	16.0	10.0	9.6
R17	26.3	21.6	15.7	15.2	9.1	8.7
R18A 1st	29.0	23.1	16.7	16.1	10.2	9.6
R18B 4th	26.3	21.4	16.2	15.6	9.6	9.1
R19A 1st	32.6	25.4	17.6	17.1	11.2	10.7
R19B 6th	27.9	22.2	16.4	15.9	9.8	9.3
R20A GF	28.8	22.9	16.7	16.1	10.2	9.6
R20B 5th	25.9	21.2	16.1	15.6	9.5	9.0
R21	**45.2**	32.9	22.3	21.5	15.1	14.1
R22	29.3	23.1	16.7	16.1	10.2	12.2
R23	33.0	25.3	18.7	18.4	12.5	13.4
R24	39.5	29.7	20.0	19.8	13.6	13.7
R25	**40.6**	30.7	20.2	20.1	13.9	8.9
R26	25.6	20.4	16.1	15.6	9.3	11.2
R27	33.1	25.6	18.9	18.5	11.6	9.6

7.8 Embedded Mitigation

7.8.1 This section describes the measures envisaged that have been already incorporated to reduce or offset environmental effects. Embedded mitigation aims to design out effects from the Proposed Development where possible.

7.8.2 In terms of impacts on air quality by the Proposed Development, the following can be considered as embedded mitigation:

- **Site Location:** The REP site is in an industrial location with the closest sensitive human receptors over 750 m to the south. This provides a buffer zone between the Proposed Development and sensitive human receptor locations.

- **Stack Height:** A high stack achieves better dispersion of air emissions resulting in lower concentrations at sensitive receptor locations. A stack sensitivity analysis has been completed to provide an optimised stack height to adequately disperse emissions.

- **Emission Limit Values for Design and Operation of the Equipment:** Combustion emissions from REP are controlled by the requirements of the IED, emerging BREF and the Medium Combustion Plant Directive.

- **Construction Dust:** The outline Code of Construction Practice (CoCP) which is submitted as part of the REP DCO application is anticipated to employ the dust mitigation measures that are outlined in the dust risk assessment.

7.9 Assessment of Likely Effects

The REP site and Main Temporary Construction Compounds

Construction/Decommissioning - Dust

7.9.1 The main potential air quality effects during construction and decommissioning of REP and the Main Temporary Construction Compounds are dust deposition and associated elevation in PM_{10} concentrations. The following activities have the potential to cause emissions of dust:

- Site preparation including delivery of construction material, erection of fences and barriers;
- Earthworks including digging foundations and landscaping;
- Materials handling such as storage of material in stockpiles;
- Construction and fabrication of units;
- Decommissioning activities (including demolition); and
- Removal of materials.

7.9.2 Typically, the main cause of unmitigated dust generation on construction / decommissioning sites is from demolition and vehicles using unpaved haul roads, and off-site from the suspension of dust from mud deposited on local roads by traffic. The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor.

7.9.3 In addition to the generation of dust and PM_{10} emissions, emissions of NO_x can occur from road traffic, plant and equipment used on the REP site and Main Temporary Construction Compounds.

Sensitivity

7.9.4 The REP site and Main Temporary Construction Compounds are located in an area of industrial development and no residential properties exist within 150 m from these areas. The closest significant residential developments lie over 500 m south from the REP site and the closest national designated terrestrial biodiversity site lies over 1.6 km north east of the Application Site. The study area for dust effects from the REP site and Main Temporary Construction Compounds is therefore considered to be of low sensitivity (**Tables 7.10 to 7.12**). It is not possible to determine the sensitivity of the area during decommissioning with any certainty as the location and nature of receptors may change. Given the industrial nature of the area, however, it is expected that significant numbers of new sensitive receptors are unlikely and that the sensitivity of the area will be similar to current conditions.

Demolition

7.9.5 No significant demolition works are required for the construction phase of REP and Main Temporary Construction Compounds. Demolition would, however, form the most significant part of decommissioning activities were operations to cease permanently. Given the potential building area that would need to be demolished and the height of the stack, the potential dust emission would be expected to be large.

Earthworks

7.9.6 No significant earthworks are anticipated for the REP site or Main Temporary Construction Compounds. However, the potential dust emission is assessed as being large (**Table 7.10**) for earthworks within the REP site and Main Temporary Construction Compounds, primarily due to the scale of the development area (more than 10,000 m^2).

Construction

7.9.7 Emissions during construction of REP itself would be moderated by the largely prefabricated nature of the installation and would have therefore been classed as small in line with **Table 7.10**.

Trackout

7.9.8 The dust emission magnitude for the effects of trackout is considered to be large for the REP site and Main Temporary Construction Compounds as a result of over 50 HDV movements per day as a peak and given that there are no unpaved roads in close proximity to the sensitive receptors. This is likely to be similar for trackout during decommissioning, although this will depend on the future use of the site and whether material would be re-used on site.

7.9.9 The results of the assessment are summarised below in **Table 7.33**.

Table 7.33: Summary of Construction and Decommissioning Risk for the REP Site and Main Temporary Construction Compounds

Phase of Works	Dust Emissions Class	Sensitivity of Areas	Risk of Impacts
Demolition	No significant demolition required during construction. Large (during decommissioning)	N/A for construction. Likely to be Low for decommissioning.	N/A for construction. Likely to be Low Risk for decommissioning.
Earthworks	Large (Total site area > 10,000 m^3)	Low	Low Risk
Construction	Small (Total volume <25,000 m^3 primarily Prefabricated)		Low Risk
Track out	Large (peak of over 50 HDV per day)		Low Risk

7.9.10 Based on the IAQM criteria (**Table 7.14**), the risk of dust impacts during construction is low. Appropriate mitigation corresponding to a low risk site is therefore required during the construction phase of REP.

7.9.11 As there are a number of unknown variables at this time, a full construction dust risk assessment will need to be carried out prior to decommissioning in order to identify the appropriate level of mitigation for these works.

Construction/Decommissioning - Traffic

7.9.12 There will be additional HGV trips associated with the construction and decommissioning of REP. Although the number of additional trips is not currently known, it is expected that on an annual average basis, the amount of construction HGV traffic will not be significant. In addition, there will be significantly fewer trips relating to the construction period than those already considered within the operational phase assessment and therefore impacts will not be more significant than those identified within the operational phase assessment section of this Chapter.

Operation of REP – Transport Emissions

Road Transport

7.9.13 The impact of emissions from additional road traffic associated with the Proposed Development including worst case locations or roads with the greatest increase in traffic has been assessed at 27 receptors. Predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are presented in **Appendix C.1.** These show that the magnitude of impact is **Negligible** at all locations and road traffic impacts are therefore considered not significant.

River Transport

7.9.14 As noted in the Port of London Authority Air Quality Strategy, NO_x and particulate emissions from river based activities were estimated to be approximately 1.05% and 0.63% of the emissions in London in 2013 (LAEI), rising to 2.68% and 0.95% respectively by 2030 due to reductions in other emission sources in London.

7.9.15 The Strategy reports on dispersion modelling of the impact of vessel emissions on receptors adjacent to the River Thames. The minimum point of exposure for receptors (i.e. residential properties) was estimated to be 90 m from the vessel, due to the width of the river along a typical river journey. Most freight vessels travel close to the middle of the river during their transit, due to bridge limitations.

7.9.16 For Tier II emission vessel movements (emissions as a result of vessel movements on the River Thames from vessels with emissions complying with International Maritime Organisation (IMO) Tier II emission standards) (the same as currently used for RRRF), the annual mean NO_x concentration at the point of exposure was modelled to be 0.08µg/m^3, equivalent to approximately 0.06µg/m^3 of NO_2. This is approximately 0.14% of the assessment level and therefore imperceptible. The Navigational Risk Assessment (NRA) (Marico, 2018) estimated the increase in river traffic movements by stretch of the river from REP. For the majority of the river, the increase in hourly river usage was less than 10%. The three stretches of the river with increases above 10% are Barking Reach (11%), Tilbury Docks (13%) and Halfway Reach (27%).

7.9.17 The increases at Barking Reach and Halfway Reach reflect the approaches to the REP site from the west and east respectively. The increase in movements at Tilbury Docks reflects increased loadings of waste there. Annual mean NO_2 concentrations as a result of the predicted increase in vessel movements are therefore estimated to increase by approximately 0.006 µg/m^3 at Barking Reach, 0.008 µg/m^3 at Tilbury Docks and 0.02 µg/m^3 at Halfway Reach respectively. In all cases the increases are imperceptible and the impact **Negligible** in relation to Air Quality.

7.9.18 In addition, residential properties are located more than 90 m from both the REP site and Tilbury Docks and therefore the increase in annual mean NO_2 concentrations at locations of relevant exposure will be less than this.

7.9.19 The magnitude of impact is therefore **Negligible** at all locations and river traffic impacts are considered not significant.

Operation of the ERF – Stack Emissions

7.9.20 **Table 7.34** provides the maximum ground level concentrations of pollutants anywhere within the receptor grid for any of the five years' worth of meteorological data modelled. The results are for the ERF operating at the maximum daily emission limit values from the IED or draft BREF note (see Section 7.2.11) as applicable.

Table 7.34: Maximum Point of Impingement Concentrations with ERF Stack

Pollutant and Averaging Time	Averaging Time	AQAL µg/m³	PC µg/m³	PC % of AQAL[a]
Ammonia	Annual	180	0.46	0.25%
	Hourly	2500	4.23	0.17%
Antimony	Annual	5	5.3×10^{-4}	0.01%
	Hourly	150	4.9×10^{-3}	0.003%
Arsenic	Annual	0.003	0.001	**38.2%**
Benzene	Annual	5	0.46	9.2%
	Hourly	195	4.23	2.2%
Benzo(a)pyrene – Annual	Annual	0.00025	9.6×10^{-6}	**3.8%**
Cadmium	Annual	0.005	9.2×10^{-4}	**18.3%**
	Hourly	15	8.5×10^{-3}	0.1%
Carbon monoxide	8-hour running	10,000	14.4	0.14%
	Hourly	30000	21.1	0.1%
Chromium (Total)	Annual	3	0.004	0.1%
Chromium III	Annual	5	0.01	0.3%
	Hourly	150	0.13	0.1%
Chromium VI	Annual	0.0002	6×10^{-6}	**3.0%**
Cobalt	Annual	0.2	2.6×10^{-4}	0.1%
	Hourly	1.5	2.3×10^{-3}	0.2%

Pollutant and Averaging Time	Averaging Time	AQAL µg/m^3	PC µg/m^3	PC % of AQAL[a]
Copper	Annual	10	1.3×10^{-3}	0.01%
	Hourly	200	0.012	0.01%
Dioxins and Furans -	Annual	-	2.7×10^{-9}	-
Hydrogen chloride	Hourly	750	2.5	0.3%
Hydrogen fluoride	Annual	16	0.05	0.3%
	Hourly	160	0.42	0.3%
Lead	Annual	0.25	0.002	**0.9**%
Manganese	Annual	0.15	0.003	**1.8%**
	Hourly	1500	0.025	0.002%
Mercury	Annual	0.25	9.2×10^{-4}	0.4%
	Hourly	7.5	0.01	0.1%
Nickel	Annual	0.02	0.010	**50.4%**
	Hourly	30	0.10	0.3%
Nitrogen Dioxide	Annual	40	3.9	**9.6%**
	99.79th %ile hourly	200	13.3	6.7%
Particulates (PM_{10})	Annual	40	0.23	**0.6**%
	90.41th %ile daily	50	0.63	1.3%
Particulates ($PM_{2.5}$)	Annual	20	0.23	**1.1%**
Sulphur dioxide	99.90th %ile 15 minute	266	10.4	3.9%

Pollutant and Averaging Time	Averaging Time	AQAL µg/m³	PC µg/m³	PC % of AQAL [a]
	99.18th %ile daily	125	6.9	5.6%
	99.73th %ile hourly	350	9.5	2.7%
Thallium	Hourly	30	0.01	0.03%

[a] Pollutants that cannot be screened out as being negligible (<0.5% of the long term AQAL or 10% of the short term AQAL) are shown in bold.

7.9.21 None of the predicted maximum ground level concentrations exceed the assessment levels. Where the predicted maximum concentrations cannot be screened out as negligible (in accordance with **Tables 7.20** to **7.22**), the PCs and PECs have been provided at the identified sensitive receptor locations. **Appendix C.2** contains the results for sensitive receptor locations. The following paragraphs provide a summary of the modelling results for selected pollutants at these locations.

7.9.22 The PC for nitrogen dioxide (NO_2) at human health receptors ranges from 0.1% to 1.4% of the annual mean objective. Once background and other existing sources of NO_2 (including road sources where relevant) have been taken into account, total concentrations range from 47.7% to 82.7% of the objective. Based on the IAQM significance criteria, combined NO_2 impacts of both vehicle and on-site emissions are **Negligible** at all receptors.

7.9.23 In terms of PM_{10} and $PM_{2.5}$ impacts, the combined PC is below 0.5% of the relevant objective at all receptors, total concentrations are well below the objective and impacts are all **Negligible** irrespective of the baseline concentration.

7.9.24 The PC for Arsenic at human health receptors ranges from 0.8% to 5.7% of the relevant long term assessment level. Once background concentrations and existing local sources of Arsenic have been taken into consideration, total concentrations at receptors range from 33.7% to 41.5% of the assessment level. Based on the IAQM assessment criteria, there are **Negligible** impacts at most receptors and **Minor** impacts at two receptors. The two receptors with **Minor** impacts are both located within a business park where the long term objective is not relevant.

7.9.25 In terms of Benzene, the process contribution ranges from 0.1% to 1.4% of the relevant long term assessment level. The PEC ranges from 9.1% to 18.6% of the long term assessment level and the impacts are all **Negligible**.

7.9.26 For Benzo(a)pyrene, the PC is less than 0.6% of the relevant assessment level at all of the receptor locations. The PEC is predicted to be between 82% and 84.1% of the relevant assessment level, and the impacts are all **Negligible**.

7.9.27 The PC for Cadmium ranges from 0.2% to 2.7% of the relevant assessment level. The highest PEC is 12.4% of the assessment level and therefore all of the impacts are **Negligible**.

7.9.28 For Chromium VI, the PC is well below 0.5% at all receptors, and the PEC is 161% at all receptors. The high environmental concentration is due to the high background concentration used in this assessment, however, due to the number of uncertainties and worst case assumptions used, it is likely that concentrations are lower than this indicates. Despite the high background concentrations, the impacts from REP on Chromium VI concentrations are **Negligible** at all receptors.

7.9.29 The Lead and Manganese PCs are well below 1%, and the PECs below 6% of the relevant long term assessment levels at all of the receptors. The impacts are therefore considered to be **Negligible** at all receptors.

7.9.30 In terms of Nickel, the PC ranges from 0.6% to 7.5% of the relevant assessment level and the PEC ranges from 6.2% to 23.6% of the assessment level. There are **Minor** impacts at 7 receptors and **Negligible** impacts at the remaining 19 receptors. As the PEC is well below the assessment level at all receptors, the impacts from REP on Nickel concentrations are not considered to be significant.

7.9.31 The IED allows operation of the installation with higher emissions over half hourly periods, although compliance with the daily emission limit must be maintained. An assessment of the maximum short term concentrations has been undertaken assuming that the higher short-term emissions occur all year round. The predicted concentrations are therefore highly conservative in terms of the short-term impacts of the emissions.

Table 7.35: Short Term Impacts at Higher Emission Rates

Pollutant	Short Term Emission Limit (mg/Nm^3)	Short Term Emission Rate (g/s)	Process Contribution (PC) µg/m^3	PC % of assessment level
Benzene	20	2.38	8.45	4.33%
Carbon monoxide	100	11.91	42.26	0.14%
Hydrogen chloride	60	7.14	25.35	3.38%
Hydrogen fluoride	4	0.48	1.69	1.06%
Mercury	0.035	0.0042	0.0148	0.20%
Nitrogen Dioxide	400	16.67	44.42	22.21%
Particulates (PM_{10})	10	1.19	1.27	2.54%
Particulates ($PM_{2.5}$)	10	1.19	0.46	1.83%

Pollutant	Short Term Emission Limit (mg/Nm³)	Short Term Emission Rate (g/s)	Process Contribution (PC) µg/m³	PC % of assessment level
Sulphur dioxide (15 minute)	200	23.82	69.45	26.11%
Sulphur dioxide (Hourly)	200	23.82	63.10	18.03%

7.9.32 Only the hourly NO_2 and 15-minute and hourly SO_2 concentrations are greater than 10% of the assessment level at the point of maximum concentration. The PECs in both cases would be less than 50% of the assessment level and therefore not significant.

Stepped Building

7.9.33 As noted in Paragraph 7.5.37, whilst the DCO application is based on maximum building parameters (i.e. a Rochdale Envelope), it is likely that the 'as built' REP building would be smaller and 'stepped' in profile (**Figure 1.3**). The results of this stepped building modelling are provided within Appendix C2.4. The maximum ground level concentrations are far lower for a stepped building than for those predicted using the maximum parameters in the Rochdale Envelope. This is primarily a result of the stepped profile having less interaction with the emissions from the stack and creating less building downwash effects.

Human Health Risk Assessment (HHRA)

7.9.34 The potential impacts on human health arising from dioxins and furans (PCDD/Fs) and dioxin-like PCBs and trace metals emitted from the ERF have been assessed under a reasonable worst case scenario, namely of an individual exposed for a lifetime to the effects of the airborne concentrations and consuming locally grown vegetables. This equates to a hypothetical resident consuming home grown vegetables from a garden or allotment, situated in close proximity to the facility at various locations. Two types of receptor are considered, a resident who consumes only a few locally grown foods (Resident) and a farmer, who has a diet that includes a significant fraction of locally grown foods (Farmer). Children of both these receptor types are also explicitly considered. The details of the HHRA are provided in **Appendix C3**.

7.9.35 The HHRA has identified and considered the most plausible pathways of exposure for the individuals considered. Deposition and subsequent uptake of the Compounds of Potential Concern (COPC) into the food chain is the more numerically significant pathway over direct inhalation for most pollutants considered. The following have been considered COPCs for the ERF:

- PCDD/Fs (individual congeners and dioxin-like PCBs);

- Benzo(a)pyrene;
- Antimony;
- Arsenic;
- Cadmium;
- Chromium, trivalent and hexavalent;
- Mercury;
- Lead;
- Nickel; and
- Thallium.

7.9.36 Non-carcinogenic risks have been assessed for each COPC according to a Hazard Quotient, which is a ratio of the average dose ingested by an individual and the Reference Dose, or the amount inhaled divided by the Reference Concentration. Values for the Reference Dose and Reference Concentration are published by the US EPA. When the Hazard Quotients for all of the COPCs are added together, the result is a Hazard Index for each receptor. Should the Hazard Index be equal to 1.0, then the health effect is considered significant. In the case of emissions from ERF, the predicted Hazard Indices for each of the receptors considered were far below the assessment criterion. Highest values were predicted for the Resident Child and Farmer Child in Rainham. These were 0.0034 and 0.0050 respectively, substantially below the assessment level of 1.0.

7.9.37 The lifetime carcinogenic risk arising from inhalation and ingestion of COPCs was assessed in the IRAP model, which uses US EPA cancer potency factors and unit risk factors, resulting in reasonable worst case estimates as follows:

- 5.5×10^{-6} (1 in 181,333) for the hypothetical Farmer; and
- 1.0×10^{-7} (1 in 10,000,000) for the Resident.

7.9.38 The assessment of health effects arising from the exposure to COPCs indicates that emissions from the ERF do not pose a significant carcinogenic risk to health, given what is considered to be an acceptable level of lifetime risk in the UK, i.e. 1 in 14,300 (equivalent to an annual risk of 1 in 1,000,000 over a lifetime of 70 years).

7.9.39 The intake of dioxins and furans has been evaluated against the concept of a ‘tolerable daily intake’ (TDI). The TDI represents the TDI for lifetime exposure and short-term excursions above the TDI would have no consequence provided that the average intake over long periods is not exceeded. The World Health Organisation (WHO) recommends a TDI for dioxins/furans of 1 to 4 pg I-TEQ /kg BW/day (picogrammes as the International Toxic Equivalent per kilogram bodyweight per day). The UK's Committee on Toxicology (COT) recommended TDI is 2 pg I-TEQ/kg BW/d for dioxins, furans and dioxin like PCBs. The modelled results conclude that the most exposed receptor is the Farmer East Child, for whom the additional daily intake would be approximately 4.2% of the COT TDI.

7.9.40 The individual with maximum exposure is not subject to a significant carcinogenic risk or non-carcinogenic hazard, arising from exposure via both inhalation and the ingestion of foods. It follows that all other individuals in the population would also not be exposed to significant risks or hazards.

7.9.41 It can therefore be concluded that there will be no significant effects in relation to long term exposure to dioxins and metals.

Terrestrial Biodiversity Receptors

7.9.42 Detailed modelling has been carried out to predict the PCs and PECs of relevant pollutants at 21 terrestrial biodiversity receptors. The results of the modelling are contained in **Appendix C.2**, and are discussed in the following paragraphs.

7.9.43 For the International and Nationally Designated sites, all of the PCs are less than 1% of the critical level, or the PECs do not exceed the critical level apart from at two receptor locations for predicted annual average NO_x concentrations. The annual mean NO_x PC is 2.8% and 2.1% of the critical level at Inner Thames Marshes / Rainham Marshes and Ingrebourne Marshes respectively, and the critical level is exceeded. Whilst the PC is above the threshold for potential significance this reflects the annual mean NO_x concentrations whereas the determining factor which could potentially affect habitats is the nutrient nitrogen deposition. In all cases, apart from the Ingrebourne Marshes, the nutrient nitrogen deposition PC is less than 1% of the relevant critical load or the PEC's do not exceed the critical load and therefore it is unlikely that there will be a significant effect on the habitats. The predicted nitrogen deposition PC at Ingrebourne Marshes is 2.3% of the critical load and as the PEC is 115%, the potential significance of this is discussed in Chapter 11, where it is concluded that the effect is Not Significant. The acid deposition PC is less than 1% of the critical load, or the PECs do not exceed the critical load at all of the International and Nationally Designated sites.

7.9.44 At the Locally Designated sites, all of the PCs are less than 100% of the assessment level and therefore **Not Significant** in accordance with the criteria outlined in Section 7.5.65.

Operation of the Anaerobic Digestion Plant

7.9.45 Contour plots of the PCs for hourly mean NO_2, annual mean NO_x and daily mean NO_x concentrations are shown in **Figures 7.8** to **7.10** respectively. The contour plots indicate that the effects of the anaerobic digestion combustion are limited to the immediate vicinity of the REP site and there is no interaction (cumulative effects) with the emissions from the ERF as the impacts of emissions from the ERF are well below the levels of significance.

7.9.46 Potentially significant impacts are limited to the Crossness LNR, and only a small area of the LNR has hourly mean NO_2 concentrations above 10% of the objective and therefore potentially significant for human health receptors in the LNR. However, the area where the hourly mean NO_2 concentrations are above 10% is not an area where members of the public will be regularly present and therefore is not an area of relevant exposure for air quality strategy objectives.

7.9.47 Predicted NO_x concentrations are potentially significant for terrestrial biodiversity receptors in the Crossness LNR, but the impacted area is limited to the immediate vicinity of the REP site. The potential significance of this effect is discussed in **Chapter 11**.

Dust and Odour Impacts relating to the Operation of REP

7.9.48 The impact of dust from the operation of REP has been qualitatively assessed. As the tipping is a closed-door process and all the other operations take place within a sealed building under negative air pressure, it is considered unlikely that there will be significant impacts on the local area.

7.9.49 The potential for odour impacts has also been considered. Waste will be delivered in closed ISO containers, sheeted in bulk container vehicles or enclosed refuse collections vehicles. Furthermore, all delivery of waste would take place within the waste reception halls as for RRRF which is operated under negative pressure, with an inflow of air but no outflow of air. In addition, air from within the bunker area is used as combustion air, with odorous compounds being burnt. Therefore, the potential for odour impacts is considered to be **Not Significant**.

The Electrical Connection and the Cable Route Temporary Construction Compounds

Construction/Decommissioning – Dust

<u>Area sensitivity</u>

7.9.50 The study area for the assessment of the Electrical Connection and Cable Route Temporary Construction Compounds is considered to be of high sensitivity for dust soiling as there would be more than 100 dwellings within 20 m from the Electrical Connection construction site boundary. The impacted area is considered to be of medium sensitivity for human health given that the annual mean PM_{10} concentration is below 24 µg/m^3 and there would be more than 100 dwellings within 20 m from the works (**Table 7.12**).

7.9.51 At the end of its operational life, it is currently anticipated that the ducting for the Electrical Connection will be left in situ, but that the cables may be removed, and therefore effects would be anticipated to be less than above.

Demolition

7.9.52 Minor demolition works in the form of breaking up paved and tarmac areas are required for the construction of the Electrical Connection. Similar works will be required as part of decommissioning activities. Given the potential area of concrete and tarmac that will need to be broken up, the potential dust emission is expected to be **Small**.

Earthworks

7.9.53 For the Electrical Connection, the works to be undertaken in close proximity to sensitive receptors are expected to be less than 2,500 m^2 with fewer than five heavy earth moving vehicles active at the time. The potential dust emission is therefore assessed as being **Small** to install the electrical cabling. At the end of its operational life, it is currently anticipated that the Electrical Connection will be left in situ, but that the cables may be removed.

Construction

7.9.54 The potential dust emissions magnitude for construction activities associated with the Electrical Connection is classed as **Small**, given that the total construction volume in proximity to sensitive receptors will be below 25,000 m^3.

Trackout

7.9.55 The dust emission magnitude for the effects of trackout is considered to be **Small** for the Electrical Connection and Cable Route Temporary Construction Compounds as a result of less than 10 HDV per day and given that there are no unpaved roads in close proximity to the sensitive receptors. This is not expected to be significantly changed during decommissioning.

7.9.56 The results of the assessment are summarised below in **Table 7.36**.

Table 7.36: Summary of Construction Dust Impacts from Electrical Connection Construction and Decommissioning

Phase of Works	Dust Emissions Class	Sensitivity of Areas	Risk of Impacts
Demolition	Small	High	N/A
Earthworks	Small (Total site area > 10,000 m, dusty soils)		Low Risk
Construction	Small (Total volume <2,500 m^3 at one time)		Low Risk
Track out	Small (> 5 per day at one time)		Low Risk

Construction/Decommissioning – Traffic

7.9.57 The expected level of traffic during construction of the Electrical Connection and Cable Route Temporary Construction Compounds is below the threshold for set out for requiring a detailed assessment (IAQM 2017) and any impacts are therefore considered to be **Negligible**. At the end of its operational life, it is currently anticipated that the Electrical Connection ducting will be left in situ, but that the cables may be removed.

Operation/Maintenance

7.9.58 The operation of the Electrical Connection is not anticipated to give rise to significant adverse effects to the environment. The Electrical Connection comprises a predominantly underground trefoil of cables, which will not give rise to any emissions to air during operation and thus potential impacts are associated within the construction phase only.

Summary of Assessment

Construction/Decommissioning

7.9.59 The impacts of construction and decommissioning on air quality have been assessed from the Proposed Development. In relation to dust impacts, the dust risk assessment has identified a suite of mitigation measures which will be required. With these in place, the impact of dust from construction and demolition activities will not be significant. The impact on local air quality from road traffic from construction will be smaller than the impact assessed from traffic during operation which has been assessed as **Not Significant**.

7.9.60 In terms of decommissioning, a set of appropriate mitigation measured have been identified as works will be different to those during construction. With these mitigations measures in place, the impact is not expected to be significant.

7.9.61 It is expected that traffic impacts from decommissioning will be significantly less than those already assessed due to reduced vehicle emissions over time.

Operation/Maintenance

7.9.62 The impact of emissions from additional road traffic associated with REP have been assessed at a number of sensitive human health receptors. Concentrations of relevant pollutants are all below the appropriate objectives and impacts are not significant. A qualitative assessment of emissions from operational river vessel movements has been undertaken which has not identified that significant effects are likely.

7.9.63 The impact of emissions from REP have been assessed, using detailed dispersion modelling to identify maximum concentrations as well as concentrations at worst case receptors. A number of reasonable worst case assumptions were made regarding building size, stack height and emissions. In addition, existing sources of pollution in the area (RRRF and Crossness Sewage Treatment Works) have been taken into account along with emissions from traffic where appropriate. Impacts at human health receptors are considered not significant for all pollutants. The impacts to terrestrial habitats are also considered **Not Significant**.

7.10 Cumulative Assessment

Construction and Decommissioning

7.10.1 Construction and decommissioning of REP could occur simultaneously with 'Other Developments' located in the vicinity of the Application Site. The 'Other Developments' with the most potential for simultaneous construction effects are identified in **Chapter 4** and **Appendix A.4**. Construction dust impacts need to be considered within a zone of influence of 350 m of the activity, and therefore there are a limited number of residential receptors that could be affected by dust emissions from one or more developments. Having reviewed the location and type of the cumulative sites and the location of residential receptors, it is not considered that there will be any interaction between the developments during the construction period. In addition, construction phase mitigation measures will be employed during the construction of REP, as such significant adverse cumulative construction effects are not anticipated to be likely.

7.10.2 It is assumed for the purposes of this assessment that the REP generating equipment would be removed once the plant had ceased operations permanently. Any decommissioning phase is assumed to be of a similar or shorter duration to construction, and therefore environmental effects are considered to be of a similar level to those during the construction phase. It is assumed that the ducting for the Electrical Connection would remain in situ, but that the cables may be removed.

Operation/Maintenance

7.10.3 The operation of REP could occur simultaneously with 'Other Developments' located in the vicinity of the Application Site. The 'Other Developments' with the most potential for simultaneous operational effects are identified in **Chapter 4** and **Appendix A.4**. Cumulative effects could arise due to the introduction of new residential receptors into a previously unoccupied area, or by the developments changing the baseline air quality to which the REP impacts are added. The zone of influence of such cumulative impacts is limited to where the impacts of emissions from the ERF are above 1% of the assessment level.

7.10.4 Having reviewed the location of the 'Other Developments', it has been confirmed that the assessment of the impacts from REP has considered all locations where there is the likelihood for significant residential impacts. None of the cumulative developments have significant point source emissions which will significantly impact on the baseline to which the REP impacts have been added. Traffic impacts from the cumulative developments are assumed to be taken account of in the future baseline predictions, which include for background traffic growth and reductions in emissions from the vehicle fleet (especially NO_x emissions). As such, no significant cumulative operational effects are predicted.

7.10.5 REP has been designed to be CHP enabled, meaning that there is the ability to supply waste heat generated from the combustion process to a local heat off-taker. It is acknowledged that any future supply of waste heat to (e.g. district heat network scheme for a local residential area) could result in impacts to the local environment. However, given the nature of any such scheme (likely to consist mainly of a network of buried pipes) any impacts would be limited to the temporary construction phase which is unlikely to overlap with construction of REP. Given that the network would most likely serve the local Thamesmead/Peabody area, impacts would likely be restricted to existing brownfield urbanised land (e.g. burying pipes in roads). Such temporary impacts would be subject to a separate planning application which is anticipated to be bound by a Code of Construction Practice or similar best practice working methods. It is therefore considered highly unlikely that there would be any likelihood of significant cumulative effects.

7.11 Further Mitigation and Enhancement

7.11.1 Emissions from the CHP gas engine could be reduced by the provision of further abatement systems to reduce emissions to those of an ultralow NO_X gas boiler. This would reduce the emissions, but the effects are not considered significant on human health or terrestrial biodiversity (see Section 11). There is therefore no need for additional mitigation to reduce the effects of the emissions.

7.11.2 Whilst the effects of emissions from river traffic are not considered significant, options to reduce emissions from the current fleet of tugs are being investigated by Cory. These include the use of bio fuels/synthetic fuels, retrofitting additional scrubber technology and optimising operational practices to increase efficiency. REP is likely to require investment in additional tugs to handle the additional throughput on the river. The additional tugs, as a minimum, would comply with relevant marine emissions standards and legislation applying at that point. However, Cory's strong preference is to adopt hybrid technology for new tugs subject to operational viability and regulatory approval.

7.11.3 As no additional mitigation to reduce the effects has been identified, the residual effects will be the same as the effects set out in Section 7.9.

7.12 Residual Effects and Monitoring

Summary of Residual Effects

Table 7.37: Summary of Residual Effects

	Receptor name and description	Potential mitigation	Assessment of Residual Effects
The REP DCO			
Construction / decommissioning	Human health and terrestrial biodiversity receptors – dust and PM_{10} impacts	No specific mitigation is anticipated at this stage over and above the embedded mitigation outlined	Effects will not be significant following mitigation
Operation	Human health receptors in the study area	Emissions will be controlled in line with the environmental permitting requirements pursuant to the Industrial Emissions Directive (IED) and an appropriate stack height has been selected	Effects will not be significant based on maximum ground level concentrations and concentrations at sensitive receptor locations
	Terrestrial biodiversity receptors within study area		Effects are anticipated to be not significant

7.13 Summary and Conclusion

7.13.1 Assessments of the potential emissions to air quality from construction, decommissioning of the Proposed Development have been conducted. Effects from construction and decommissioning dust has been identified as being not significant based on a suite of identified mitigation measures. The impact on local air quality from construction traffic has also been assessed as being not significant.

7.13.2 Operational emissions to air quality from increased road and river movements have not been identified as significant. Similarly, operational emissions from REP, taking a reasonable worst case approach, has identified that significant effects are not likely. No significant effects to terrestrial biodiversity are predicted, see **Chapter 11** for further details.

7.14 References

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