REPORT

Boston Alternative Energy Facility - Preliminary Environmental Information Report

Chapter 14 Air Quality

Client: Alternative Use Boston Projects Ltd

Reference: PB6934-RHD-01-ZZ-RP-N-2014

Status: 01/Final

Date: 17/06/2019

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Boston Alternative Energy Facility

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Document title:	Boston Alternative Energy Facility - Preliminary Environmental Information Report
Document short title:	Air Quality
Reference:	PB6934-RHD-01-ZZ-RP-N-2014
Status:	01/Final
Date:	17/06/2019
Project name:	Boston Alternative Energy Facility
Project number:	PB6934-RHD-01-ZZ-RP-N-2014
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Date / initials:	GB 17/06/2019

Classification
Project related

Table of Contents

Table of Tables

Non-Technical Summary

This chapter of the PEIR contains a preliminary air quality assessment of impacts during the construction and operational of the Facility. The chapter provides an overview of existing air quality within the Study Area.

There are potential air quality impacts associated with dust, plant and vehicle exhaust emissions during construction of the Facility. Potential impacts during construction were assessed using best practice guidance in the UK. Appropriate best practice mitigation measures are recommended to minimise dust and pollutant emissions from on-site construction activities, such that off-site effects will not be significant.

Emissions from the Facility stacks, shipping vessel activities and road traffic exhausts during the operational phase are considered in the preliminary assessment. Dispersion modelling was undertaken to predict pollutant concentrations at sensitive receptors near the Application Site. The modelling was based on a Facility stack height of 70 m per stack for the purposes of this preliminary assessment.

The significance of the operational phase air quality impacts in EIA terms will be identified at the Environmental Statement (ES) stage of the project.

14 Air Quality

14.1 Introduction

14.1.1 This chapter of the PEIR describes the existing environment in relation to air quality and provides a preliminary assessment of potential air quality impacts associated with the construction and operational phases of the Boston Alternative Energy Facility ('the Facility').

14.1.2 The approach provides an overview of existing baseline air quality, the findings of which have been used to inform the preliminary assessment of emissions from the Facility.

14.1.3 The Facility also has the potential to impact other environmental aspects with a link to air quality, which are discussed in other chapters within this PEIR. The relevant chapters are:

- **Chapter 12 Terrestrial Ecology**;
- **Chapter 18 Navigational Issues**; and
- **Chapter 19 Transport**.

14.1.4 This chapter is supported by two appendices:

- **Appendix 14.1 Construction Phase Dust and Particulate Matter Assessment Methodology**; and
- **Appendix 14.2 Dispersion Modelling Methodology**.

14.1.5 This chapter provides a preliminary assessment of the potential effects of the Facility on local air quality. The significance of all potential impacts, and where appropriate any necessary mitigation measures, will be identified at the Environmental Statement (ES) stage.

14.2 Legislation, Policy and Guidance

14.2.1 The EU Air Quality Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management entered into force in September 1996 (European Parliament, 1996). This was a framework for addressing air quality through setting European-wide air quality Limit Values in a series of Daughter Directives, prescribing how air quality should be assessed and managed by Member States. Directive 96/62/EC and the first three Daughter Directives were combined to form the new EU Directive 2008/50/EC (European Parliament, 2008) on Ambient Air

Quality and Cleaner Air for Europe, which came into force June 2008.

14.2.2 The 1995 Environment Act (Her Majesty's Stationery Office (HMSO), 1995) required the preparation of a national Air Quality Strategy (AQS) which set out the Government's Approach to meeting the air quality Standards and Objectives for specified pollutants. The Act also outlined measures to be taken by Local Planning Authorities (LPAs) in relation to meeting these standards and Objectives (the Local Air Quality Management (LAQM) system).

14.2.3 The UK AQS was originally adopted in 1997 (Department of the Environment (DoE), 1997) and has been reviewed and updated to take account of the evolving EU Legislation, technical and policy developments and the latest information on health effects of air pollution. The strategy was revised and reissued in 2000 as the AQS for England, Scotland, Wales and Northern Ireland (Department of the Environment, Transport and the Regions (DETR), 2000). This was subsequently amended in 2003 (DETR, 2003) and was last updated in July 2007 (Defra, 2007).

14.2.4 The Government published its Clean Air Strategy in January 2019 (Defra, 2019a), which reset the focus for the first time since the 2007 Air Quality Strategy revision. The Clean Air Strategy identifies a series of 'new' air quality issues, including biomass combustion, shipping emissions, and releases from agricultural activities. There is a recognition that the effects of pollutant deposition on sensitive ecosystems and habitats needs greater focus. The concept of an overall exposure reduction approach is raised, in recognition that numerical standards are not safe dividing lines between a risk and a safe exposure, within a population with a varying age and health profile.

Local Air Quality Management

14.2.5 The standards and Objectives relevant to the LAQM framework have been transposed through the Air Quality (England) Regulations (2000) (HMSO, 2000), and the Air Quality (England) (Amendment) Regulations 2002 (HMSO, 2002); the Air Quality Standards (England) Regulations 2010 set out the combined Daughter Directive Limit Values and Interim Targets for Member State compliance (HMSO, 2010). The Air Quality Standards (Amendment) Regulations 2016 (HMSO, 2016) were published on 6 December 2016.

14.2.6 Pollutant standards relate to ambient pollutant concentrations in air, based on medical and scientific evidence of how each pollutant affects human health. Pollutant Objectives incorporate target dates and averaging periods, which take into account economic considerations, practicability and technical feasibility.

14.2.7 Where an air quality Objective is not being met, LPAs must designate those areas as Air Quality Management Areas (AQMAs) and take action, along with others, to work towards meeting the Objectives. Following the designation of an AQMA, LPAs are required to develop an Air Quality Action Plan (AQAP) to work towards meeting the Objectives and improve air quality locally.

14.2.8 Possible exceedances of air quality Objectives are usually assessed in relation to those locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the Objective.

The Industrial Emissions Directive

14.2.9 The Industrial Emissions Directive (IED, Directive 2010/75/EU) is the main EU instrument regulating pollutant emissions from industrial installations. The IED consolidated seven previous Directives (including in particular the Integrated Pollution Prevention and Control (IPPC) Directive and the Waste Incineration Directive (WID)). The IED entered into force on 6 January 2011 and was transposed in the UK via the revisions to the Environmental Permitting (EP) Regulations, which were most recently amended in 2018.

14.2.10 The IED and the associated EP Regulations set out air Emission Limit Values for prescribed activities, including energy from waste facilities.

14.2.11 The EU Withdrawal Act 2018 ensures that existing EU environmental law will continue to have effect in UK law, including the Industrial Emissions Directive and Best Available Techniques (BAT) Conclusion Implementing Decisions made under it.

Air Quality Standards, Objectives and Guidelines

14.2.12 The current UK air quality standards and Objectives (for the purpose of LAQM), and EU Ambient Air Directive (AAD) Limit Values are shown in **Table 14.4**. Also listed are Environmental Assessment Levels (EALs), which are published by the Environment Agency in technical guidance under the EP regulatory regime (Environment Agency and Defra, 2016).

National Planning Policy

National Policy Statements

14.2.13 The policy framework for examining and determining applications for Nationally Significant Infrastructure Projects (NSIPs) is provided by National Policy Statements (NPSs). Section 104 of the Planning Act 2008 requires the Secretary of State to determine applications for NSIPs in accordance with any relevant NPS,

unless:

- it would lead to the UK being in breach of its international obligations;
- It would be in breach of any statutory duty that applies to the Secretary of State;
- It would be unlawful;
- the adverse impacts of the development outweigh its benefits; or
- it would be contrary to any Regulations that may be made prescribing other relevant conditions.

14.2.14 In July 2011, the Secretary of State for the Department of Energy and Climate Change ('DECC' who's functions were replaced by the Department for Business, Energy and Industrial Strategy (BEIS)) designated a number of NPSs relating to nationally significant energy infrastructure.

14.2.15 The NPSs that are considered to be relevant to the Project include:

- **Overarching National Policy Statement for Energy (EN-1)**; and
- **National Policy Statement for Renewable Energy Infrastructure (EN-3)**.

14.2.16 **Paragraph 5.2.1** of **NPS EN-1** states that:

> *"Infrastructure development can have adverse effects on air quality. The construction, operation and decommissioning phases can involve emissions 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 EU legal requirements."*

14.2.17 **Paragraph 5.2.4** of **NPS EN-1** states that:

> *"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 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 IPC 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."

14.2.18 **NPS EN-3** states:

"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."

National Planning Policy Framework

14.2.19 The National Planning Policy Framework (NPPF) (MHCLG, 2019) was updated in February 2019 and refers to the LAQM process by recognising that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas"

14.2.20 The NPPF identifies that local planning authorities should maintain consistency within the Local Air Quality Management process and states that:

"Planning decisions should ensure that any new development within Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

Planning Practice Guidance

14.2.21 The UK Government Planning Practice Guidance (MHCLG, 2014) provides guidance on how the planning process can take account of the impact new development may have on air quality.

14.2.22 The guidance states that air quality may be relevant to a planning application where:

- Traffic near the development may be affected by increasing volume or congestion or altering the fleet composition on local roads;
- New point sources of air pollution are to be introduced;
- People may be exposed to existing sources of pollution;
- Potentially unacceptable impacts (such as dust) may arise during construction; and

- Biodiversity may be affected.

Local Planning Policy

South-East Lincolnshire Local Plan

14.2.23 The South-East Lincolnshire Local Plan was adopted in March 2019 and outlines the policies which will help shape the growth of Boston Borough (and South Holland District) from 2011 – 2036 (South-East Lincolnshire Joint Strategic Planning Committee, 2019). The Local Plan includes the following policy of relevance to air quality:

*"**Policy 30: Pollution***

Development proposals will not be permitted where, taking account of any proposed mitigation measures, they would lead to unacceptable adverse impacts upon:

1. health and safety of the public;

2. the amenities of the area; or

3. the natural, historic and built environment;

by way of:

air quality, including fumes and odour;"

[…]

Planning applications, except for development within the curtilage of a dwelling house as specified within Schedule 2, Part 1 of The Town and Country Planning (General Permitted Development) (England) Order 2015, or successor statutory instrument, must include an assessment of:

9. impact on the proposed development from poor air quality from identified sources;

10. impact on air quality from the proposed development;

[…]

Suitable mitigation measures will be provided, if required. Proposals will be refused if impacts cannot be suitably mitigated or avoided."

Guidance

14.2.24 The following technical guidance was used in the preparation of the preliminary air quality assessment at the PEIR stage:

- Local Air Quality Management (LAQM) Technical Guidance (TG16). (LAQM.TG(16)) (Defra, 2016);
- Institute of Air Quality Management (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2016);
- IAQM (2017) 'Land Use Planning and Development Control: Planning for Air Quality' (IAQM & Environmental Protection UK (EPUK), 2017); and
- Defra EP guidance 'Air emissions risk assessment for your environmental permit' (Environment Agency (EA) and Defra, 2016).

14.3 Consultation

14.3.1 Consultation undertaken throughout the pre-application phase informed the approach and the information provided in this chapter. A summary of the consultation relevant to air quality is detailed in **Table 14.1**.

Table 14.1 Consultation and Responses

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
Planning Inspectorate Scoping Opinion, July 2018	*The Scoping Report states that there are two AQMA's (Haven Bridge and Bargate Bridge), but it does not provide details of the location of these relative to the Proposed Development. The Inspectorate considers that the AQMA's should be shown on a map within the ES.*	*Refer to **Section 14.6** and **Figure 14.3***
Planning Inspectorate Scoping Opinion, July 2018	*The proposed study area will include consideration of human receptors within 350 m of the construction site and ecological receptors within 50 m. The ES should also consider impacts on sensitive receptors located within proximity to the affected road network during construction and operation. The Applicant should make effort to agree the sensitive receptors for inclusion within the assessment with relevant consultation bodies.*	*Refer to **Section 14.5***

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
Planning Inspectorate Scoping Opinion, July 2018	*The assessment of potential significant effects of vessel traffic in the ES should set out the basis for the assessment. As part of the description of vehicle movements, the ES should explain where construction and operational vessels would be refuelled and manoeuvre.*	***Section 14.5** and **14.7***
Planning Inspectorate Scoping Opinion, July 2018	*The ES should explain the approach used to develop the dispersion modelling and the findings. The Inspectorate considers that specific impacts on sensitive receptors, associated with the operation of the facility, including those associated with transportation of feedstock, aggregate and residual material, the gasification process, and aggregate production must be identified in the ES and assessed where significant effects may occur. Cross references should be made to the transportation chapter*	*Refer to **Appendix 14.2** and **Section 14.7***
Planning Inspectorate Scoping Opinion, July 2018	*The Scoping Report proposes to conduct a qualitative assessment of odour emissions associated with dredging works. The ES should explain the approach to undertaking the qualitative assessment and provide details of any mitigation taken into account when determining significant effects.*	*A qualitative assessment of odour during the operational phase of the Facility will be undertaken at the ES Stage.*
Planning Inspectorate Scoping Opinion, July 2018	*The Scoping Report states that a detailed dispersion modelling study will be used to assess impacts from traffic movements on the local road network. The Inspectorate considers that the ES should assess impacts on sensitive receptors from construction and operational traffic movements. The ES should also assess any impacts which additional vehicular traffic would place on the AQMA's identified within the affected road network.*	*Refer to **Appendix 14.2** and **Section 14.7***
Boston Borough Council, February 2019	*Consultation was carried out with the Environmental Health Officer (EHO) at BBC regarding the methodology for the assessment. An email dated 5/2/2019 confirmed that the proposed approach was acceptable, but it was advised that the air quality assessment should consider the potential air quality*	*Refer to **Section 14.5** and **Section 14.7***

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	effects associated with construction and operational phase traffic emissions within and near the existing AQMAs.	

14.4 Assessment Methodology

14.4.1 The preliminary air quality assessment considered impacts associated with dust, plant and vehicle exhaust emissions during the construction phase, and vehicle exhaust, shipping and Facility stack emissions potentially arising from the operational phase. The approach undertaken for each assessment is provided below.

Construction Phase Dust and Particulate Matter Assessment

14.4.2 An assessment of potential impacts associated with the site construction activities was undertaken in accordance with relevant IAQM guidance (IAQM, 2016). A summary of the staged assessment procedure is provided below:

14.4.3 Construction phase assessment steps:

1) Screen the need for a more detailed assessment;

2) Separately for demolition, earthworks, construction and trackout:

   A. determine potential dust emission magnitude;

   B. determine sensitivity of the area; and

   C. establish the risk of dust impacts.

3) Determine site specific mitigation; and

4) Examine the residual effects to determine whether or not additional mitigation is required.

14.4.4 Trackout is defined as the transport of dust and dirt from the construction site onto the public road network. Full details of the assessment methodology are provided in **Appendix 14.1**.

14.4.5 Defra technical guidance (Defra, 2016) states that emissions from Non-Road

Mobile Machinery (NRMM)[1] used on construction sites are unlikely to have a significant impact on local air quality where relevant control and management measures are employed. As such, emissions from NRMM were not considered quantitively in this assessment, and the relevant control measures to be employed are detailed in **Section 14.7**.

Construction and Operational Phase Road Traffic Emissions Assessment

14.4.6 The Atmospheric Dispersion Modelling System for Roads (ADMS-Roads model) Version 4.1.1.0 was used to assess the potential impact on local air quality associated with vehicle exhaust emissions generated during both the construction and operational phases of the Facility. The main traffic-related pollutants of concern for human health are nitrogen dioxide and particulate matter (NO_2 and PM_{10} and $PM_{2.5}$). Concentrations of these pollutants were therefore considered in the road traffic emissions assessment at identified receptors located adjacent to the road network within the Study Area.

14.4.7 The ADMS-Roads model is a comprehensive tool for investigating air pollution in relation to road networks. The model uses algorithms for the height-dependence of wind speed, turbulence and stability to predict emissions dispersion and ground level pollutant concentrations. The outputs are expressed as long-term and short-term averages, including percentile values for comparison with relevant Standards and Objectives.

14.4.8 Full details of the methodology for the road traffic emissions assessment are provided in **Appendix 14.2**. This Appendix provides details of the following:

- Dispersion modelling scenarios;
- Traffic data;
- Model verification;
- Emission factors;
- NOx (oxides of nitrogen) to NO_2 conversion; and
- Meteorological data.

14.4.9 The road links included in the ADMS-Roads modelling are detailed in **Figure 14.1**.

[1] *Non-Road Mobile Machinery is defined as any mobile machinery, transportable industrial equipment or vehicle fitted with an internal combustion engine not intended for passenger or goods transport by road. Explanatory Memorandum to the UK Non Road Mobile Machinery (Emissions of Gaseous & Particulate Pollutants) (Amendment) Regulations (2006).*

Operational Phase Vessel Emissions Assessment

Dispersion Modelling

14.4.10 The Atmospheric Dispersion Modelling System 5 (ADMS-5) Version 5.2.4.0 was used to assess the potential impact on local air quality from vessel emissions during the operational phases of the Facility. The main pollutants of concern for human health relating to vessel emissions are NO_2, PM_{10}, $PM_{2.5}$ and sulphur dioxide (SO_2) and these pollutants were therefore the focus of the dispersion modelling assessment. The inputs for the ADMS-5 model are detailed in **Figure 14.1**.

14.4.11 Full details of the methodology for the vessel emissions assessment undertaken are provided in **Appendix 14.2**. This Appendix provides details of the following:

- Dispersion modelling scenarios;
- Emission calculations;
- Dispersion model inputs;
- Meteorological conditions;
- Terrain data; and
- Conversion of NO_x to NO_2.

Operational Phase Stack Emissions Assessment

Air Dispersion Model

14.4.12 The potential impact of the development-generated stack emissions from the operational phase of the Facility were assessed using ADMS-5 (model version 5.2.4.0).

14.4.13 Pollutant emissions were considered from the main gasifier stack, the lightweight aggregates (LWA) facility stack with two lines operating simultaneously (via LWA stack 1), and operations with releases from a LWA stack with one line dedicated to APC residues (see **Chapter 5 Project Description** in **Section 5.4**).

14.4.14 Full details of the methodology for the stack emissions assessment undertaken are provided in **Appendix 14.2**. This appendix provides details of the following:

- Emission parameters and Emission Limit Values used;
- Consideration of metals;
- Meteorological conditions;
- Treatment of terrain;

- Treatment of buildings;
- Dispersion model inputs; and
- Conversion of NO_x to NO_2.

14.4.15 A stack release height of 70 m for each stack was considered in the preliminary assessment. A sensitivity test of the effects of emissions released over a range of stack heights will be presented at the ES stage.

Identification of Receptor Locations

Construction Phase Dust and Fine Particulate Matter Assessment

14.4.16 The IAQM guidance states that a Detailed Assessment is required if there are human receptors located within 350 m and ecological receptors within 50 m of the site boundary. There are several human receptors within 350 m of the site boundary, and a Detailed Assessment was therefore undertaken.

14.4.17 There are no statutory designated ecological sites located within 50 m of the site boundary.

14.4.18 Distance boundaries showing the Study Area construction phase assessment are detailed in **Figure 14.2**.

Road Traffic, Vessel and Stack Emissions Assessment

Human Receptor Locations

14.4.19 Sensitive receptor locations were identified within the Study Area for consideration in the road traffic, vessels and stack emissions assessment. Pollutant concentrations resulting from emissions from each source were predicted at each of the identified human receptor locations to provide an in-combination assessment.

14.4.20 The sensitive receptor locations were selected based on their proximity to the Facility, road links and / or navigation routes affected by the proposed activities, where the potential effect of development-related emissions on local air pollution would be most significant.

14.4.21 The sensitive receptor locations considered in the dispersion modelling study are detailed in **Table 14.2**Error! Reference source not found. and **Figure 14.3**.

14.4.22 R2 is the closest human receptor to the Application Site and is approximately 35 m to the north. Receptors R12, R18, R 19 and R20 are located within the Boston AQMA, and receptors R29 and R30 are located within the Bargate Bridge AQMA

(see **Section 14.6**).

Table 14.2 Sensitive Human Receptor Locations

Receptor ID	Location	Grid Reference	
		X	Y
R1	*Heron Way*	*533499*	*341991*
R2	*Beeston Farm, Battery Lane*	*533658*	*342465*
R3	*Rectory Road*	*533623*	*343094*
R4	*Fishtoft Road*	*534001*	*342947*
R5	*Powell Street*	*534145*	*342652*
R6	*Rider Gardens*	*534521*	*342751*
R7	*Windrush*	*534795*	*342486*
R8	*Woad Farm*	*535396*	*341808*
R9	*Silt Pit Farm*	*534089*	*341069*
R10	*Ivy House*	*533944*	*341621*
R11	*Baptist Farm*	*533446*	*341698*
R12	*Liquorpond Street*	*532661*	*343672*
R13	*Wyberton Low Road*	*533160*	*342011*
R14	*Slippery Gowt Lane*	*533543*	*341625*
R15	*Marsh Lane*	*533524*	*342083*
R16	*River Way*	*534055*	*342766*

Receptor ID	Location	Grid Reference	
		X	Y
R17	St Thomas' CE Primary School	532935	342370
R18	95 John Adams Way	532575	343696
R19	68 Liquorpond Street	532470	343736
R20	16 Liquorpond Street	532331	343848
R21	5 Middlecott Close	532602	342734
R22	61 London Road	532603	342759
R23	12 Middlecott Close	532604	342707
R24	71 Bayswood Avenue	532692	342536
R25	2 to 50 Wyberton Low Road	532818	342754
R26	77 Wyberton Low Road	532835	342654
R27	3 Marsh Lane	532940	342634
R28	64A Wyberton Low Road	532894	342620
R29	Roadside adjacent to 30 Spilsby Road	533251	344642
R30	Spilsby Road	533226	344624

Ecological Receptor Locations

14.4.23 In accordance with Defra guidance (Defra, 2016), statutory designated ecological sites were considered based on the following criteria:

- Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites within 10 km of the site;
- Sites of Special Scientific Interest (SSSIs) within 2 km of the site; and
- National Nature Reserves (NNRs), Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs) and Ancient Woodlands within 2 km of the site.

14.4.24 The following five designated ecological sites were identified and considered in the preliminary air quality assessment:

- The Wash and North Norfolk Coast SAC;
- The Wash SPA and Ramsar;
- Havenside LWS / LNR;
- South Forty Foot Drain LWS; and
- Slippery Gowt Sea Bank LWS.

14.4.25 A preliminary assessment of potential impacts to designated ecological sites was undertaken at this PEIR stage. Predicted pollutant concentrations within the designated ecological sites were considered with reference to appropriate Critical Levels and Critical Loads. The closest point of each of the designated sites within the Study Area were included within the air quality assessment, as an initial screen of impacts on the ecological receptors identified above. These locations are detailed in **Table 14.3** and **Figure 14.3Error! Reference source not found.**.

Table 14.3 Ecological Receptor Grid Locations Included in the Assessment

Receptor Name	Ecological Receptor	Grid Reference	
		X	Y
E1	The Wash and North Norfolk Coast SAC	535935	339954
E2	The Wash SPA and Ramsar	535935	339954
E3	Havenside LNR	534128	342609
E4	South Forty Foot Drain LWS	532633	342874
E5	Slippery Gowt Sea Bank LWS	535107	341192

Background Pollutant Concentrations

14.4.26 Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ corresponding to the 1 km x 1 km grid squares covering the Application Site and identified receptor locations included in the assessment, were obtained from the LAQM support tools provided by Defra for use in air quality assessments (Defra, 2019b).

14.4.27 Ambient concentrations of pollutants prescribed in the IED and EP Regulations, were derived from different sites within Defra's ambient air quality monitoring network. Heavy metals data were taken from the Heigham Holmes rural background site in Norfolk, which is part of the Heavy Metals Network. Volatile Organic Compounds (VOCs) and associated species data were derived from the Scunthorpe Town monitoring station, an urban industrial site classification. These datasets are likely to incorporate a contribution from industrial emissions in the

locality and may provide higher background levels than conditions at the Application Site, but of all such monitoring facilities across the UK, this is the closest station to the Site to record concentrations of pollutants prescribed in the IED and EP Regulations. Other data sources were used for hydrochloric acid, ammonia and hydrogen fluoride (HCl, NH_3 and HF) background data (see **Section 14.6**).

14.4.28 The Process Contribution (PC) from the Biomass UK No. 3 Ltd facility, which is currently being commissioned, were added to the background concentrations of the Study Area. The PCs from Biomass UK No. 3 Ltd emissions would not have yet been included in the background pollutant concentration maps. Receptors R1-R12 in this assessment were at the same locations as those modelled in Biomass UK No. 3 Ltd, therefore for these receptors Biomass UK No. 3 Ltd PC concentrations were added directly. For receptor locations R13-R30, the most representative Biomass UK No. 3 Ltd PC (that is, the closest location in each case) was applied, which provided a conservative assessment.

Assessment Significance Criteria

Construction Phase Dust and Particulate Matter

14.4.29 In the IAQM methodology, the dust emission magnitude is combined with the sensitivity of the area to determine the risk of impacts, prior to any mitigation. Once appropriate mitigation measures have been identified, the significance of construction phase impacts can be determined. The aim is to prevent significant effects at receptors due to the implementation of effective mitigation.

14.4.30 With implementation of effective mitigation measures, generation of dust and fine particulate matter will be minimised such that the residual impacts can be considered to be 'not significant', in accordance with guidance provided by the IAQM (IAQM, 2016).

Human Receptors

14.4.31 The ambient air quality Objectives considered in the assessment of impacts at human receptor locations are detailed in **Table 14.4**.

14.4.32 For those pollutants which are not covered by the LAQM regulatory regime, as they are predominantly released from specific industry sector activities, the EALs listed in Environment Agency technical guidance for the permitting of installations were applied as benchmarks for their assessment. The EALs considered in the assessment with the relevant source for each are detailed in **Table 14.4**.

Table 14.4 Air Quality Objectives and Environmental Assessment Levels

Pollutant	Air Quality Objectives*			Source of Objective / EAL
	Annual	Short-Term	Short-Term Period	
Nitrogen Dioxide (NO_2)	40 µg.m^{-3}	200 µg.m^{-3}	1-hour mean, not to be exceeded more than 18 times per year	Air Quality (England) Regulations 2000, as amended
Oxides of Nitrogen (NO_x) as NO_2	30 µg.m^{-3} (ecological sites only)	75 µg.m^{-3} (ecological sites only)	24-hour mean	EU AAD Limit Value (long-term) EU AAD Target Value (short-term)
Particulates (PM_{10})	40 µg.m^{-3}	50 µg.m^{-3}	24-hour mean, not to be exceeded more than 35 times per year	Air Quality (England) Regulations 2000, as amended
Particulates ($PM_{2.5}$)	25 µg.m^{-3} (20 µg.m^{-3} from 2020)	-	-	EU AAD Limit Value
Sulphur Dioxide (SO_2)	20 µg.m^{-3} (ecological sites only)	350 µg.m^{-3}	1-hour mean, not to be exceeded more than 24 times a year	Air Quality (England) Regulations 2000, as amended
	-	125 µg.m^{-3}	24-hour mean, not to be exceeded more than 3 times a year	Air Quality (England) Regulations 2000, as amended
	-	266 µg.m^{-3}	15-minute mean, not to be exceeded more than 35 times a year	Air Quality (England) Regulations 2000, as amended
Carbon Monoxide (CO)	-	10 mg.m^{-3}	Maximum daily running 8-hour mean	Air Quality (England) Regulations 2000, as amended
	-	30 mg.m^{-3}	1-hour mean	EAL (2016 H1)
Ammonia (NH_3)	180 µg.m^{-3}	2,500 µg.m^{-3}	1-hour mean	EAL (2003 H1)
Hydrogen Chloride (HCl)	20 µg.m^{-3}	750 µg.m^{-3}	1-hour mean	EAL (2003 H1, long-term) EAL (2014 H1, short-term)
Hydrogen Fluoride (HF)	16 µg.m^{-3}	160 µg.m^{-3}	1-hour mean	EAL (2016 H1)
	-	5 µg.m^{-3}	24-hour mean	EU AAD Target Value
	-	0.5 µg.m^{-3}	7-day mean	EU AAD Target Value

Pollutant	Air Quality Objectives*			Source of Objective / EAL
	Annual	Short-Term	Short-Term Period	
Mercury (Hg)	0.25 µg.m^{-3}	7.5 µg.m^{-3}	1-hour mean	EAL (2016 H1)
Cadmium (Cd)	5 ng.m^{-3}	-	-	EU AAD Target Value
Thallium (Tl)	1 µg.m^{-3}	30 µg.m^{-3}	1-hour mean	EAL (2003 H1)
Arsenic (As)	6 ng.m^{-3}	-	-	EU AAD Target Value
Cobalt (Co)	0.2 µg.m^{-3}	6 µg.m^{-3}	-	EAL (2003 H1)
Copper (Cu)	10 µg.m^{-3}	200 µg.m^{-3}	-	EAL (2016 H1)
Chromium (Cr)	5 µg.m^{-3}	150 µg.m^{-3}	-	EAL (2016 H1) for Chromium III, chromium III (compounds and chromium III compounds (as chromium)
Chromium VI (Cr(VI))	0.0002 µg.m^{-3}	-	-	EAL (2016 H1)
Manganese (Mn)	0.15 µg.m^{-3}	1,500 µg.m^{-3}	-	EAL (2016 H1)
Nickel (Ni)	20 ng.m^{-3}	-	-	EU AAD Target Value
Lead (Pb)	0.25 µg.m^{-3}	-	-	UK AQS Objective
Antimony (Sb)	5 µg.m^{-3}	150 µg.m^{-3}	1-hour mean	EAL (2016 H1)
Vanadium (V)	5 µg.m^{-3}	1 µg.m^{-3}	1-hour mean	EAL (2016 H1)
PCDD & PCDF†	-	-	-	None
TOC‡	5 µg.m^{-3} (as benzene)	-	-	Air Quality (England) Regulations 2000, as amended
Polycyclic Aromatic Hydrocarbon (PAH)	1 ng.m^{-3} (BaP)	-	-	EU AAD Target Value

* *mg.m^{-3}, µg.m^{-3} and ng.m^{-3} are milligrams (10^{-3} grams), micrograms (10^{-6} grams) and nanograms (10^{-9} grams) per cubic metre, respectively.*

† *PCDD is polychlorinated dibenzodioxins; PDDF is polychlorinated dibenzofurans.*

‡ *Total Organic Carbon (TOC) was assessed by comparison with the benzene Objective value.*

14.4.33 Guidance is provided by the IAQM and EPUK (IAQM & EPUK, 2017) to determine the significance of a development's impact on local ambient air quality. **Table 14.5** details the impact descriptors that take account of the magnitude of change in pollutant concentrations, and the concentration value in relation to the air quality

Objectives. The guidance recommends that the assessment of significance of effect should consider the following factors:

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

14.4.34 The guidance also states that a judgement of the significance should be made by a competent professional who is suitably qualified. This air quality assessment and determination of the significance of the development on local air quality was undertaken by members of the IAQM and the Institute of Environmental Management and Assessment (IEMA).

14.4.35 In the preliminary air quality assessment for this PEIR, the impact descriptors were applied to the change in pollutant concentrations arising from construction phase road traffic movements. The significance of impacts from operational phase activities associated with the Facility will be addressed at the ES stage.

Table 14.5 Impact Descriptor for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentration relative to the Air Quality Assessment Level (AQAL)			
	1	2 - 5	6 – 10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76% to 94% of AQAL	Negligible	Slight	Moderate	Moderate
95% to 102% of AQAL	Slight	Moderate	Moderate	Substantial
103% to 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

14.4.36 The above criteria relate to impacts based on annual mean pollutant concentrations. Short-term pollutant concentrations were compared to the relevant air quality Objectives; any predicted exceedances of these Objectives would be considered to constitute a significant impact.

Ecological Receptors

14.4.37 The EALs that are applicable to ecological receptors considered in this assessment are detailed in **Table 14.6** and **Table 14.7**.

14.4.38 Critical Levels for the protection of vegetation and ecosystems apply irrespective of habitat type and are based on the concentration of the relevant pollutants in air.

14.4.39 Critical Levels are not habitat-specific, and UK assessment levels are detailed in **Table 14.6**. As it is not possible to predict weekly concentrations in the ADMS-5, daily mean concentrations of HF were compared to the weekly mean Critical Level in the preliminary assessment.

Table 14.6 Critical Levels for the Protection of Vegetation and Ecosystems

Pollutant	Concentration ($\mu g.m^{-3}$)	Measured as	Source
Oxides of Nitrogen (NO_X)	30	Annual mean	EU Target Value for the protection of vegetation and ecosystems
	75	Daily mean	
Sulphur Dioxide (SO_2)	20	Annual mean	
Ammonia	3	Annual mean	
Hydrogen Fluoride (HF)	5	Daily mean	
	0.5	Weekly mean	

14.4.40 Critical Loads are a habitat-specific estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge (CEH, 2019).

14.4.41 Critical Loads associated with habitats present within The Wash and North Norfolk Coast SAC and The Wash SPA were considered in the assessment.

14.4.42 There are several different habitats and species sensitive to nutrient nitrogen and acid deposition within The Wash and North Norfolk Coast SAC and The Wash SPA. Predicted annual mean NO_x, SO_2 and NH_3 concentrations were compared to the lowest (most stringent) Critical Loads of all habitats present within the designated site, as detailed in **Table 14.7**. Where a Critical Load range was provided as the benchmark, the most demanding value was applied to provide a conservative assessment.

Table 14.7 Critical Load Values for Nutrient Nitrogen and Acid Deposition on Considered Ecological Habitats

Site	Feature	Habitat Type	Nutrient Nitrogen CL (kg)	MinCLMinN (keq N/ha/yr)	MinCLMaxN (keq N/ha/yr)	MinCLMaxS (keq S/ha/yr)
The Wash and North Norfolk Coast SAC	Coastal lagoons, Salicornia and other annuals colonizing mud and sand, Atlantic salt meadows, Mediterranean and thermo-Atlantic halophilous scrubs.	Pioneer, low-mid, mid-upper saltmarshes	20-30	-	-	-
The Wash SPA	Common Tern, Little Tern	Supralittoral sediment (acidic type)	8-10	0.223	1.268	0.830
		Supralittoral sediment (calcareous type)	10-15	0.856	4.856	4.000
		Supralittoral sediment	10-20	-	-	-
	Pink-footed goose, Dark-bellied brent goose, Common Shelduck, Eurasian wigeon, Northern pintail, Common goldeneye, Eurasian oystercatcher, Grey plover, Red knot, Sanderling,	Littoral sediment	20-30	-	-	-

Site	Feature	Habitat Type	Nutrient Nitrogen CL (kg)	MinCLMinN (keq N/ha/yr)	MinCLMaxN (keq N/ha/yr)	MinCLMaxS (keq S/ha/yr)
	Dunlin, Black-tailed godwit, Bar-tailed godwit, Common redshank.					
	Eurasian curlew	Neutral Grassland – acid	20-30	0.223	1.268	0.830
		Neutral Grassland – calcareous		0.856	4.856	4.000
		Littoral Sediment		-	-	-
	Ruddy turnstone	Littoral Rock	20-30	-	-	-
The Wash Ramsar site (as The Wash SSSI)	Fen, marsh and swamp	Rich fens	15-30	-	-	-
	Common Tern, Little Tern	Supralittoral sediment (acidic type)	8-10	0.223	1.268	0.830
		Supralittoral sediment (calcareous type)	10-15	0.856	4.856	4.000
		Supralittoral sediment	10-20	-	-	-
	Eurasian curlew	Neutral Grassland – acid	20-30	0.22	1.268	0.830
	Eurasian curlew	Neutral grassland – calcareous	20-30	0.856	4.856	4.000

14.4.43 The assessment of deposition on sensitive ecological receptors was conducted in accordance with the Environment Agency guidance (Environment Agency and Defra, 2016). The guidance indicates that within 2 km of an emitting source, dry deposition is the predominant route for transferal of airborne pollutants into sensitive ecological habitats. The guidance also recommends deposition velocities for ecological receptors based upon the classification of the habitat type and the assessed pollutant, as summarised in **Table 14.8**.

Table 14.8 Recommended Deposition Velocities

Pollutant	Deposition Velocity ($m.s^{-1}$)	
	Grassland	**Forest**
NO_2	0.0015	0.003
SO_2	0.012	0.024
NH_3	0.02	0.03

14.4.44 The dry deposition flux ($\mu g.m^{-2}.s^{-1}$) was calculated by multiplying the airborne concentration ($\mu g.m^{-3}$) by the deposition velocity ($m.s^{-1}$). The deposition velocities for grassland were considered to be most representative for the habitats in the Study Area. The calculated dry deposition flux is converted to a nitrogen and acid equivalent ($kg.ha^{-1}.y^{-1}$) in order for comparison to the specific Critical Loads for each ecological habitat.

14.4.45 The assessment used the Environment Agency (Environment Agency and Defra, 2016) criteria to determine the significance of impact on designated sites relative to Critical Levels and Critical Loads. Process contributions are considered to be insignificant using the following criteria:

- For Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Ramsar and Sites of Special Scientific Interest (SSSI)
  - the short-term PC is less than 10% of the short-term environmental standard for protected conservation areas; and
  - the long-term PC is less than 1% of the long-term environmental standard for protected conservation areas.

- For all other locally designated ecological sites
  - the short-term PC is less than 100% of the short-term environmental standard; and
  - the long-term PC is less than 100% of the long-term environmental standard.

14.4.46 The preliminary air quality assessment predicted pollutant concentrations at the closest point of each designated ecological site to the Facility, to determine whether the potential impacts are considered to be insignificant. Where exceedances of the relevant environmental standard are predicted, a further detailed assessment will be carried out at the ES stage.

Odour

14.4.47 There is potential for odour emissions to be released from the proposed RDF storage, handling and processing facilities at the site. Odour will be managed by ensuring all bales received are tightly wrapped and sealed in plastic wrap; and that storage will be minimised to approximately five days at the Application Site prior to processing. An assessment of the main odour sources at the Application Site will therefore be carried out at the ES stage.

Assumptions and Limitations

14.4.48 Any relevant assumptions and limitations associated with the data sources or information used to define the scope or Study Area will be identified at the ES stage.

Cumulative Impact Assessment

14.4.49 An assessment of potential cumulative air quality impacts arising from the Facility and other plans and projects will be undertaken at the ES stage. The findings of the cumulative impact assessment will be reported within the ES, with mitigation measures proposed as required.

Transboundary Impact Assessment

14.4.50 Where relevant, an assessment of potential transboundary air quality impacts arising from the Facility will be undertaken at the ES stage. The findings of the assessment will be reported within the ES, with mitigation measures proposed as required.

14.5 Scope

Study Area

14.5.1 The Study Area for the air quality assessment was defined as follows:

- Construction phase dust and particulate matter assessment:
  - Human receptors within 350 m of the site boundary and within 50 m of routes used by construction vehicles, up to 500 m from the site boundary; and,
  - Ecological receptors within 50 m of the site boundary and within 50 m of

routes used by construction vehicles, up to 500 m from the site boundary. The construction dust and particulate matter assessment Study Area is detailed in **Figure 14.2**.

- Construction / operation phase road traffic emissions:
  - Human and ecological receptors within 200 m of roads that are expected to experience a change in traffic flows because of the Facility. The road traffic network considered in the road traffic emissions assessment is detailed in **Figure 14.1**.

- Operational phase vessel and stack emissions assessment:
  - The vessel emissions Study Area was defined as the spatial extent of the navigation route on which development-generated vessels are predicted to travel and identified human and ecological receptor locations situated along the assessed navigational route (i.e. along The Haven to the turning point at the Port of Boston). The stack emissions Study Area was defined as the area affected by emissions from the proposed gasification plant main stack and the two proposed LWA stacks. The stack emissions Study Area is detailed in **Figure 14.1**.

Data Sources

14.5.2 The assessment was undertaken with reference to several sources, as detailed in **Table 14.9.**

Table 14.9 Key Information Sources

Data Source	Reference
Boston Borough Council (BBC)	Dioxide Diffusion Tube Results 2018[2]
Centre for Ecology and Hydrology (CEH)	CEH (2019): Air Pollution Information System (APIS)
Department for Environment Food and Rural Affairs (Defra)	Defra (2016): Local Air Quality Management Technical Guidance TG(16)
Defra's LAQM Support Tools	Defra (2019): Local Air Quality Management 1 km x 1 km grid background pollutant maps
Environment Agency and Defra	Environment Agency & Defra (2016): Air quality risk assessment for your environmental permit
Institute of Air Quality Management (IAQM)	IAQM (2014): Guidance on the Assessment of Dust from Demolition and Construction
IAQM and Environmental Protection UK (EPUK)	IAQM & EPUK (2017): Land-use Planning & Development Control: Planning for Air Quality

[2] *Provided in consultation with the EHO at BBC.*

14.6 Existing Environment

Local Air Quality Management

14.6.1 There are two statutory designated AQMAs in Boston, both were declared by BBC for exceedances of the annual mean air quality Objective for NO_2. The Boston (Haven Bridge) AQMA is located on the A16 John Adams Way, approximately 1.5 km northwest of the Facility, and was declared in September 2001. The Bargate Bridge AQMA is located on the A16 Spilsby Road, approximately 1.8 km north-northwest of the Facility, and was declared in March 2005.

14.6.2 The AQMAs encompass the main roads within BBC's administrative region, including the A16 and the A52, and road traffic exhaust emissions are likely to be the largest source of pollutants within the AQMAs.

Air Quality Monitoring

14.6.3 BBC undertakes air quality monitoring within the borough, using a network of NO_2 diffusion tubes. The most recent monitoring data were obtained from BBC during consultation[2] and were reviewed to establish the existing conditions at, and in proximity to, the Application Site.

14.6.4 BBC does not carry out air quality monitoring within or near the Facility. The nearest monitoring is undertaken at John Adams Way intersection with Haven Bridge Roadside (Site ID: 5), approximately 1.5 km north. Monitoring data from 2014 – 2018 for all diffusion tubes are detailed in **Table 14.10**. Exceedances of the NO_2 annual mean Objective are highlighted in bold text.

Table 14.10 BBC Diffusion Tube NO2 Monitoring Data within Boston

Site ID	Location	Site Type	Grid Reference		NO_2 Annual Mean Concentration ($\mu g.m^{-3}$)				
			X	Y	2014	2015	2016	2017	2018*
1	North side of Haven Bridge Road	Roadside	532575	343696	**51.7**	**49.7**	**45.8**	**49.4**	**42.4**
2	North side of Haven Bridge Road	Roadside	532656	343716	**53.7**	**50.1**	37.5	**44.5**	**44.5**
3	68 Liquorpond Street	Roadside	532470	343736	**45.3**	**46.0**	**46.2**	**53.2**	**48.3**

Site ID	Location	Site Type	Grid Reference		NO_2 Annual Mean Concentration ($\mu g.m^{-3}$)				
			X	Y	2014	2015	2016	2017	2018*
4	18 Queen Street	Roadside	532331	343848	**40.2**	36.4	38.6	38	39.4
5	John Adams Way intersection with Haven Bridge	Roadside	532859	343760	36.1	34.9	34.6	36.8	37.1
6	37 Spayne Road	Urban Background	533124	343939	17	17.1	17.8	18.6	17.2*
7	29 Manor Gardens	Urban Background	533324	344044	15.9	16.3	17.0	17.9	16.4*
8	Bargate Roundabout	Roadside	533112	344476	34.2	31.1	31.1	31.3	32.5
9	30 Spilsby Road	Roadside	533251	344642	**46.6**	**44.2**	**41.5**	**43.6**	39.4
10	23 Spilsby Road	Roadside	533312	344665	31.7	28.5	28.2	27.7	27.9*
11	41 Spilsby Road	Roadside	533368	344728	36.3	33.0	30.6	31.8	**46.3**
12	Junction of New Asda Road and Sleaford Road	Roadside	532168	343987	30.7	28.6	26.8	27.6	31.8
13	42 Spilsby Road	Roadside	533287	344675	23.3	22.0	21.7	22.1	30.0
14	20 Spilsby Road	Roadside	533226	344624	**41.6**	36.6	36.7	37.1	37.8
15	Façade of 32 Spilsby Road	Roadside	533253	344653	25.2	21.4	21.8	22.5	21.8*
*the diffusion tubes at Site ID 6, 7, 10 and 15 were moved for December 2018, thus the results show the average from January to November (inclusive) only.									

14.6.5 The monitoring data show that there were exceedances of the NO_2 annual mean air quality Objective at seven diffusion tube locations from 2014 – 2018. These locations are situated within, or on the boundary of the Haven Bridge or Boston AQMAs, where elevated pollutant concentrations are anticipated.

Background Pollutant Concentrations

14.6.6 Background concentrations of NO_2, PM_{10}, $PM_{2.5}$, CO and SO_2 were obtained from the air pollutant concentration maps provided by Defra (Defra, 2019b) for the grid squares covering the Study Area. 2018, 2021 and 2025 background concentrations were obtained by factoring from the latest 2017-based maps, apart from CO and SO_2 for which the latest mapped data provided by Defra is from 2001.

14.6.7 The relevant background pollutant concentrations were obtained for the grid squares covering the selected receptor locations and are detailed in **Table 14.11** to **Table 14.13**.

Table 14.11 2018 Annual Mean Background Pollutant Concentrations

Receptor	Coordinates		Defra Mapped Background Concentration (µg.m^{-3})				
	X	Y	NO_2	PM_{10}	$PM_{2.5}$	CO*	SO_2*
R13, R17, R21-R28	532500	342500	13.3	14.6	8.9	264	2.2
R12, R18, R19, R20	532500	343500	14	14.6	9.3	267	2.2
R1, R10, R11, R14	533500	341500	10.5	15.8	8.8	253	2.4
R2, R15	533500	342500	13	16.5	9.3	262	2.3
R3	533500	343500	14.5	14.1	9	266	2.1
R29, R30	533500	344500	13.8	14.2	9.1	264	2.55
R9	534500	341500	10.6	15.4	8.7	248	3.3
R4, R5, R6, R7, R16	534500	342500	12.2	15.6	9.1	256	2.7
R8	535500	341500	9.2	15.6	8.7	240	3.6
*latest CO and SO_2 background concentrations are from 2001, and were used in all future year scenarios							

Table 14.12 2021 Annual Mean Concentrations

Receptor	Coordinates		Defra Mapped Background Concentration (µg.m^{-3})		
	X	Y	NO_2	PM_{10}	$PM_{2.5}$
R13, R17, R21-R28	532500	342500	11.8	14.1	8.5
R12, R18, R19, R20	532500	343500	12.4	14.1	8.9
R1, R10, R11, R14	533500	341500	8.3	15.3	8.4
R2, R15	533500	342500	8.9	16.1	8.9
R3	533500	343500	12.9	13.6	8.6
R29, R30	533500	344500	12.2	13.6	8.7
R9	534500	341500	9.6	14.9	8.3
R4, R5, R6, R7, R16	534500	342500	11.1	15.1	8.7
R8	535500	341500	8.3	15.1	8.3

Table 14.13 2025 Annual Mean Concentrations

Receptor	Coordinates		Defra Mapped Background Concentration (µg.m^{-3})		
	X	Y	NO_2	PM_{10}	$PM_{2.5}$
R13, R17, R21-R28	532500	342500	11.8	14.1	8.5
R12, R18, R19, R20	532500	343500	12.4	14.1	8.9
R1, R10, R11, R14	533500	341500	8.3	15.3	8.4
R2, R15	533500	342500	8.9	16.1	8.9
R3	533500	343500	12.9	13.6	8.6
R29, R30	533500	344500	12.2	13.6	8.7
R9	534500	341500	9.6	14.9	8.3
R4, R5, R6, R7, R16	534500	342500	11.1	15.1	8.7
R8	535500	341500	8.3	15.1	8.3

14.6.8 Ambient concentrations of pollutants prescribed in EP Regulations as transposed from the IED, including heavy metals, total organic carbon (TOC) (as benzene), Benzo[a]pyrene (BaP), dioxins and furans, were obtained from the Heigham Holmes rural monitoring station, supplemented by data from the Scunthorpe Town urban industrial monitoring station.

14.6.9 HCl was measured as part of the UKEAP-Acid Gas and Aerosol Network (AGANet) at predominantly rural background sites. The Stoke Ferry (UKA00317) monitoring site is the closest HCl monitoring locations to the Application Site, approximately 57 km south-east of the Application Site. The latest year of HCl monitoring data was 2015. In 2015, the average concentration of gaseous HCl at the Stoke Ferry monitoring station was 0.2 $\mu g.m^{-3}$.

14.6.10 Ambient monitoring of NH_3 is undertaken as part of the National Ammonia Monitoring Network (NAMN) at 72 locations in the UK. APIS estimates NH_3 concentrations at a 5 km grid resolution. The three-year average (2015-2017) NH_3 concentration for the grid square covering the Application Site (533880, 342505) is 2.03 $\mu g.m^{-3}$.

14.6.11 There are very few recent ambient measurements of HF in the UK. Defra guidance states that it would be reasonable to expect that a maximum 1-hour mean HF concentration of 0.00000246 $\mu g.m^{-3}$ would be suitable for a rural site exposed to power station plumes (Defra, 2006). This value was used for the annual mean concentration as well for a conservative estimate.

14.6.12 Monitoring of mercury (Hg in the PM_{10} airborne particulate fraction) ceased in December 2013, therefore background concentrations from the 2013 dataset were used.

14.6.13 There are no data available for the background concentrations of antimony (Sb) or thallium (Tl) as it is not measured in the UK, and therefore the background concentration of these metals was assumed to be zero.

14.6.14 The background concentrations of heavy metals, HCl, HF and BaP used in this assessment are detailed in **Table 14.14Error! Reference source not found.**.

Table 14.14 Heavy Metal, BaP, HCl, HF, PCDD / PCDF, NH_3 and Benzene Background Concentrations

Pollutant	Monitoring Year	Monitoring Location	Concentration ($\mu g.m^{-3}$)
TOC (as benzene)	2018	Scunthorpe Town	0.87
BaP	2018	Scunthorpe Town	0.0017
As	2018	Heigham Holmes	0.0005
Cd	2018	Heigham Holmes	0.0001
Co	2018	Heigham Holmes	0.00007
Cr	2018	Heigham Holmes	0.00095
Cu	2018	Heigham Holmes	0.00196
Mn	2018	Heigham Holmes	0.00278
Ni	2018	Heigham Holmes	0.00077
Pb	2018	Heigham Holmes	0.0041
Sb	-	-	Assumed zero
V	2018	Heigham Holmes	0.00096
Zn	2018	Heigham Holmes	0.00986
Tl	-	-	Assumed zero
Hg	2013	Heigham Holmes	0.00131
NH_3	2015 – 2017	5 km resolution for Application Site (533880, 342505)	2.03
HCl	2015	Stoke Ferry	0.2
HF	-	**	0.00000246

*$fg.m^{-3}$
** Defra, 2006

14.6.15 Short-term background concentrations of all pollutants were assumed to be twice the annual mean, in accordance with EA and Defra guidance (Environment Agency & Defra, 2016), except for HF as the guidance concentration was given as a 1-hour mean.

14.7 Potential Impacts

Embedded Mitigation

14.7.1 Emissions from the Facility were assumed to be at the relevant Emission Limit Value, thereby the emissions abatement systems which will be a necessary component of the Facility design for those Limits to be met, were assumed to be in place (and will be required for the environmental permit for the site). No other

embedded mitigation measures have been considered as part of this preliminary assessment. These will be fully considered and assessed within the Air Quality Assessment ES chapter, however embedded mitigation measures are likely to include the following:

- Construction and decommissioning works will be undertaken in accordance with best practice measures and proportional to the likely impacts; and
- An Air Quality Management Plan (AQMP) will be developed as part of the Code of Construction Practice (CoCP).

14.7.2 Any requirement for additional air quality, dust or odour mitigation measures will be determined through liaison with BBC and other relevant regulatory stakeholders.

Potential Impacts during Construction

Construction Dust and Particulate Matter Assessment

14.7.3 The construction works associated with the Facility have the potential to impact on local air quality conditions in the following manner:

- Dust emissions generated by demolition, excavation, construction and earthwork activities associated with the construction of the proposed development, have the potential to cause nuisance to, and soiling of, sensitive receptors;
- Emissions of exhaust pollutants, especially NO_2 and PM_{10} from construction traffic on the local road network, have the potential to adversely impact upon local air quality at sensitive receptors situated adjacent to the routes utilised by construction vehicles; and
- Emissions of NO_2 and PM_{10} from non-road mobile machinery (NRMM) operating within the proposed development site, have the potential to adversely impact local air quality at sensitive receptors near the works.

14.7.4 The potential for sensitive receptors to be affected will depend on where within the Application Site the dust raising activity takes place, the nature of the activity and controls, and meteorological dispersion conditions.

14.7.5 If construction operations were un-mitigated, the effects of dust during dry and windy conditions could lead to an increase in the 24-hour mean PM_{10} concentration immediately surrounding the Facility site. However, the maximum background PM_{10} concentration, for the 1 km x 1 km grid squares covering the Study Area, was 16.5 $\mu g.m^{-3}$ in 2018, based on 2017 mapped background estimates. Therefore, the mapped background concentrations are well below the

annual mean PM_{10} Objective of 40 $\mu g.m^{-3}$, and it is unlikely that the short-term construction operations would cause the annual mean or short-term Objectives to be exceeded within the vicinity of the Facility.

14.7.6 A qualitative assessment of construction phase dust and PM_{10} emissions was carried out in accordance with the IAQM guidance (IAQM, 2016). Full details of the methodology are provided in **Appendix 14.1**.

Step 1: Screen the Need for a Detailed Assessment

14.7.7 The IAQM guidance states that a Detailed Assessment is required if there are human receptors located within 350 m and ecological sites within 50 m of the site boundary. There were no ecological sites within 50 m of the site boundary but several human receptors within 350 m of the site boundary, so a Detailed Assessment was undertaken.

Step 2A: Define the Potential Dust Emission Magnitude

14.7.8 The IAQM guidance recommends that the dust emission magnitude is determined for demolition, earthworks, construction and trackout. There is not anticipated to be any demolition as part of the construction phase. The dust magnitudes for earthworks, construction and trackout were determined from site plans and in accordance with the IAQM methodology and are summarised in **Table 14.15**.

Table 14.15 Dust Emission Magnitude for the Facility

Construction Activity	Dust Magnitude	Justification
Earthworks	Large	Total site area > 10,000 m^2
Construction	Large	Total building volume > 100,000 m^3
Trackout	Large	> 50 outward HGV trips in any one day

14.7.9 The risk of potential impact of construction phase dust and PM_{10} emissions during earthworks, construction and trackout is used to recommend appropriate mitigation measures. The dust magnitude for construction activities was categorised as **large** for earthworks, construction and trackout.

Step 2B: Define the Sensitivity of the Area

14.7.10 The sensitivity of human receptors to dust soiling and health effects of PM_{10} associated with earthworks, construction and trackout activities during construction of the Facility were determined and are summarised in **Table 14.16**.

Sensitivity of People to Dust Soiling

- Earthworks and Construction: there are between 1 and 10 residential receptors within 100 m of the Site, and the next most proximate properties are beyond 350 m. The sensitivity is therefore **low**.
- Trackout: there are between 1 and 10 high sensitivity residential receptors within 50 m of routes that construction vehicles will use to access the Application Site. The sensitivity is therefore **low**.

Sensitivity of People to Health Effects of PM_{10}

- Earthworks and construction: the annual mean background PM_{10} concentration at the site is less than 24 $\mu g.m^{-3}$, and there are between 10 and 100 high sensitivity residential receptors within 200 m of the Application Site boundary. The sensitivity is therefore **low**.
- Trackout: the annual mean background PM_{10} concentration at the site is less than 24 $\mu g.m^{-3}$, and there are between 1 and 10 high sensitivity residential receptors within 50 m of the routes that construction vehicles will use to access the Application Site. The sensitivity is therefore **low**.

Table 14.16 Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low
Human Health	Low	Low	Low

Step 2C: Define the Risk of Impacts

14.7.11 The dust emission magnitude detailed in **Table 14.16** is combined with the sensitivity of the area detailed in **Table 14.15** to determine the risk of impacts with no mitigation applied. The risks concluded for dust soiling and human health are provided in **Table 14.17.**

Table 14.17 Summary Dust Risk Table to Define Site-Specific Mitigation

Potential Impact	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Low Risk	Medium Risk
Human Health	Low Risk	Low Risk	Medium Risk

14.7.12 The risk of dust soiling and human health impacts during the construction phase were therefore described as 'Medium Risk' for trackout, and 'Low Risk' for

earthworks and construction. Step 3 and Step 4 of the guidance, which are the 'site specific mitigation' and 'determining the significant effects' stages, are discussed in **Section 14.8** of this report.

Construction Phase Road Traffic Emissions Assessment

Human Receptors

14.7.13 The assessment considered the impact of road traffic emissions at receptors during the construction phase. The results set out below are inclusive of the pollutant contribution from road traffic emissions and background concentrations. Exceedances of the air quality objectives are shown in bold text. The results are detailed in **Table 14.18**.

Table 14.18 Predicted Annual Mean NO_2, PM_{10} and $PM_{2.5}$ Concentrations and Impact of the Facility for Peak Construction (2021)

Receptor	Predicted Concentrations 2021 – Construction Phase				
	Without the Facility ($\mu g.m^{-3}$)	With the Facility ($\mu g.m^{-3}$)	Change as a result of the Facility ($\mu g.m^{-3}$)	Change as Percent of Objective (%)	Impact
Nitrogen Dioxide – Annual Mean NO_2 Objective of 40 $\mu g.m^{-3}$					
R1	9.38	9.39	0.01	0%	Negligible
R2	9.44	9.52	0.08	0%	Negligible
R3	13.17	13.18	0.01	0%	Negligible
R4	11.27	11.27	0.00	0%	Negligible
R5	11.23	11.24	0.01	0%	Negligible
R6	11.19	11.19	0.00	0%	Negligible
R7	11.16	11.16	0.00	0%	Negligible
R8	8.3	8.31	0.01	0%	Negligible
R9	9.65	9.65	0.00	0%	Negligible
R10	8.37	8.38	0.01	0%	Negligible
R11	8.47	8.47	0.00	0%	Negligible
R12	20.46	20.63	0.17	0%	Negligible
R13	9.60	9.61	0.01	0%	Negligible
R14	8.43	8.43	0.00	0%	Negligible
R15	9.75	9.76	0.01	0%	Negligible
R16	11.25	11.26	0.01	0%	Negligible
R17	12.79	12.81	0.02	0%	Negligible

Receptor	Predicted Concentrations 2021 – Construction Phase				
	Without the Facility ($\mu g.m^{-3}$)	With the Facility ($\mu g.m^{-3}$)	Change as a result of the Facility ($\mu g.m^{-3}$)	Change as Percent of Objective (%)	Impact
Nitrogen Dioxide – Annual Mean NO_2 Objective of 40 $\mu g.m^{-3}$					
R18	35.73	36.20	0.47	1%	Negligible
R19	31.96	32.5	0.54	1%	Negligible
R20	**42.56**	**43.58**	1.02	3%	Moderate adverse
R21	25.64	26.05	0.41	1%	Negligible
R22	22.66	22.98	0.32	1%	Negligible
R23	22.27	22.59	0.32	1%	Negligible
R24	15.38	15.53	0.15	0%	Negligible
R25	13.18	13.23	0.05	0%	Negligible
R26	19.45	19.99	0.54	1%	Negligible
R27	15.23	15.45	0.22	1%	Negligible
R28	14.89	15.03	0.14	0%	Negligible
R29	12.68	12.69	0.01	0%	Negligible
R30	12.71	12.72	0.01	0%	Negligible
PM_{10} – Annual Mean PM_{10} Objective of 40 $\mu g.m^{-3}$					
R1	15.51	15.52	0.00	0%	Negligible
R2	16.16	16.18	0.02	0%	Negligible
R3	13.65	13.65	0.00	0%	Negligible
R4	15.12	15.12	0.00	0%	Negligible
R5	15.11	15.11	0.00	0%	Negligible
R6	15.10	15.10	0.00	0%	Negligible
R7	15.10	15.10	0.00	0%	Negligible
R8	15.28	15.28	0.00	0%	Negligible
R9	14.88	14.88	0.00	0%	Negligible
R10	15.30	15.30	0.00	0%	Negligible
R11	15.32	15.32	0.00	0%	Negligible
R12	15.42	15.44	0.02	0%	Negligible
R13	16.19	16.19	0.00	0%	Negligible

Receptor	Predicted Concentrations 2021 – Construction Phase				
	Without the Facility ($\mu g.m^{-3}$)	With the Facility ($\mu g.m^{-3}$)	Change as a result of the Facility ($\mu g.m^{-3}$)	Change as Percent of Objective (%)	Impact
Nitrogen Dioxide – Annual Mean NO_2 Objective of 40 $\mu g.m^{-3}$					
R14	15.31	15.31	0.00	0%	Negligible
R15	16.23	16.23	0.00	0%	Negligible
R16	15.11	15.12	0.00	0%	Negligible
R17	14.33	14.33	0.00	0%	Negligible
R18	18.19	18.26	0.07	0%	Negligible
R19	17.5	17.58	0.08	0%	Negligible
R20	18.58	18.69	0.10	0%	Negligible
R21	16.48	16.54	0.06	0%	Negligible
R22	15.97	16.01	0.05	0%	Negligible
R23	15.90	15.95	0.05	0%	Negligible
R24	14.78	14.80	0.02	0%	Negligible
R25	14.39	14.40	0.01	0%	Negligible
R26	15.44	15.51	0.07	0%	Negligible
R27	14.84	14.89	0.05	0%	Negligible
R28	14.69	14.72	0.02	0%	Negligible
R29	13.71	13.71	0.00	0%	Negligible
R30	13.72	13.72	0.00	0%	Negligible
$PM_{2.5}$ – Annual Mean $PM_{2.5}$ Target of 25 $\mu g.m^{-3}$					
R1	8.57	8.57	0.00	0%	Negligible
R2	8.94	8.95	0.01	0%	Negligible
R3	8.59	8.59	0.00	0%	Negligible
R4	8.67	8.67	0.00	0%	Negligible
R5	8.67	8.67	0.00	0%	Negligible
R6	8.66	8.66	0.00	0%	Negligible
R7	8.66	8.66	0.00	0%	Negligible
R8	8.44	8.44	0.00	0%	Negligible
R9	8.31	8.31	0.00	0%	Negligible
R10	8.45	8.45	0.00	0%	Negligible

Receptor	Predicted Concentrations 2021 – Construction Phase				
	Without the Facility ($\mu g.m^{-3}$)	With the Facility ($\mu g.m^{-3}$)	Change as a result of the Facility ($\mu g.m^{-3}$)	Change as Percent of Objective (%)	Impact
Nitrogen Dioxide – Annual Mean NO_2 Objective of 40 $\mu g.m^{-3}$					
R11	8.46	8.46	0.00	0%	Negligible
R12	9.64	9.66	0.01	0%	Negligible
R13	8.96	8.96	0.00	0%	Negligible
R14	8.45	8.45	0.00	0%	Negligible
R15	8.98	8.98	0.00	0%	Negligible
R16	8.67	8.67	0.00	0%	Negligible
R17	8.59	8.59	0.00	0%	Negligible
R18	11.26	11.30	0.04	0%	Negligible
R19	10.86	10.91	0.05	0%	Negligible
R20	11.55	11.62	0.07	0%	Negligible
R21	9.84	9.88	0.03	0%	Negligible
R22	9.54	9.57	0.03	0%	Negligible
R23	9.50	9.53	0.03	0%	Negligible
R24	8.85	8.86	0.01	0%	Negligible
R25	8.62	8.63	0.01	0%	Negligible
R26	9.23	9.27	0.04	0%	Negligible
R27	8.88	8.90	0.03	0%	Negligible
R28	8.80	8.81	0.01	0%	Negligible
R29	8.74	8.74	0.00	0%	Negligible
R30	8.75	8.75	0.00	0%	Negligible

14.7.14 The results show that construction phase NO_2 impacts are not predicted to be significant at all receptors, except at R20. This location is within the Boston AQMA where existing NO_2 concentrations are elevated and above the NO_2 annual mean Objective value.

14.7.15 Annual mean PM_{10} and $PM_{2.5}$ pollutant concentrations were predicted to be below the relevant air quality Objectives at all receptors.

14.7.16 Impacts resulting from construction phase traffic emissions were predicted to be **moderate adverse** for NO_2 at receptor R20, and negligible for all other pollutants.

14.7.17 In accordance with Defra guidance, it may be assumed that exceedances of the 1-hour Objective for NO_2 are unlikely, as the predicted annual mean concentrations were less than 60 $\mu g.m^{-3}$ (Defra, 2016). The short-term PM_{10} Objective was predicted to be met at all modelled locations, with fewer than 35 exceedances of the daily mean Objective of 50 $\mu g.m^{-3}$.

14.7.18 A moderate adverse impact is predicted for annual mean NO_2 concentrations at one receptor location, both within an AQMA where existing background concentrations are already close to or above the relevant Objective. At all other receptor locations for NO_2, and at all receptor locations from PM_{10} and $PM_{2.5}$, the impact was predicted to be negligible. Therefore overall, the impact significance of construction phase road traffic emission assessment was determined to be **minor adverse**.

Potential Impacts during Operation

Human Receptors

14.7.19 Pollutant concentrations were predicted at human receptor locations due to the combined releases from the Facility stacks and development-related vessel and road traffic activities. These combined results are set out in **Table 14.19**. The combined results reported for SO_2 are inclusive of the Facility's contribution from vessel and stack emissions (i.e. there is no traffic emissions contribution for this pollutant). **Table 14.19** details the maximum predicted pollutant concentrations from the Facility operations.

14.7.20 The predicted PCs were added the relevant background component as detailed in **Table 14.13** and **Table 14.14**, and the Biomass UK No. 3 Ltd PC values, to provide a Predicted Environmental Concentration (PEC) at each selected receptor location.

Table 14.19 Maximum Predicted Pollutant Concentrations at Human Receptor Locations

Pollutant	Averaging Time	Max PC Receptor	PC ($\mu g.m^{-3}$)	Max PEC Receptor	PEC ($\mu g.m^{-3}$)	PC/ AQS (%)	PEC/ AQS (%)
NO_2	Annual mean	R20	23.5	R20	34.64	59%	87%
	99.79 percentile of 1 hour means	R20	70.2	R20	95.15	35%	48%
PM_{10}	Annual mean	R20	4.69	R20	18.26	12%	46%

Pollutant	Averaging Time	Max PC Receptor	PC ($\mu g.m^{-3}$)	Max PEC Receptor	PEC ($\mu g.m^{-3}$)	PC/ AQS (%)	PEC/ AQS (%)
	90.41 percentile of 24 hour means	R20	5.8	R6	33.8	12%	68%
$PM_{2.5}$	Annual mean	R20	2.73	R20	11.16	11%	45%
SO_2	99.73 percentile of 1 hour means	R5	86.3	R5	100	25%	29%
	99.18 percentile of 24 hour means	R6	53.7	R6	60.3	43%	48%
	99.9 percentile of 15 minute means	R6	92.6	R6	111.1	35%	42%
CO	8 hour running mean	R3	39.9	R3	555.2	0%	6%
	1 hour mean	R5	47.5	R3	567.7	0%	2%
NH_3	Annual mean	R6	0.2	R6	2.2	0%	1%
	1 hour mean	R5	1.9	R5	6.2	0%	0%
HCl	Annual mean*	R6	0.4	R6	0.6	2%	3%
	1 hour mean	R5	28.53	R5	31.94	4%	4%
HF	Annual mean*	R6	0.04	R6	0.04	0%	0%
	1 hour mean	R5	1.9	R5	2.1	1%	1%
Hg	Annual mean	R6	0.002	R6	0.004	1%	1%
	1 hour mean	R5	0.033	R5	0.039	1%	1%
Cd	Annual mean	R6	0.002	R6	0.002	40%	45%
Tl**	Annual mean	R6	0.002	R6	0.0006	0%	0%
	1 hour mean	R5	0.033	R5	0.036	0%	0%
As	Annual mean	R6	0.001	R6	0.0032	16%	53%
Co	Annual mean	R6	0.02	R6	0.02	10%	11%
	1 hour mean	R5	0.33	R5	0.36	6%	6%
Cr(VI)	Annual mean	R6	0.000005	R6	0.000196	3%	98%
Cr(III)	Annual mean	R6	0.016	R6	0.018	0%	0%
	1 hour mean	R5	0.27	R5	0.27	0%	0%
Mn	Annual mean	R6	0.02	R6	0.024	13%	16%

Pollutant	Averaging Time	Max PC Receptor	PC (µg.m^{-3})	Max PEC Receptor	PEC (µg.m^{-3})	PC/ AQS (%)	PEC/ AQS (%)
	1 hour mean	R5	0.33	R5	0.34	0%	0%
Ni	Annual mean	R6	0.0087	R6	0.0112	44%	56%
Pb	Annual mean	R6	0.02	R6	0.03	8%	10%
Sb**	Annual mean	R6	0.02	R6	0.022	0%	0%
	1 hour mean	R5	0.33	R5	0.36	0%	0%
Cu	Annual mean	R6	0.02	R6	0.024	0%	0%
	1 hour mean	R5	0.33	R5	0.35	0%	0%
V	Annual mean	R6	0.02	R6	0.023	0%	1%
	1 hour mean	R5	0.33	R5	0.35	33%	36%
BaP	Annual mean	R6	0.00004	R6	0.0017	4%	173%
TOC (as Benzene)	Annual mean	R6	0.4	R6	1.3	8%	26%
PCDD/F***	Annual mean	R6	0.0040****	R6	0.0331****	n/a	n/a

* No Biomass UK No. 3 Ltd long-term concentration reported
** No background data available
*** No EAL
**** pg.m^{-3}

14.7.21 The dispersion modelling assessment was conservative in several respects, as follows:

- Five years of meteorological data (2014 – 2018) were considered in both the stack and vessel emissions assessment and the highest predicted concentrations for all the dispersion years is reported for each receptor.
- All pollutant releases were modelled at the relevant Emission Limit Value, the maximum concentration which cannot be exceeded under the EP permit conditions. In practice, emission concentrations will be retained below the respective limits, for many pollutants significantly so, as the Facility will be designed and operated in accordance with BAT principles, with an emissions abatement system which will minimise pollutant releases.
- The most stringent EAL levels were used in the assessment.

14.7.22 As detailed in **Table 14.19**, there were predicted to be exceedances of the relevant EALs for BaP. PC concentrations of BaP were predicted to be well below the EAL, therefore the exceedance was due to background concentrations used in the assessment.

14.7.23 The maximum predicted concentrations at human receptors were below the relevant Objectives or all other pollutants considered in the assessment.

Designated Ecological Sites

Critical Level Assessment

14.7.24 The predicted preliminary PC values at each of the designated ecological receptors within the Study Area are detailed in **Table 14.20**. The closest location of The Wash and North Norfolk Coast SAC and The Wash SPA are the same, therefore only one PC value is reported. The PC value includes the maximum contribution from the process stacks and marine vessels to provide a conservative assessment.

14.7.25 The predicted PC was added to the relevant background pollutant concentration to provide a total concentration at each site.

Table 14.20 Critical Level Assessment for The Wash and North Norfolk Coast SAC and The Wash SPA

Site	PC	Background	Total Concentration	PC / Objective	Total Concentration / Objective
	($\mu g.m^{-3}$)	($\mu g.m^{-3}$)	($\mu g.m^{-3}$)	%	%
NO_x Annual Mean Critical Level Assessment					
NOx Annual Mean	1.2	8.9	10.1	4%	34%
NOx 24 Hour	26.1	17.7	43.9	35%	58%
SO_2 Annual Mean	0.3	2.1	2.4	3%	24%
NH_3 Annual Mean	0.02	2.0	2.1	2%	68%
HF Daily Mean	0.3	0.00000246	0.3	5%	5%
HF Weekly Mean	0.3	0.00000246	0.3	49%	49%

14.7.26 As detailed in **Table 14.20**, maximum predicted NOx, SO_2, NH_3 and HF concentrations were below the relevant Critical Levels at The Wash and North Norfolk Coast SAC and The Wash SPA designated ecological sites.

14.7.27 The PC values at Local Nature sites are provided in **Table 14.21**.

Table 14.21 Critical Level Assessment for the Local Nature Sites

Site	Highest Predicted Process Contribution	Process Contribution /Objective
	($\mu g.m^{-3}$)	(%)
NOx Annual Mean Critical Level Assessment		
Havenside LNR	5.1	17%
South Forty Foot Drain LWS	0.8	3%
Slippery Gowt Sea Bank LWS	2.4	8%
NOx 24-Hour Mean Critical Level Assessment		
Havenside LNR	128	**171%**
South Forty Foot Drain LWS	28.3	38%
Slippery Gowt Sea Bank LWS	48.2	64%
SO_2 Annual Mean Critical Level Assessment		
Havenside LNR	1.2	12%
South Forty Foot Drain LWS	0.2	2%
Slippery Gowt Sea Bank LWS	0.6	6%
NH_3 Annual Mean Critical Level Assessment		
Havenside LNR	0.1	9%
South Forty Foot Drain LWS	1.0	32%
Slippery Gowt Sea Bank LWS	0.04	4%
HF Daily Mean Critical Level Assessment		
Havenside LNR	1.3	25%
South Forty Foot Drain LWS	0.3	6%
Slippery Gowt Sea Bank LWS	0.5	9%
HF Weekly Mean Critical Level Assessment		
Havenside LNR	1.3	**253%**
South Forty Foot Drain LWS	0.3	56%
Slippery Gowt Sea Bank LWS	0.5	91%

14.7.28 As detailed in **Table 14.21**, PC values were predicted to be above the NOx 24-hour and the HF weekly mean Critical Level values at the Havenside LNR. The Havenside LNR is situated approximately 85 m to the east of the Facility and is the closest designated ecological site to the process stacks and The Haven.

14.7.29 The PC values represent the maximum pollutant concentrations from the process stacks and marine vessels combined to provide a conservative scenario. The *maximum daily* HF concentrations were compared to the weekly mean Critical Level. Therefore, the HF weekly mean values in **Table 14.20** are likely to be over-estimated.

Critical Load Assessment

14.7.30 The maximum modelled NOx, SO_2 and NH_3 concentrations were predicted at the ecological sites considered, as a result of emissions from the process stacks and marine vessels. These values were corrected for nitrogen (as N) and sulphur (as S) for comparison with the most stringent Critical Loads for Nutrient Nitrogen and acid deposition, within the identified habitats. The results of the assessment are detailed in **Table 14.22**.

Table 14.22 Critical Load Assessment

Designation	Highest Predicted Nutrient Nitrogen Deposition Rate (kgN.Ha-yr^{-1})	Maximum Modelled Nutrient Nitrogen Deposition Rate as % Critical Load	Highest Predicted Acid Deposition Rate (kgEq.Ha-yr^{-1})	Maximum Modelled Acid Deposition Rate as % Critical Load
The Wash and North Norfolk SAC	0.22	2%	N/A	N/A
The Wash SPA	0.22	3%	0.03	4%

14.7.31 Comparison with the Critical Loads detailed in **Table 14.22** shows that concentrations of nutrient nitrogen were above 1% of the lowest Critical Load value for habitats within the Wash and North Norfolk SAC, and the Wash SPA. Predicted concentrations of acid deposition were above 1% of the lowest Critical Load values for the Wash SPA.

14.7.32 Whilst predicted deposition rates below the 1% threshold can be considered to be insignificant, an exceedance of the 1% threshold does not necessarily indicate that an adverse impact from pollutant deposition will be experienced at the habitat.

14.7.33 Further analysis will be carried out at the ES stage to determine the significance of nutrient nitrogen and acid deposition at the designated ecological sites arising from the Facility operations.

Potential Impacts during Decommissioning

14.7.34 The decommissioning of the Facility would form part of an overall

Decommissioning Plan. Air quality impacts associated with the decommissioning programme would be similar, but over a shorter period of time to those identified in the construction programmes, and appropriate controls and management approaches would be expected to be in place.

14.8 Mitigation

Construction Phase

Step 3: Site-Specific Mitigation

14.8.1 Step three of the IAQM guidance identifies appropriate site-specific mitigation. These measures are related to the site risk for each activity.

14.8.2 The dust assessment determined that there was a **medium risk** of impacts resulting from construction activities without the implementation of mitigation measures. Additional guidance is provided by the IAQM in relation to dust and air mitigation measures. It is recommended that the good practice measures outlined in the IAQM guidance are followed.

14.8.3 The recommendations below will be detailed in a Dust Management Plan (DMP) to prevent or minimise the release of dust and/or dust being deposited on nearby receptors. Particular attention will be paid to operations which must unavoidably take place close to the site boundary. The effective implementation of the DMP will ensure that any potential dust releases associated with the construction phase will be reduced.

Highly Recommended Mitigation Measures

14.8.4 A list of mitigation measures that are highly recommended for a **medium risk** site by the IAQM are provided below.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary and the head or regional office contact information. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

Dust Management

- Develop and implement a DMP, which may include measures to control other emissions, approved by BBC.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to BBC when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results and make an inspection log available to BBC when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.
- Erect solid screens or barriers around dusty activities, or the site boundary, that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Take measures to control site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.

- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Bonfires and burning of waste materials should not be permitted.

Measures Specific to Construction

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

Measure Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site.
- Avoid dry sweeping of large areas.
- Ensure loaded vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud) prior to leaving the site where reasonably practicable.
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Locate site access gates at least 10 m from receptors where possible.

Desirable Mitigation Measures

14.8.5 A list of mitigation measures that are desirable for a **medium risk** site by the IAQM are provided below.

Dust Management

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to note any dust deposition, record inspection results, and make the log available to BBC when asked.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced, and 10 mph on unsurfaced, haul roads and work areas.
- Implement the Travel Plan that has been produced for the Facility, which supports and encourages sustainable travel for contractor operatives and staff (public transport, cycling, walking, and car-sharing).

Measures Specific to Earthworks

- Re-vegetate or cover earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Non-Road Mobile Machinery (NRMM)

14.8.6 Non-Road Mobile Machinery (NRMM) and plant would be well maintained. If any emissions of dark smoke occur, then the relevant machinery should stop immediately, and any problem rectified. In addition, the following controls should apply to NRMM:

- All NRMM should use fuel equivalent to ultralow sulphur diesel (fuel meeting the specification within EN590:2004).

- All NRMM should comply with regulation (EU) 2016/1628 of the European Parliament and of the Council on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery.
- All NRMM should be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting).
- The ongoing conformity of plant retrofitted with DPF, to a defined performance standard, should be ensured through a programme of onsite checks.
- Fuel conservation measures should be implemented, including instructions to:
  - throttle down or switch off idle construction equipment;
  - switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded; and
  - ensure equipment is properly maintained to ensure efficient fuel consumption.

14.9 Cumulative Impacts

14.9.1 Potential cumulative air quality impacts arising from other plans and projects will be fully assessed within the ES.

14.10 Transboundary Impacts

14.10.1 Where relevant, potential transboundary air quality impacts will be fully assessed within the Air Quality Assessment and reported in the ES.

14.11 Inter-Relationships with Other Topics

14.11.1 There are inter-relationships with the following chapters with regard to the environmental impact of emissions generated by road traffic and vessel movements during the construction and operation of the Facility and from the discharges from the stacks, which will be discussed within the ES chapter:

- **Chapter 10 Noise and Vibration**;
- **Chapter 18 Navigational Issues**;
- **Chapter 19 Transport**;
- **Chapter 21 Health Impacts**; and
- **Chapter 22 Climate Change**.

14.12 Interactions

14.12.1 The impacts identified above have the potential to interact with each other, which could give rise to in-combination (synergistic) impacts because of that interaction. Interactions between impacts will be reported within the ES.

14.13 Summary

14.13.1 A preliminary Air Quality Assessment was carried out at the PEIR stage, to determine the potential air quality impacts associated with the Facility.

14.13.2 A construction phase dust assessment was undertaken in accordance with guidance provided by the IAQM. Appropriate mitigation was recommended based on the level of risk determined in the assessment. With the effective implementation of the mitigation recommended, the residual impact of construction phase dust emissions is considered to be not significant.

14.13.3 The air quality impact of road traffic emissions during construction of the Facility was predicted to be 'minor adverse', in accordance with IAQM and EPUK guidance (IAQM and EPUK, 2017), and is negligible at all but one receptor location.

14.13.4 PCs from the operation of the Facility were predicted to be below all of the relevant EALs at human receptor locations. With the inclusion of existing background pollutant concentrations, PEC values for Cr(VI), BaP and Ni were predicted to be above the relevant EALs.

14.13.5 There were predicted to be exceedances of the NOx 24 hour and HF weekly mean Critical Level values at the Havenside LNR site. Further analysis will be carried out at the ES stage to determine the significance of nutrient nitrogen and acid deposition arising from the Facility operations at The Wash and North Norfolk SAC and The Wash SPA.

14.13.6 The preliminary air quality assessment was based on an assumed stack height of 70 m. The ES stage will include the following:

- A stack height sensitivity analysis;
- A qualitative assessment of potential odour emissions; and
- A detailed study of potential impacts at the designated ecological sites.

14.13.7 The significance of all potential impacts, and where appropriate any necessary mitigation measures, will be identified at the ES stage.

14.13.8 A summary of the air quality assessment, as is available from the preliminary assessment, is provided in **Table 14.23**.

Table 14.23 Summary

Description of Impact	Significance	Mitigation	Residual Impact
Construction Phase			
Construction phase dust and particulate matter	n/a	Best practice mitigation measures to be detailed within a CEMP	Not significant
Road traffic emissions	Minor adverse		n/a
Operational Phase			
Stack emissions	To be reported at ES	To be determined	To be determined
Road traffic emissions	To be reported at ES	To be determined	To be determined
Vessel emissions	To be reported at ES	To be determined	To be determined
Decommissioning Phase			
Decommissioning phase dust emissions	n/a	Best practice mitigation measures	Not significant

14.14 References

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