REPORT

Boston Alternative Energy Facility – Environmental Statement

Chapter 14 Air Quality

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Enhancing Society Together

Project Related

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Executive Summary

This chapter of the Environmental Statement (ES) contains an assessment of air quality and odour impacts during construction, operation and decommissioning of the Boston Alternative Energy Facility ('the Facility'). The chapter also provides an overview of existing air quality within the study area.

This chapter has been updated ~~following [insert reasons why]~~in response to Relevant Representations made by interested parties and to reflect changes to Environmental Assessment Levels issued by the Environment Agency following the original Development Consent Order (DCO) submission for the Facility (Environment Agency, 2021). Appendices 14.2 and~~to~~ 14.3~~5~~ have also been updated as a result, and Appendices 14.4 to 14.6 have been added.

The Facility may give rise to effects associated with dust, plant, vehicle and vessel exhaust emissions during construction of the Facility. Likely significant effects of dust and plant emissions during construction were assessed using best practice guidance in the UK. Appropriate best practice mitigation measures (e.g. damping down, appropriate storage of materials and use of wheel washing systems) will be secured in the Code of Construction Practice (CoCP) to minimise dust and pollutant emissions from on-site construction activities, such that off-site effects will not be significant. Air quality modelling was undertaken to predict impacts on human and ecological receptors as a result of emissions from construction-generated traffic and vessel movements, including at receptors within the more sensitive locations in Boston which are statutory Air Quality Management Areas (AQMAs). These impacts were found to be **not significant** in relation to human receptors. The significance of impacts at ecological receptors is discussed in **Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**. Impacts of construction phase odour emissions from capital dredging works were assessed using the risk-based methodology included within industry guidance and were found to be not significant.

Emissions from the Facility stacks, vessel activities and road traffic exhausts during the operational phase were assessed, together with emissions from the adjacent Biomass UK No. 3 Ltd facility. Dispersion modelling was undertaken to predict pollutant concentrations at sensitive human and ecological receptors in the vicinity of the Application Site. The modelling was based on a Facility stack height of 80 m for the three energy from waste (EfW) stacks and the two lightweight aggregate (LWA) plant stacks. Impacts at human receptors were assessed to be **not significant** overall. The significance of operational phase impacts at ecological receptors is discussed in **Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**.

An assessment of odour impacts as a result of refuse derived fuel (RDF) processing was undertaken and, owing to the control measures which would be in place at the Facility (e.g. enclosure of the RDF processing and extraction of the building air for combustion), secured as part of the Environmental Permit, the potential for impacts was considered to be low and any impacts would be **not ~~in~~significant**.

Impacts associated with visible plumes arising from the EfW and LWA stacks were considered in accordance with industry guidance. The assessment identified that impacts of visible plumes would be **not significant**.

A Human Health Risk Assessment was undertaken and is presented in **Appendix 14.5** (document reference 9.9). The assessment considered impacts of dioxins and furans, dioxin-like PCBs and certain heavy metals on human health arising from exposure routes through inhalation and ingestion routes through the food chain. Impacts were found to be **not significant**.

The potential for abnormal emissions during operation of the Facility to give rise to impacts at receptors was considered. Impacts on short-term and long-term standards were considered and impacts were found to be **not significant**.

14 Air Quality

14.1 Introduction

14.1.1 This chapter of the Environmental Statement (ES) describes the existing environment in relation to air quality and provides an assessment of likely significant effects of the Boston Alternative Energy Facility ('the Facility') with respect to air quality impacts associated with the construction and operational phases.

14.1.2 This chapter and Appendices have been updated following receipt of Relevant Representations from Natural England (RR-021), Public Health England (RR-023), the Environment Agency (RR-013) and Boston Borough Council (RR-019) and discussions at an Air Quality Topic Meeting on 7th September 2021. This additional information has been provided by the Applicant to aid both the above organisations and the Examining Authority in their responses to and evaluation of the DCO Application for the Boston Alternative Energy Facility. The updates consist of the following items:

- Provision of air quality and air pollutant deposition data for the Habitat Mitigation Area and areas of saltmarsh alongside The Haven;
- Provision of an updated visible plume assessment (**Section 14.7** and **Appendix 14.2**);
- Addition of detailed tabulated dispersion modelling results for nitrogen dioxide (NO_2) concentrations at sensitive human receptors (**Appendix 14.3**);
- Provision of additional air quality data and analysis thereof to support the adoption of the less stringent daily mean nitrogen oxides (NO_X) Critical Level for evaluation of the effects of NO_X on vegetation (**Table 14-5** and footnote and **Appendix 14.4**);
- Provision of an assessment of abnormal emissions from the Facility and the air quality effects upon receptors (**Section 14.7**, **Appendix 14.2** and **Appendix 14.6**);
- A human health risk assessment (HHRA) of emissions of dioxins, furans, dioxin-like PCB and certain heavy metals from the Facility (**Section 14.7**, **Appendix 14.2** and **Appendix 14.5**); and
- An update to **Figure 14.6**, **Figure 14.9** and **Figure 14.10** to illustrate the typical locations of saltmarsh areas alongside The Haven.

~~14.1.1~~

~~14.1.2~~14.1.3 The approach provides an overview of existing baseline air quality, the findings of which have been used to inform the assessment of emissions to atmosphere from the Facility.

~~14.1.3~~14.1.4 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 ES. The relevant chapters are:

- **Chapter 9 Landscape and Visual Impact Assessment (APP-047);**
- **Chapter 12 Terrestrial Ecology (APP-050)**;
- **Chapter 18 Navigational Issues (APP-056)**;
- **Chapter 19 Traffic and Transport (APP-057)**;
- **Chapter 21 Climate Change (APP-059)**; and
- **Chapter 22 Health (APP-060)**.

~~14.1.4~~14.1.5 This chapter is supported by six~~three~~ appendices:

- **Appendix 14.1 Construction Phase Dust and Particulate Matter Assessment Methodology** (document reference 6.4.14);
- **Appendix 14.2 Dispersion Modelling Methodology** (document reference 6.4.15(1)); ~~and~~
- **Appendix 14.3 Tabulated Assessment Results** (document reference 6.4.16(1));~~.~~
- **Appendix 14.4 Analysis of SO_2 and O_3 Concentrations to Justify Adoption of the Less Stringent Daily Mean NO_x Critical Level for Protection of Vegetation** (document reference 9.8);

;

- **Appendix 14.5 Human Health Risk Assessment** (document reference 9.9); and
- **Appendix 14.6 Abnormal Emissions Assessment** (document reference 9.10).

~~14.1.5~~14.1.6 This chapter provides an assessment of the likely significant effects of the Facility on local air quality. The significance of all potential impacts and, where appropriate, any necessary mitigation measures and their effectiveness, are also discussed.

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 in 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) (European Parliament, 2010) 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 (ELVs) for prescribed activities, including energy from waste (EfW) facilities. Paragraph 6 of Schedule 7 of the EP Regulations state that:

> *"The regulator must ensure that it is informed of developments in best available techniques and of the publication of any new or updated BAT conclusions and where appropriate must exercise its functions so as to encourage the application of emerging techniques, in particular those identified in BAT reference documents."*

14.2.11 An updated Best Available Techniques (BAT) Reference Document (BREF) for Waste Incineration (European Commission (EC), 2019a), and the associated BAT Conclusions (BATC) document (EC, 2019b), were published in December 2019.

The BATC document sets out updated BAT-Associated Emission Levels (AELs) which apply to Waste Incineration facilities; due to the updates to techniques which are considered to form BAT, these are more stringent than the ELVs set out in the IED.

14.2.12 The EU Withdrawal Act 2018 ensures that existing EU environmental law will continue to have effect in UK law, including the IED and BATC Implementing Decisions made under it.

Air Quality Standards, Objectives and Guidelines

14.2.13 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, 2021~~16~~).

National Planning Policy

National Policy Statements (NPSs)

14.2.14 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.

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

14.2.16 The NPSs that are considered to be relevant to the Facility include:

- Overarching NPS for Energy (EN-1) (DECC, 2011a); and

- NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011b).

14.2.17 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."

14.2.18 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."

14.2.19 Paragraph 2.5.39 of 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

14.2.20 The National Planning Policy Framework (NPPF) (Ministry of Housing Communities and Local Government (MHCLG), 2019a) was updated in February 2019 and paragraph 181 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"

14.2.21 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

14.2.22 The UK Government Planning Practice Guidance (MHCLG, 2019b) provides guidance on how the planning process can take account of the impact new development may have on air quality.

14.2.23 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

14.2.24 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

14.2.25 The following technical guidance was used in the preparation of the air quality assessment:

- Local Air Quality Management (LAQM) Technical Guidance (TG16). (LAQM.TG (16)) (Defra, 2018);
- 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);
- IAQM (2018) Guidance on the Assessment of Odour for Planning
- IAQM (2020) A guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM, 2020); and
- Defra EP guidance 'Air emissions risk assessment for your environmental permit' (Environment Agency (EA) and Defra, 20211~~16~~).

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.	The AQMAs are discussed in **Section 14.6** and shown on **Figure 14.5**
	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.	The sensitive receptors considered within the assessment are presented in **Section 14.5** and include receptors in proximity to the affected road network. Receptors included within the assessment were discussed with Boston Borough Council (BBC) during consultation.
	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.	Details of the methodology used in the assessment of vessel emissions is provided in **Section 14.4** and **Appendix 14.2**. Impacts are presented in **Section 14.7** as the combination of emissions from all sources; a breakdown of pollutant concentrations by source is provided in **Appendix 14.3**. No vessels will be re-fuelled at the Facility.
	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	The dispersion modelling methodology is described in **Section 14.4** and **Appendix 14.2**. Impacts are presented in **Section 14.7**.

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	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	
	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 odour assessment was undertaken in accordance with IAQM guidance (IAQM, 2018) as described in **Section 14.4**.
	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.	Construction and operational phase traffic movements were considered in the assessment, including the associated impact on AQMAs. This is described in **Section 14.4** and **Appendix 14.2**.Impacts are presented in **Section 14.7**.
BBC, 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 effects associated with construction and operational phase traffic emissions within and near the existing AQMAs.	Construction and operational phase traffic movements were considered in the assessment, including the associated impact on AQMAs. This is described in **Section 14.4** and **Appendix 14.2**.Impacts are presented in **Section 14.7**
Section 42 Consultation Response – Lincolnshire County Council (LCC), 1st August 2019	The Council are content that this chapter addresses all relevant points with adequate detail.	Noted.
Section 42 Consultation Response – Anglian	Anglian Water does not have any comments relating to the proposed mitigation of the identified impacts relating to noise, dust and traffic during the operational and construction phases.	Noted.

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Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
Water, 6th August 2019		
Section 42 Consultation Responses – BBC	We are mindful that Boston has two AQMAs in operation and we are concerned not to have received the detail in relation to traffic movements for both construction and operation that would enable the Council to fully assess the potential impact, including shipping traffic and how this may be mitigated. We require detailed traffic assessment information before the project progresses further to the next stage.	The traffic flows and vessel numbers used in the air quality assessment are detailed in **Appendix 14.2**.
	The lack of information relating to the traffic management plan both for the construction period and clarity of site operations means that a detailed assessment cannot yet be assessed. We have requested that all the options for traffic routes for construction traffic and operational service traffic are examined as part of the process. In addition, we note the potential on the AQMA of pollution via shipping vehicles.	Traffic management methods are detailed in **Chapter 19 Traffic and Transport**. Construction and operational traffic generation was considered on all potential access routes, as described in **Appendix 14.2**. A combined assessment was undertaken to consider impacts of vessel, stack and road traffic emissions at receptors within the AQMAs. This is described further in **Section 14.4**. The relative contribution of each source to the total concentrations at each receptor is provided in **Appendix 14.3**.
	Concern about noise, odour and pollution and how this will be monitored, the impact on air quality on crops with regard to the agricultural industry and will "scrubbers" be utilised for pollutants. In addition, what will happen to the type of waste that cannot be recycled, such as batteries. What consideration has been given to pollution of the river.	The Facility will employ a Continuous Emissions Monitoring System (CEMS) to ensure that the emissions from the proposed stacks are within the required emission limits; this will be a requirement of the Environmental Permit. The Facility will utilise a number of flue gas treatment technologies to remove pollutants prior to discharge to atmosphere. Details of the disposal of non-

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Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
		recyclable waste are provided in **Chapter 5 Project Description**. The impact of air pollutants on crops is detailed in **Chapter 22 Health**. Impacts on the River Witham are detailed in **Chapter 15 Marine Water and Sediment Quality**. Noise impacts are considered in **Chapter 10 Noise and Vibration**.
	We note the high level of advanced technology proposed within the site, which will likely give rise to noise and pollution impacts on local residents and businesses. However, without detailed proposals, we are unable to fully assess such impact and suggest areas of mitigation. We require further detail to enable such consideration.	Details of the technology to be utilised are provided in **Chapter 5 Project Description**.
Section 42 Consultation Response – Environment Agency, 6th August 2019	Please note, we have not undertaken any review of the air quality modelling contained in Chapter 14 (ref: PB6934-RHD-01_ZZ-Rp-N-2014, dated 17 June 2019) or the associated Appendices, and would advise that this will only be undertaken as part of our discretionary pre-application permit service or once an application for an environmental permit had been duly made.	Comment noted
	We have serious concerns regarding potential emissions of odour from the proposed development given the scale and nature of the RDF ship unloading facility and associated dockside RDF storage given the proximity of residential areas to the northeast of the site. We welcome the proposal in paragraph 14.4.47 to carry out an assessment of the main odour sources at the site. We recommend that a quantitative assessment for odour be carried out that includes the ship unloading facilities, dockside storage and conveyor lines under worst case conditions.	Following receipt of this comment, the method of unloading, processing and storing refused derived fuel (RDF) has been revised, resulting in a significant reduction in the potential for odour from RDF. A risk-based odour assessment has therefore been undertaken, as per the methodology detailed in **Section 14.4**.

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
Section 42 Consultation Response – Lincolnshire Wildlife Trust, 6th August 2019	It is unclear how deposition of material in The Wash relating to emissions to air from the facility might on The Wash SAC, elements of which are currently in an unfavourable condition. We would like to be assured that this has been considered and mitigation measures put in place where necessary.	Impacts of pollutant concentrations and deposition on The Wash as a result of the construction and operational phases are presented in **Section 14.7**. The significance of the predicted impacts is discussed in **Chapter 17 Marine and Coastal Ecology**.
Section 42 Consultation Response – Natural England, 6th August 2019	We note that no impacts to SAC/ SPA from air pollution deposition from the actual plant are identified (chapter 14 page 42) it notes that the 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. However, PC values were predicted to be above the NOx 24-hour and the HF weekly mean Critical Level values at the Havenside LNR. The PC values represent the maximum pollutant concentrations from the process stacks and marine vessels combined to provide a conservative scenario.	Impacts on designated ecological sites are presented in **Section 14.7**. The significance of the predicted impacts is discussed in **Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**.
	Pollution Contingency plan is a critical document that we need to see before we can agree that pollution incidents are not an issue.	An outline Code of Construction Practice (OCoCP) will be provided. Operational pollution control will be implemented by the conditions of the Environmental Permit(s) for the Facility.
Section 42 Consultation Response – Eastern Inshore Fisheries and Conservation Authority (IFCA), 27th September 2019	Eastern IFCA consider that the potential for cumulative impacts from the Project and nearby industrial sources should be fully considered. The combined effects of airborne emissions from different sources and discharges (e.g. washing out of clay delivery vessels, release of sodium hydroxide-dosed water) into the river (Haven) and into The Wash should be set out for consideration.	The Air Pollution Information System (APIS) website states that *"in most lowland rivers and burns, nitrogen inputs from catchment land-use, not deposition from the atmosphere, are likely to be much more significant"*. However, impacts on the intertidal habitat have been considered. Marine habitats are excluded from the APIS website as it is stated that "*they don't*

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
		tend to be sensitive to air pollution impacts or are dominated by other sources of inputs." As such, the assessment focussed on impacts of air emissions on terrestrial habitats as presented in **Section 14.7**. Impacts of the Facility on water quality are discussed in **Chapter 15 Marine Water and Sediment Quality.**
	The Non-Technical summary reported that *"potential impacts from increased emissions to air and deposits on marine and estuarine habitats will be assessed when results of the air quality assessment are available"*. Eastern IFCA query when such potential impacts on marine and estuarine habitats, including shellfish beds in The Wash, will be considered. Mussel and cockle beds are an economic resource for local inshore fishermen as well as being attributes of the intertidal mudflats and sandflats feature of The Wash and North Norfolk Coast Special Area of Conservation. If impacts on shellfish habitats are anticipated, consideration must be given to potential impacts on the food chain as well as on biodiversity.	It is not considered that deposition of air pollutants would lead to significant impacts on shellfish beds as these areas would be washed by the tide twice a day. This is discussed further in **Chapter 17 Marine and Coastal Ecology**.
	Eastern IFCA seeks assurance that these shellfish production areas (as well as the naturally-occurring cockle and mussel beds in The Wash) will not be adversely affected by the *"potential impacts from increased emissions to air and deposits on marine and estuarine habitats"* noted in the Non-Technical Summary.	

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
Principal Environmental Health Officer (EHO), BBC (August 2020)	Additional consultation was undertaken to confirm amendments to the air quality assessment methodology since the PEIR stage, including: • Widening of the road traffic study area to consider impacts within the Bargate Bridge AQMA; • Update of the Facility stack emissions in accordance with the latest Waste Incineration BAT Conclusions document; and • An assessment of vessel emissions during the construction phase, as they will now be used to import construction materials. No further comments were received from BBC on the proposed changes.	The assessment methodology is detailed in **Section 14.4** and **Appendix 14.2**.

14.4 Assessment Methodology

14.4.1 The air quality assessment considered the following impacts:

Construction phase:

- Dust and particulate matter emissions;
- Construction plant exhaust emissions;
- Road traffic exhaust emissions;
- Vessel exhaust emissions; and
- Odour emissions.

Operational phase:

- Facility stack emissions;
- Vessel exhaust emissions;
- Road traffic exhaust emissions; and
- Odour emissions.

14.4.2 Construction at the Habitat Mitigation Area will be of a minor nature with the use of one excavator (potentially delivered via a floating pontoon) and hand tools, with works being of a short duration (up to one week). As such, the construction phase vessel assessment was undertaken based on the most conservative number of vessel movements associated with the construction of the Facility.

14.4.3 For the decommissioning phase, it is anticipated that the Facility would be demolished or redeveloped, with the wharf retained as it forms the flood defence. Although exact details regarding the decommissioning cannot be known at this stage, consideration has been given to the expected activities that would be undertaken and it is anticipated that there will be no odour impacts associated with decommissioning as it is not expected that any odour-generating activities would be carried out.

14.4.4 The Facility may generate emissions of dust during its operation, from storage of the LWA product and the silt/clay that will be used. However, any dust from these sources can be controlled using standard dust suppression methods, and these will be included as part of the Environmental Permit(s) for the Facility. As such, operational phase dust emissions are not expected to be significant and were not considered further.

14.4.5 The approach undertaken for each assessment is provided below.

Construction Phase Dust and Particulate Matter Assessment

14.4.6 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:

14.4.7 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.

14.4.8 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**.

14.4.9 Defra technical guidance (Defra, 2018) 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

14.4.10 The Atmospheric Dispersion Modelling System for Roads (ADMS-Roads model) Version 5.0.0.1 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, 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.

14.4.11 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.

14.4.12 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.

14.4.13 The road links included in the ADMS-Roads modelling are detailed in **Figure 14.1** and **Figure 14.2**.

[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).

Construction and Operational Phase Vessel Emissions Assessment

Dispersion Modelling

14.4.14 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 construction and 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** and **14.2**.

14.4.15 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

14.4.16 The potential impact of the development-generated stack emissions from the operational phase of the Facility were assessed using ADMS-5 (model version 5.2.2.0).

14.4.17 Pollutant emissions were considered from the three EfW stacks, the 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 Air Pollution Control residues (APCr) (see **Chapter 5 Project Description** in **Section 5.4**).

14.4.18 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 data used;
- Consideration of metals;
- Meteorological conditions;
- Treatment of terrain;

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

14.4.19 BBC's 1999 Local Plan, now replaced by the South-East Lincolnshire Local Plan, included a requirement that development should "*not obstruct a public view of St Botolph's church, Boston or challenge the visual dominance of the church*". This is still considered to be a relevant consideration due to the church's visual dominance in the area. As such, the maximum height of the Facility stacks are limited. A stack release height of 80 m for each of the five stacks was considered in the assessment. A sensitivity test was undertaken to consider the effects of emissions released over a range of stack heights and is presented in **Appendix 14.2**.

Construction and Operational Phase Odour Assessment

14.4.20 A qualitative odour assessment was undertaken to consider the potential for impacts to occur at nearby receptors as a result of capital dredging works and as a result of the Facility's operation. The assessment was undertaken using the risk-based source-pathway-receptor approach detailed in IAQM guidance (IAQM, 2018) to determine the odour impact. The approach is divided into a number of different steps, as follows:

14.4.21 **Step 1** – estimation of the odour-generating potential of the site activities, taking into account:

- The scale of release from the source (taking into account any mitigation measures in place);
- How odorous the emission is; and
- The hedonic tone (pleasantness/unpleasantness) of the odour.

14.4.22 **Step 2** – estimation of the effectiveness of the pollutant pathway, having consideration of:

- The distance from source to receptor;
- Whether receptors are downwind of the source;
- The effectiveness of odour dispersion from the point of release; and
- The topography and terrain between source and receptor.

14.4.23 **Step 3** – The source odour potential is combined with the pathway effectiveness to predict the risk of odour exposure at receptors, using the matrix in **Table 14-2**.

Table 14-2 Risk of Odour Exposure (Impact) at the Specific Receptor Location

		Source Odour Potential		
		Small	Medium	Large
Pathway effectiveness	Highly effective pathway	Low risk	Medium risk	High risk
	Moderately effective pathway	Negligible risk	Low risk	Medium risk
	Ineffective pathway	Negligible risk	Negligible risk	Low risk

14.4.24 **Step 4** – the final step is to estimate the effect of the above impact on the receptor, taking into account its sensitivity, using the matrix in **Table 14-3**.

Table 14-3 Likely Magnitude of Odour Effect at the Specific Receptor Location

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High risk of odour exposure	Slight adverse effect	Moderate adverse effect	Substantial adverse effect
Medium risk of odour exposure	Negligible effect	Slight adverse effect	Moderate adverse effect
Low risk of odour exposure	Negligible effect	Negligible effect	Slight adverse effect
Negligible risk of odour exposure	Negligible effect	Negligible effect	Negligible effect

14.4.25 Finally, having predicted the effect at individual representative receptors, the overall effect must be determined, taking into account the varying magnitude and the number of receptors experiencing the effects. IAQM guidance (IAQM, 2018) states that this should be undertaken by a competent and suitably experienced Air Quality Practitioner. This assessment was undertaken by members of the IAQM.

Identification of Receptor Locations

Construction Phase Dust and Fine Particulate Matter Assessment

14.4.26 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 Application Site boundary. However, we are aware that Natural England internal guidance states that ecological sites within 200 m of a site boundary should be considered in relation to construction dust effects. There are several human receptors within 350 m of the Application Site boundary, and the Havenside Local Nature Reserve (LNR) is located within 200 m. A Detailed Assessment was therefore undertaken.

14.4.27 Distance boundaries showing the study area construction phase assessment are detailed in **Figure 14.3**.

Road Traffic, Vessel and Stack Emissions Assessment

Human Receptor Locations

14.4.28 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.

14.4.29 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.

14.4.30 The sensitive receptor locations considered in the dispersion modelling study are detailed in **Table 14-4** and **Figure 14.4**.

14.4.31 R2 is the closest human receptor to the Application Site and is approximately 21 m to the north of the Order limits. Receptors were included within the Haven Bridge and Bargate Bridge AQMAs (see **Section 14.6**), as denoted in **Table 14-4**.

Table 14-4 Sensitive Human Receptor Locations

Receptor ID	Location	Grid Reference	
		X	Y
R1	Haven Way	533499	341991
R2	Beeston Farm	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

Receptor ID	Location	Grid Reference	
		X	Y
R10	Ivy House	533944	341621
R11	Baptist Farm	533446	341698
R12	Haven Bridge (within Haven Bridge AQMA)	532661	343672
R13	Marsh Lane / Lealand Way	533467	342598
R14	Marsh Lane	533519	342105
R15	Slippery Gowt Lane	533543	341625
R16	River Way	534055	342766
R17	Wyberton Low Road	533160	342011
R18	St Thomas' CE Primary School	532935	342370
R19	5 Middlecott Close	532602	342734
R20	61 London Road	532603	342759
R21	12 Middlecott Close	532604	342707
R22	71 Bayswood Avenue	532692	342536
R23	2-50 Wyberton Low Road	532818	342754
R24	77 Wyberton Low Road	532835	342654
R25	3 Marsh Lane	532940	342634
R26	64A Wyberton Low Road	532897	342616
R27	83 Liquorpond Street (Haven Bridge AQMA)	532500	343722
R28	34 Queen Street (Haven Bridge AQMA)	532355	343817
R29	16 Spilsby Road (Bargate Bridge AQMA)	533221	344622
R30	Blue Street, Haven Village, Staniland (Haven Bridge AQMA)	532507	343651
R31	21 Sleaford Road	532139	344022
R32	John Adams Way (Haven Bridge AQMA)	532979	344055
R33	Spayne Road, John Adams Way (Haven Bridge AQMA)	532981	343886
R34	The Georgians Nursing Home (Bargate Bridge AQMA)	533054	344506
R35	Fishtoft Road, Bladon Estate	534445	342601
R36	13 Drakards Lane	533357	343272
R37	Victoria House, John Adams Way (Haven Bridge AQMA)	532559	343693
R38	96 B1397 London Road	532444	342604
R39	Sir Isaac Newton Drive	532626	342355

Ecological Receptor Locations

14.4.32 In accordance with Defra and Environment Agency guidance (Defra and EA, 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 Application Site;
- Sites of Special Scientific Interest (SSSIs) within 2 km of the Application Site; and
- National Nature Reserves (NNRs), LNRs, Local Wildlife Sites (LWSs) and Ancient Woodlands within 2 km of the Application Site.

14.4.33 The following seven ~~five~~ designated ecological sites were identified and considered in the air quality assessment, as shown in **Figure 14.6** and **Figure 14.13**:

- The Wash and North Norfolk Coast SAC;
- The Wash SPA, SSSI and Ramsar site;
- Havenside LNR;
- South Forty Foot Drain LWS;
- The Habitat Mitigation Area;
- Areas of saltmarsh alongside The Haven; and
- Slippery Gowt Sea Bank LWS.

14.4.34 An assessment of the potential impacts to designated ecological sites was undertaken. Predicted pollutant concentrations and deposition within the designated ecological sites were considered with reference to appropriate Critical Levels and Critical Loads, discussed in more detail later in this section. Receptor grids were included in the dispersion model in order to calculate the maximum point of impact within each of the designated site boundaries. Further details on the receptor grids are provided in **Appendix 14.2**.

14.4.35 South Forty Foot Drain LWS is the only designated ecological site which is within 200 m of the assessed road network. Screening criteria provided in the Design Manual for Roads and Bridges (DMRB) (Highways England, 2019) are considered by Natural England to equate to a 1 % change in the Critical Load or Level (Natural England, 2018), which is regarded as a threshold of insignificance. These criteria are an increase in 1,000 vehicles per day or more, or an increase of 200 Heavy

Duty Vehicles (HDVs) per day or more. The traffic generated by the Facility during both the construction and operational phases is below these criteria (see **Appendix 14.2**); as such, impacts of project-related road traffic emissions are not considered to be significant. However, the contribution from road traffic emissions (including project-generated vehicle movements) was added to the total predicted NOx concentrations and nutrient nitrogen deposition, at the location at which the maximum impact of stack emissions from the Facility was predicted, to provide an in-combination assessment.

Background Pollutant Concentrations

14.4.36 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, 2020b). Defra provides 2001-based background mapping for concentrations of benzene, SO_2 and carbon monoxide (CO); in addition, these pollutants are mapped using the Pollution Climate Mapping (PCM) model, though no CO maps were produced beyond 2010. To provide a conservative assessment, the assessment used the highest values of either the 2001-based maps or the PCM outputs.

14.4.37 Ambient concentrations of pollutants prescribed in the Waste Incineration BATC document were derived from different sites within Defra's ambient air quality monitoring network. Heavy metals data were obtained from the Heigham Holmes rural background site in Norfolk, which is part of the Heavy Metals Network. Other data sources were used for dioxins and furans, hydrochloric acid, ammonia and hydrogen fluoride (PCDD/F, HCl, NH_3 and HF respectively) background data (see **Section 14.6**).

14.4.38 The Process Contribution (PC) from the Biomass UK No. 3 Ltd facility, which is currently being commissioned, were added to the background concentrations within the study area, as the PCs from this facility would not be included in the background pollutant concentrations. Receptors R1 – R12 in this assessment were included at the same locations as those modelled in the assessment undertaken for the Biomass UK No. 3 Ltd application, therefore for these receptors the PCs were added directly. For receptor locations R13 – R39, the most representative PC was applied (which was either the closest receptor or, where there were two receptors equidistant, the highest PC) which provided a conservative assessment.

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Assessment Significance Criteria

Construction Phase Dust and Particulate Matter

14.4.39 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 by means of implementing effective mitigation.

14.4.40 With implementation of effective mitigation measures, generation of airborne 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).

Construction and Operational Phase Emissions

Human Receptors

14.4.41 The ambient air quality Objectives considered in the assessment of impacts at human receptor locations are detailed in **Table 14-5**.

14.4.42 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 14-5**.

Table 14-5 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 $\mu g.m^{-3}$	200 $\mu g.m^{-3}$	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 $\mu g.m^{-3}$ (ecological sites only)	200 $\mu g.m^{-3}$** (ecological sites only)	24-hour mean	EU AAD Limit Value (long-term) WHO Guideline (short-term)
Particulates (PM_{10})	40 $\mu g.m^{-3}$	50 $\mu g.m^{-3}$	24-hour mean, not to be exceeded more than 35 times per year	Air Quality (England) Regulations 2000, as amended

Pollutant	Air Quality Objectives*			Source of Objective / EAL
	Annual	Short-Term	Short-Term Period	
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 three 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
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}	-	-	EAL (2021 Air Emissions Risk Assessment for your Environmental Permit)~~EU AAD Target Value~~

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Pollutant	Air Quality Objectives*			Source of Objective / EAL
	Annual	Short-Term	Short-Term Period	
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 (2021 Air Emissions Risk Assessment for your Environmental Permit)~~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)	-30 (as benzene)	24-hour mean-	Air Quality (England) Regulations 2000, as amended EAL (2021 Air Emissions Risk Assessment for your Environmental Permit)

** 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.*

***The WHO Guidelines include a 24-hour mean of 75 µg.m-3 for NO_x, however, the document also states that "Experimental evidence exists that the CLE decreases from around 200 µg/m3 to 75 µg/m3 when in-combination with O_3 or SO_2 at or above their critical levels. In the knowledge that short-term episodes of elevated NO_x concentrations are generally combined with elevated concentrations of O_3 or SO_2, 75 µg/m3 is proposed for the 24 h mean." This is discussed in greater detail in later sections.*

† PCDD is polychlorinated dibenzodioxins; PCDF is polychlorinated dibenzofurans.

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

14.4.43 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 14-6** 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.

14.4.44 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).

Table 14-6 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

14.4.45 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

14.4.46 Impacts on ecological receptors were considered in respect to the relevant Critical Loads and Critical Levels as described in the following sections.

14.4.47 Guidance provided by the Environment Agency (Environment Agency, 2016) states that where the contribution of a project leads to nutrient nitrogen deposition values below 1 % of the Critical Load, impacts can be considered to be not significant. The use of the 1 % criterion is also considered by Natural England (Natural England, 2018) to be a reasonable determination of the level at which impacts of a project or plan are not significant. A change of this magnitude is likely to be within the natural range of fluctuations in deposition and effects are unlikely to be perceptible.

14.4.48 A project or plan in isolation may not lead to significant effects, but the outcome of recent court judgements (notably the Wealden Judgement, 2017) has led to the requirement for the consideration of impacts associated with a project or plan both in isolation, and in addition to other plans or projects which may affect the same designated site (an 'in-combination' assessment). The 1 % criterion should then be applied to the in-combination impact to determine whether impacts remain insignificant, or whether further ecological investigation is required.

14.4.49 A search was carried out for additional consented projects which include sources of air emissions which could act in-combination with the Facility and would not be included in background air quality data. This search identified two such projects; the Biomass UK No. 3 Ltd project, located adjacent to the Facility, and a gas-fired peaking power plant located at Lealand Way, 350 m to the north. The relevant pollutant contributions were therefore included to provide an in-combination assessment, where there was sufficient information included within the respective application to quantify these emissions. It should be noted that the application for the gas-fired peaking power plant only considered impacts on annual mean NOx concentrations at the Havenside LNR; as such, in-combination impacts of other pollutants and averaging times and impacts on other designated sites could not be considered with this project.

14.4.50 Any development-generated or in-combination nutrient nitrogen deposition values above 1 % of the Critical Load or Level would require additional assessment by an ecologist to determine whether any significant impacts may be experienced at the affected habitats, taking into account the in-combination increase and the total overall pollutant concentration or deposition value which includes background levels. The determination of the significance of impacts on designated ecological sites is considered in **Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**.

Critical Levels

14.4.51 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.

14.4.52 The Critical Levels used in the assessment are detailed in **Table 14-7**.

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Table 14-7 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 WHO Guidelines
	200	Daily mean	
Sulphur Dioxide (SO_2)	20 (10 for lichen and bryophytes)	Annual mean	
Ammonia (NH_3)	3 (1 for lichen and bryophytes)	Annual mean	
Hydrogen Fluoride (HF)	5	Daily mean	
	0.5	Weekly mean	

14.4.53 Guidance from the IAQM on assessing the air quality impacts on designated nature conservation sites (IAQM, 2019) notes that the WHO Guidelines include a 24-hour mean NO_x concentration of 75 $\mu g.m^{-3}$. The Guidelines provide additional detail as follows: *"Experimental evidence exists that the CLE decreases from around 200 µg/m³ to 75 µg/m³ when in-combination with O_3 or SO_2 at or above their critical levels. In the knowledge that short-term episodes of elevated NOx concentrations are generally combined with elevated concentrations of O_3 or SO_2, 75 µg/m³ is proposed for the 24 h mean."* The IAQM guidance document states that UK concentrations of ozone and SO_2 are typically low and that it is most appropriate to use 200 $\mu g.m^{-3}$ as the Critical Level. As noted in **Table 14-7**, background SO_2 concentrations are significantly below the Critical Level. A review of modelled O_3 concentrations from the PCM model (Defra, 2020d) showed that, for 2018 (the most recent dataset), O_3 concentrations did not exceed the EU target value. As such, 200 $\mu g.m^{-3}$ was applied as the short-term (24 hour) Critical Level in the assessment.

~~14.4.53~~14.4.54 **Appendix 14.4** contains an evaluation of ambient monitoring data over a five--year period for SO_2 and O_3 at the ~~AURN~~automatic monitoring stations closest to Boston (Wicken Fen for O_3 and Weybourne for both O_3 and SO_2). The monitoring results -show no recorded exceedances of the Critical Levels for O_3 or SO_2 and that the risk of exceedance is very low. This is supported by the SO_2 levels in the modelled background concentration maps from APIS. As neither O_3 nor SO_2 are likely to exceed the Critical Levels, a higher daily NOx threshold of 200 $\mu g.m^{-3}$ is considered to be the most appropriate for use, as referenced in IAQM guidance (IAQM, 2020)~~4~~.

~~14.4.54~~14.4.55 For the purposes of the assessment, it was assumed that all identified ecological sites are sensitive to airborne concentrations of NO_X, SO_2, NH_3 and

HF, which may not be the case for all habitats and species within a designated site.

~~14.4.55~~14.4.56 It is not possible to model weekly averaging times in ADMS-5 for consideration of the HF weekly mean Critical Level. Application of the daily average HF concentration would be extremely conservative in relation to a weekly averaging time; by contrast, an annual mean would be a significant underestimation. The air quality assessment undertaken for the consented Biomass UK No. 3 Ltd project, located adjacent to the Facility, modelled monthly mean HF concentrations using the AERMOD dispersion model, which were used as a proxy for the weekly concentration. The relationship between the modelled daily and monthly HF concentrations at each designated ecological site as reported for the Biomass UK No. 3 Ltd project was calculated as shown in **Table 14-8**. These ratios were applied to the maximum daily concentrations predicted from the Facility, to provide a more representative weekly mean concentration.

Table 14-8 HF Adjustment from Daily to Monthly Concentrations

Designated Site	Biomass UK No. 3 Ltd Facility Concentrations		
	Reported Daily Mean HF Concentration (µg.m^{-3})	Reported Monthly Mean HF Concentration (µg.m^{-3})	Factor
The Wash SPA, SAC, SSSI and Ramsar	0.0065	0.00076	0.12
Slippery Gowt Sea Bank LWS	0.035	0.0072	0.21
Havenside LNR	0.035	0.0072	0.21
South Forty Foot Drain LWS	0.015	0.0016	0.11

Critical Loads

~~14.4.56~~14.4.57 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 (Centre for Ecology and Hydrology (CEH), 2020).

~~14.4.57~~14.4.58 The APIS website (CEH, 2020) contains information on the habitats present within nationally and European designated sites, including The Wash and North Norfolk Coast SAC and The Wash SPA and SSSI.

~~14.4.58~~14.4.59 The Wash is designated for several species of bird which use different habitats, and the SSSI includes fen, marsh and swamp habitats. The project ecologists advised that supralittoral sediment, neutral grassland, and fen, marsh and swamp habitats were not present in The Wash within the study area for the Facility, and that the saltmarsh habitat was most appropriate for consideration. As such, Critical Loads for the saltmarsh habitat were used to consider impacts on the interest features of The Wash. Saltmarsh habitat is not sensitive to acid deposition; as such, impacts of acidity were not considered.

~~14.4.59~~14.4.60 Predicted annual mean nutrient nitrogen deposition levels were compared to the lowest (most stringent) Critical Loads of the saltmarsh habitat within the designated site, as detailed in **Table 14-9**, to provide a conservative assessment.

Table 14-9 Critical Load Values for Nutrient Nitrogen Deposition in The Wash

Site	Feature	Habitat Type	Nutrient Nitrogen CL (kgN/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	Pink-footed goose, Dark-bellied brent goose, Common Shelduck, Eurasian wigeon, Northern pintail, Common goldeneye, Eurasian oystercatcher, Grey plover, Red knot, Sanderling, Dunlin, Eurasian curlew, Black-tailed godwit, Bar-tailed godwit, Common redshank.	Littoral sediment (Relevant Nitrogen Critical Load Class - Pioneer, low-mid, mid-upper saltmarshes)	20-30
	Ruddy turnstone	Littoral Rock (Relevant Nitrogen Critical Load Class - Pioneer, low-mid, mid-upper saltmarshes)	20-30

~~14.4.60~~14.4.61 Site-specific Critical Loads are not available on APIS for locally designated sites. As such, the habitats present within the Havenside LNR, the South Forty Foot Drain LWS and the Slippery Gowt Sea Bank LWS were obtained from the site citations, as detailed in **Table 14-10**.

~~14.4.61~~14.4.62 APIS provides records of habitats and their sensitivities to nutrient nitrogen and acid deposition. A review was undertaken of these habitats in conjunction with the project ecologist and it was concluded that there were no suitably representative habitat types which were applicable to the grassland or scrub habitats present within the sites. The Critical Load for saltmarsh was considered to be appropriate for the assessment of the coastal grazing marsh present at the Havenside LNR and was therefore used. Nitrogen deposition was quantified at all sites; however, only the deposition at the Havenside LNR was compared to a Critical Load value. Similar to The Wash, the saltmarsh was only considered in relation to nitrogen deposition, as the habitat is not sensitive to acid deposition.

Table 14-10 Habitats within the Locally Designated Sites in the Study Area

Site	Habitats Present		Appropriate Critical Load
Havenside LNR	Main habitat:	Coarse or rank grassland	None
	Additional habitat:	New native plantation, Scrub, Semi-improved neutral grassland, Improved grassland, Ditch, Pond, Coastal grazing marsh, Marsh, Reedbed	Pioneer, low-mid, mid-upper saltmarshes 20 – 30 $kgN.ha.yr^{-1}$
	Additional features:	Tussocky vegetation, Seasonally wet/damp areas Abundant nectar sources, Open access, Right of Way, Anthills, Steep slopes	None
South Forty Foot Drain LWS	Main habitat:	Drain	None
		Neutral grassland (semi-improved)	None
		Coarse or rank grassland	None
	Additional habitat:	Calcareous grassland (semi-improved)	None
		Scattered scrub	None
		Reedbed	None
		Improved grassland	None
Slippery Gowt Sea Bank LWS	Main habitat:	Coarse or rank grassland	None
	Additional habitat:	Neutral grassland - semi-improved, Scrub - scattered	None

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~~14.4.62~~14.4.63 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. Deposition velocities for ecological receptors are based upon the classification of the habitat type and the assessed pollutant. These were obtained from the Air Quality Technical Advisory Group (AQTAG) technical guidance note (AQTAG, 2014), in addition to the factors used to convert NO_2 and NH_3 deposition fluxes to kg $N.ha.yr^{-1}$, as summarised in **Table 14-11**.

Table 14-11 Recommended Deposition Velocities

Pollutant	Deposition Velocity ($m.s^{-1}$)		Conversion factor to $kgN.ha.yr^{-1}$
	Grassland	Forest	
NO_2	0.0015	0.003	95.9
SO_2	0.012	0.024	-
NH_3	0.02	0.03	260
HCl	0.025	0.06	-

~~14.4.63~~14.4.64 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 equivalent ($kg.ha^{-1}.y^{-1}$) in order for comparison to the specific Critical Loads for each ecological habitat.

~~14.4.64~~14.4.65 The assessment used the Environment Agency (Environment Agency and Defra, 2016) criteria to determine the significance of impacts on designated sites relative to Critical Levels and Critical Loads. Process contributions are considered to be insignificant using the following criteria:

- For SPAs, SACs, Ramsar and 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.

~~14.4.65~~14.4.66 IAQM guidance (IAQM, 2020) notes that the less stringent criteria for locally designated sites may not provide adequate protection. As such, impacts on locally designated sites were considered using the same criteria as the European and nationally designated sites.

~~14.4.66~~14.4.67 Where the Facility's PC was greater than these screening criteria, the impacts could not be considered to be insignificant. The significance of ecological impacts is discussed in **Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**.

Construction and Operational Phase Odour Assessment

~~14.4.67~~14.4.68 The IAQM assessment methodology (IAQM, 2018) determines the likely effect of odour impacts occurring at discrete receptors. The EIA regulations require a conclusion on the likely significance of effects; where the overall effects are considered to be greater than 'slight adverse', these impacts are considered to be significant in EIA terms. Overall impacts of 'slight adverse' or lower are considered to be not significant, in accordance with the guidance.

Assumptions and Limitations

~~14.4.68~~14.4.69 The air quality assessment utilised traffic flow data provided by the transport consultants for the Facility. Any assumptions made in the derivation of these data are detailed in **Chapter 19 Traffic and Transport.**

~~14.4.69~~14.4.70 There is inherent uncertainty in air dispersion modelling and limitations as to the model's ability to replicate real-world situations; these are minimised insofar as possible through verification of the road traffic emissions model, and by use of the appropriate model input data, as described in **Appendix 14.2**. The models used in the study are validated by Cambridge Environmental Research Consultants (CERC), the software developer, against a number of controlled monitoring campaigns.

~~14.4.70~~14.4.71 It was assumed that the Facility would emit pollutants at the BAT-AELs. This is considered to be a conservative assumption, as actual emissions are likely to be lower.

~~14.4.71~~14.4.72 The dispersion model used for the assessment of road traffic emissions was verified using NO_2 diffusion tube monitoring data collected by BBC. Diffusion tubes are routinely used by local authorities to measure air quality; however, they do not provide the same level of precision and accuracy as automatic monitoring methods, although good quality assurance and quality control processes will minimise uncertainties insofar as possible. The uncertainties and limitations to monitored air pollution data are therefore unlikely to significantly affect the certainty of the assessment.

~~14.4.72~~14.4.73 Background pollutant concentrations within the air quality study area were derived using the pollution maps provided by Defra for 1 km x 1 km grid squares across the UK. These data are derived using modelling, combined with an empirical comparison with relevant monitoring data and, as such, there are inherent uncertainties associated with the data. However, the use of these maps is an industry-standard approach and was agreed with stakeholders during consultation. Uncertainties in these mapped background values are unlikely to significantly affect the conclusions of the assessment.

~~14.4.73~~14.4.74 Background concentrations of other pollutants were obtained from the most appropriate sources, discussed in detail in **Section 14.6**. However, historical data were used for certain pollutants due to a cessation in monitoring across the country. Furthermore, some pollutants are not routinely monitored within the UK, and therefore background data were not available (see **Section 14.6** for further details).

Cumulative Impact Assessment

~~14.4.74~~14.4.75 Traffic data utilised within the assessment includes traffic flows associated with all cumulative plans and projects identified for consideration in this ES. As such, the road traffic emissions assessment is inherently cumulative.

~~14.4.75~~14.4.76 The assessment also included the appropriate pollutant contributions from the consented Biomass UK No. 3 Ltd facility, as concentrations from this facility would not yet be included within the associated background data as this facility is currently in commissioning. The assessment is therefore cumulative in this regard.

~~14.4.76~~14.4.77 The cumulative assessment therefore focussed on the potential for any cumulative dust emissions during the construction phase, and any additional industrial or agricultural sources which could impact upon human or ecological receptors.

Transboundary Impact Assessment

~~14.4.77~~14.4.78 The only potential transboundary impact which may arise as a result of the Facility is the formation and transport of secondary particulate matter. The potential for significant transboundary impacts was considered qualitatively, with consideration given to the pollutants emitted and the associated emissions controls and industry regulation.

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 Application Site boundary and within 50 m of routes used by construction vehicles, up to 500 m from the Application Site boundary; and,
  - Ecological receptors within 200 m of the Application Site boundary and within 50 m of routes used by construction vehicles, up to 500 m from the Application Site boundary. The construction dust and particulate matter assessment study area is detailed in **Figure 14.3**.

- 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** and **Figure 14.2**.

- Construction and operation phase vessel emissions 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 EfW plant main stacks and the two proposed LWA stacks. The stack emissions study area is detailed in **Figure 14.2**.

- Construction and operational phase odour assessment:
  - The odour assessment study area was defined as including the receptors in closest proximity to the Facility which would be expected to experience the greatest potential odour impact. These closest receptors are shown in **Figure 14.4.**

Data Sources

14.5.2 The assessment was undertaken with reference to several sources, as detailed in **Table 14-12.**

Table 14-12 Key Information Sources

Data Source	Reference
BBC	Annual Status Report 2020
CEH	CEH (2020): Air Pollution Information System (APIS)
Department for Environment Food and Rural Affairs (Defra)	Defra (2018): Local Air Quality Management Technical Guidance TG(16)
Defra's LAQM Support Tools	Defra (2020): Local Air Quality Management 1 km x 1 km grid background pollutant maps
Defra	Defra (2020): UK Ambient Air Quality Interactive Map
Environment Agency and Defra	Environment Agency & Defra (2016): Air quality risk assessment for your environmental permit
IAQM	IAQM (2016): Guidance on the Assessment of Dust from Demolition and Construction
	IAQM (2018) Guidance on the Assessment of Odour for Planning
	IAQM (2020): A guide to the assessment of air quality impacts on designated nature conservation sites
IAQM and EPUK	IAQM & EPUK (2017): Land-use Planning & Development Control: Planning for Air Quality

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 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. These are shown on **Figure 14.5**.

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 (for 2019) were obtained from BBC during consultation 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 2015 – 2019 for all diffusion tubes are detailed in **Table 14-13** and the locations are shown in **Figure 14.5**. Between 2018 and 2019, a number of tube locations were discontinued and replaced by additional sites; as such, some locations only include data for 2019. Exceedances of the NO_2 annual mean Objective are highlighted in bold text.

Table 14-13 BBC Diffusion Tube NO_2 Monitoring Data within Boston

Diffusion Tube ID	Location	Site Type	Grid Reference		NO_2 Annual Mean Concentration ($\mu g.m^{-3}$)				
			X	Y	2015	2016	2017	2018*	2019
1	North side of Haven Bridge Road	Roadside	532575	343696	**49.7**	**45.8**	**49.4**	**42.4**	**49.2**
2	North side of Haven Bridge Road	Roadside	532656	343716	**50.1**	37.5	**44.5**	**44.5**	-**
3	68 Liquorpond Street	Roadside	532470	343736	**46.0**	**46.2**	**53.2**	**48.3**	**46.5**
4	18 Queen Street	Roadside	532331	343848	36.4	38.6	38	39.4	39.8
5	John Adams Way intersection with Haven Bridge	Roadside	532859	343760	34.9	34.6	36.8	37.1	34.8
6	37 Spayne Road	Urban BG	533124	343939	17.1	17.8	18.6	17.2*	-
7	29 Manor Gardens	Urban BG	533324	344044	16.3	17.0	17.9	16.4*	-
8	Bargate Roundabout	Roadside	533112	344476	31.1	31.1	31.3	32.5	31.3
9	30 Spilsby Road	Roadside	533251	344642	**44.2**	**41.5**	**43.6**	39.4	37

Diffusion Tube ID	Location	Site Type	Grid Reference		NO_2 Annual Mean Concentration ($\mu g.m^{-3}$)				
			X	Y	2015	2016	2017	2018*	2019
10	23 Spilsby Road	Roadside	533312	344665	28.5	28.2	27.7	27.9*	-
11	41 Spilsby Road	Roadside	533368	344728	33.0	30.6	31.8	**46.3**	-
12	Junction of New Asda Road and Sleaford Road	Roadside	532168	343987	28.6	26.8	27.6	31.8	28.9
13	42 Spilsby Road	Roadside	533287	344675	22.0	21.7	22.1	30.0	-
14	20 Spilsby Road	Roadside	533226	344624	36.6	36.7	37.1	37.8	35.8
15	Façade of 32 Spilsby Road	Roadside	533253	344653	21.4	21.8	22.5	21.8*	-
16	Entrance to South Quay Car Park	Roadside	532855	343719	-	-	-	-	30.1
17	Opposite 4-6 South End, Boston	Roadside	532877	343690	-	-	-	-	30.5
18	AST Roundabout, London Road, Boston	Roadside	532600	342737	-	-	-	-	33.8
19	Opposite 55 London Rd, Boston	Roadside	532630	342760	-	-	-	-	27.5
20	Kerbside, Haven Bridge	Roadside	532744	343719	-	-	-	**46.3**	**41.6**
21	36 Sleaford Road, Boston	Roadside	532024	344060	-	-	-	30	29
22	Adjacent to 94	Roadside	532544	343702	-	-	-	-	35.9

Diffusion Tube ID	Location	Site Type	Grid Reference		NO_2 Annual Mean Concentration ($\mu g.m^{-3}$)				
			X	Y	2015	2016	2017	2018*	2019
	Liquorpond St								

*the diffusion tubes at Site ID 6, 7, 10 and 15 were moved in December 2018, thus the results show the average from January to November (inclusive) only.
**Insufficient data capture was recorded as this site was replaced by Site 22 in March 2019

14.6.5 The monitoring data show that there were exceedances of the NO_2 annual mean air quality Objective at six diffusion tube locations from 2015 – 2019. These locations are situated within, or on the boundary of the Haven Bridge or Bargate Bridge AQMAs, where elevated pollutant concentrations are anticipated.

Background Pollutant Concentrations

<u>Human Receptors</u>

14.6.6 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 (i.e. the study area), were obtained from the latest 2018-based background air pollutant concentration maps provided by Defra for use in air quality assessments (Defra, 2020b). 2019, 2021 and 2025 background concentrations were obtained for the appropriate assessment scenarios.

14.6.7 Defra provides 2001-based background mapping for concentrations of benzene, SO_2 and CO; in addition, these pollutants are mapped using the PCM model, though no CO maps were produced beyond 2010. To provide a conservative assessment, the assessment used the higher of these two datasets (which were the 2001-based background maps in all instances).

14.6.8 The relevant background pollutant concentrations of NO_2, PM_{10}, $PM_{2.5}$, SO_2, CO and benzene were obtained for the grid squares covering the selected receptor locations and are detailed in **Table 14-14**.

Table 14-14 Annual Mean Background NO_2, PM_{10}, $PM_{2.5}$, SO_2, CO and Benzene Pollutant Concentrations for 2019, 2021 and 2025

Receptor	Coordinates		Defra Mapped Background Concentration ($\mu g.m^{-3}$)					
	X	Y	NO_2	PM_{10}	$PM_{2.5}$	SO_2	CO	Benzene
2019 – Verification / Base Year								
R18-R26, R38, R39	532500	342500	12.6	15.4	9.3	2.2	264	0.32

Receptor	Coordinates		Defra Mapped Background Concentration (µg.m^{-3})					
	X	Y	NO_2	PM_{10}	$PM_{2.5}$	SO_2	CO	Benzene
R12, R27, R28, R30, R33, R37	532500	343500	13.1	15.5	9.8	2.3	267	0.33
R31, R32	532500	344500	12.1	14.8	9.4	2.5	265	0.33
R1, R10, R11, R15	533500	341500	9.8	16.4	9.1	2.4	253	0.29
R2, R13, R14, R17	533500	342500	12.1	16.8	9.5	2.3	262	0.32
R3, R36	533500	343500	13.5	14.8	9.4	2.8	266	0.33
R29, R34	533500	344500	12.3	14.9	9.5	2.6	264	0.33
R9	534500	341500	9.7	15.9	9.0	3.3	248	0.27
R4-R7, R16, R35	534500	342500	11.1	15.9	9.3	2.7	256	0.30
R8	535500	341500	8.2	16.1	9.0	3.6	240	0.25
2021 – Construction Phase								
R18-R26, R38, R39	532500	342500	11.6	14.9	8.9	2.2	264	0.32
R12, R27, R28, R30, R33, R37	532500	343500	12.1	15.0	9.4	2.3	267	0.33
R31, R32	532500	344500	11.2	14.4	9.0	2.5	265	0.33
R1, R10, R11, R15	533500	341500	9.2	15.9	8.8	2.4	253	0.29
R2, R13, R14, R17	533500	342500	11.3	16.3	9.2	2.3	262	0.32
R3, R36	533500	343500	12.4	14.4	9.0	2.8	266	0.33
R29, R34	533500	344500	11.4	14.4	9.1	2.6	264	0.33
R9	534500	341500	9.1	15.5	8.6	3.3	248	0.27
R4-R7, R16, R35	534500	342500	10.4	15.5	8.9	2.7	256	0.30
R8	535500	341500	7.6	15.7	8.7	3.6	240	0.25
2025 – Operational Phase								
R18-R26, R38, R39	532500	342500	10.2	14.3	8.4	2.2	264	0.32

Receptor	Coordinates		Defra Mapped Background Concentration ($\mu g.m^{-3}$)					
	X	Y	NO_2	PM_{10}	$PM_{2.5}$	SO_2	CO	Benzene
R12, R27, R28, R30, R33, R37	532500	343500	10.6	14.3	8.8	2.3	267	0.33
R31, R32	532500	344500	9.9	13.7	8.5	2.5	265	0.33
R1, R10, R11, R15	533500	341500	8.2	15.3	8.3	2.4	253	0.29
R2, R13, R14, R17	533500	342500	10.1	15.6	8.6	2.3	262	0.32
R3, R36	533500	343500	11.1	13.7	8.5	2.8	266	0.33
R29, R34	533500	344500	9.9	13.8	8.6	2.6	264	0.33
R9	534500	341500	8.1	14.8	8.1	3.3	248	0.27
R4-R7, R16, R35	534500	342500	9.3	14.9	8.4	2.7	256	0.30
R8	535500	341500	6.7	15.1	8.2	3.6	240	0.25

14.6.9 There are limited sources of data on background concentrations of metals. The UK Heavy Metals Network monitors concentrations of metals at 24 sites across the UK at urban, industrial and rural locations. It was not considered that the use of data from an industrial or urban location was representative of conditions in the Boston area, which is a town surrounded by open countryside rather than an urban city location with significant industrial sources in the area. Data from the Heigham Holmes station were therefore used in the assessment, which is the closest rural location, situated approximately 110 km south-east of the Facility in Norfolk (Defra, 2020c).

14.6.10 Background concentrations of arsenic (As), cadmium (Cd), lead (Pb), nickel (Ni), mercury (Hg), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn) and vanadium (V) from the most recent year (2019) were used, with the exception of Hg as the monitoring of mercury ceased in January 2014; therefore, background concentrations from the 2013 dataset were used. These background concentrations are detailed in **Table 14-15**.

14.6.11 Gaseous 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 location to the Application Site, located approximately 57 km south-east of the Facility. 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 µg.m^{-3}.

14.6.12 Ambient monitoring of NH_3 is undertaken as part of the National Ammonia Monitoring Network (NAMN) at 85 locations in the UK; these data are interpolated across the UK by the Concentration Based Estimated Deposition (CBED) model at a 5 km resolution. The CEH uses the national transport model (FRAME) to spatially distribute ammonia concentrations which are calibrated to the annual ammonia measurements. The APIS website (CEH, 2020) provides these estimates of NH_3 concentrations, and the three-year average (2016-2018) NH_3 concentration for the grid square covering the Application Site (533880, 342505) and assessed receptors is 1.84 µg.m^{-3}.

14.6.13 Monitoring of PCDD and PCDF was carried out at six locations (London, Manchester, Hazelrigg, High Muffles, Weybourne and Auchencorth Moss) up until 2010 as part of the Toxic Organic Micropollutant (TOMPs) Network. The locations at London and Manchester were urban background sites and had higher PCDD and PCDF concentrations than the other four sites. The average concentration of London and Manchester between 2008 and 2010 was 28.8 femtograms (fg).m^{-3} and was used as a conservative estimate for the Application Site and study area.

14.6.14 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 µg.m^{-3} would be suitable for a rural site exposed to power station plumes (Defra, 2006). This value was also used for the annual mean concentration to provide a conservative estimate.

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

14.6.16 The background concentrations of heavy metals, HCl, HF and PCDD / PCDF used in this assessment are summarised in **Table 14-15**.

Table 14-15 Heavy Metal, HCl, HF, PCDD / PCDF and NH_3 Background Concentrations

Pollutant	Monitoring Year	Monitoring Location	Concentration (µg.m^{-3})
As	2019	Heigham Holmes	0.00058
Cd	2019	Heigham Holmes	0.0001
Co	2019	Heigham Holmes	0.000056
Cr	2019	Heigham Holmes	0.00108
Cu	2019	Heigham Holmes	0.0022

Pollutant	Monitoring Year	Monitoring Location	Concentration (μg.m^{-3})
Hg	2013	Heigham Holmes	0.00131
Mn	2019	Heigham Holmes	0.0029
Ni	2019	Heigham Holmes	0.0007
Pb	2019	Heigham Holmes	0.0038
Sb	-	-	Assumed zero
Tl	-	-	Assumed zero
V	2019	Heigham Holmes	0.00092
NH_3	2016 – 2018	5 km resolution for Application Site (533880, 342505)	1.84
HCl	2015	Stoke Ferry	0.2
HF	-	*	0.00000246
PCDD / PDCF	2008 – 2010	London and Manchester (urban background average)	0.0000000288
* Defra, 2006			

14.6.17 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.

Ecological Receptors

14.6.18 Background concentrations of NO_x and HF were obtained from the same sources as described above for human receptors; the APIS website (CEH, 2020) provides mapped 5 km x 5 km background concentrations for NOx; however, these are of a coarser resolution than the maps provided by Defra (Defra, 2020b) and are not projected forward to future assessment years. As such, it was considered more appropriate to use the Defra mapped background concentrations.

14.6.19 Concentrations of ammonia and SO_2 were obtained from the APIS website (CEH, 2020), in addition to background nitrogen deposition. The background values used at each designated site are detailed in **Table 14-16**.

Table 14-16 Background Concentrations at Designated Ecological Sites

Designated Site	Pollutant	Construction	Operation
		2021	2025
The Wash SPA, ~~SAC,~~ SSSI, Ramsar	NOx (μg.m^{-3})	9.07	7.94
	SO_2 (μg.m^{-3})	0.88	0.88

Designated Site	Pollutant	Construction	Operation
		2021	2025
The Wash and North Norfolk Coast SAC	NH_3 (µg.m^{-3})	-	0.85
	HF (µg.m^{-3})	-	0.00000246
	Nutrient nitrogen (kgN/ha/yr)	12.18	12.18
Havenside LNR	NOx (µg.m^{-3})	13.79	12.26
	SO_2 (µg.m^{-3})	1.29	1.29
	NH_3 (µg.m^{-3})	-	1.84
	HF (µg.m^{-3})	-	0.00000246
	Nutrient nitrogen (kgN/ha/yr)	17.22	17.22
South Forty Foot Drain LWS	NOx (µg.m^{-3})	23.95*	19.17*
	SO_2 (µg.m^{-3})	1.29	1.29
	NH_3 (µg.m^{-3})	-	1.84
	HF (µg.m^{-3})	-	0.00000246
	Nutrient nitrogen (kgN/ha/yr)	17.87*	17.66*
Slippery Gowt Sea Bank LWS	NOx (µg.m^{-3})	11.91	10.54
	SO_2 (µg.m^{-3})	0.88	0.88
	NH_3 (µg.m^{-3})	-	0.85
	HF (µg.m^{-3})	-	0.00000246
	Nutrient nitrogen (kgN/ha/yr)	12.18	12.18
Habitat Mitigation Area	NOx (µg.m^{-3})	11.91	10.54
	SO_2 (µg.m^{-3})	0.88	0.88
	NH_3 (µg.m^{-3})	-	1.84
	HF (µg.m^{-3})	-	0.00000246
	Nutrient nitrogen (kgN/ha/yr)	17.87*	17.66*
*These values include the modelled contribution of NOx and nutrient nitrogen from traffic on the A16			

14.7 Potential Impacts

Embedded Mitigation

14.7.1 When undertaking the environmental impact assessments, emissions from the Facility were assumed to be at the relevant BAT-AELs. Therefore, the emissions abatement systems which will be a necessary component of the Facility design for those limits to be met, and which will be required to obtain environmental permits for the site, were assumed to be in place.

14.7.2 In addition, the Facility has been designed to prevent significant odour effects from occurring; RDF conveyors will be enclosed other than at the loading point, and the RDF shredding and bunker buildings will be enclosed with the air extracted and sent to the thermal treatment plant for combustion. Fast-acting roller shutter doors will be in place to minimise the time that doors are open when the building is accessed for maintenance.

Potential Impacts during Construction

Impact 1: Potential Impacts During Construction - Dust and Particulate Matter

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 Facility have the potential to cause nuisance to, and soiling of, sensitive receptors;
- Emissions of exhaust pollutants, especially NO_2 and $PM_{10}/PM_{2.5}$ from construction traffic on the local road network, have the potential to adversely effect upon local air quality at sensitive receptors situated adjacent to the routes utilised by construction vehicles; and
- Emissions of NO_2 and $PM_{10}/PM_{2.5}$ from NRMM operating within the Application Site, have the potential to adversely affect 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 not 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 16.3 $\mu g.m^{-3}$ in 2021, based on 2018 mapped background estimates. Therefore, the mapped background concentrations are 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 200 m of the site boundary. The Havenside LNR is located within 200 m of the Application Site boundary and several human receptors are located within 350 m of the Application 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 14-17**.

Table 14-17 Dust Emission Magnitude for the Application Site

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 effect 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 and ecological 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 14-18**.

Sensitivity of People to Dust Soiling

- Earthworks and Construction: there are between 1 and 10 residential receptors within 100 m of the land side works within the Application Site, and the next nearest 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 µg.m^{-3}, and there are between 10 and 100 high sensitivity residential receptors within 200 m of the land side works within the Application Site. The sensitivity is therefore **low**.
- Trackout: the annual mean background PM_{10} concentration at the site is less than 24 µg.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**.

Sensitivity of Receptors to Ecological Effects

- Earthworks and construction: the Havenside LNR is located within 70 m of the Application Site and is assumed to be sensitive to dust effects. As it is locally designated, it is classified as a low sensitivity receptor in accordance with IAQM guidance (IAQM, 2016). The sensitivity is therefore **low**.
- Trackout: as the Havenside LNR is located on the opposite bank of the River Witham, the designated site would not be affected by construction-related traffic. Impacts associated with trackout were therefore not considered.

Table 14-18 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
Ecological Effects	Low	Low	N/A

Step 2C: Define the Risk of Impacts

14.7.11 The dust emission magnitude detailed in **Table 14-17** is combined with the sensitivity of the area detailed in **Table 14-18** to determine the risk of impacts with no mitigation applied. The risks concluded for dust soiling, human health and ecological effects are provided in **Table 14-19**.

Table 14-19 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
Ecological	Low Risk	Low Risk	N/A

Potential Impact	Risk		
	Earthworks	Construction	Trackout
Effects			

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. Impacts on ecological receptors were classified as '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.

Impact 2: Potential Impacts During Construction - Road Traffic and Vessel Emissions

Human Receptors

14.7.13 During construction, the Facility will generate air emissions from construction-related vehicle movements, and from vessel movements which will be used to import construction materials.

14.7.14 The results of the assessment are detailed in **Table 14-20**. This table summaries, for each pollutant and averaging time, the receptor with the highest Process Contribution (PC) (which includes both vessel and road traffic contributions), and the receptor with the highest overall Predicted Environmental Concentration (PEC), which includes background concentrations. It should therefore be noted that the highest concentrations experienced as a result of the Facility are not necessarily experienced at receptors with the highest overall pollutant concentrations.

14.7.15 As described in previous sections, the PEC values also include the contribution from the adjacent Boston Biomass UK No. 3 Ltd facility. For the consideration of short-term averaging periods, the background has been doubled, in accordance with Environment Agency guidance. The full receptor results are provided in **Appendix 14.3**.

Table 14-20 Construction Phase Assessment Results

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	R24	0.60	R37	49.17	1.5 %	122.9 %
	99.79 percentile of 1 hour means	R24	0.12	R37	101.50	0.1 %	50.8 %
PM_{10}	Annual mean	R24	0.10	R37	21.83	0.3 %	54.6 %
	90.41 percentile of 24 hour means	R3/R34	0.02	R37	43.66	0.0 %	87.3 %
$PM_{2.5}$	Annual mean	R24	0.06	R37	13.38	0.2 %	53.5 %
SO_2	99.73 percentile of 1 hour means	R3	0.01	R6	14.52	0.0 %	4.1 %
	99.18 percentile of 24 hour means	R3	0.01	R8	7.64	0.0 %	6.1 %
	99.9 percentile of 15 minute means	R3	0.01	R6	18.42	0.0 %	6.9 %
CO	8 hour running mean	R3	0.00	R12	534.94	0.0 %	5.3 %
	1 hour mean	R3	0.00	R12	538.40	0.0 %	1.8 %

14.7.16 The highest NO_2 PC was predicted to be experienced at receptor R24; this receptor is located closest to Marsh Lane which experiences the highest construction-generated traffic flows due to its proximity to the Application Site. However, the total concentration at receptor R24 is 24.22 $\mu g.m^{-3}$ which is 'well below' the annual mean Objective of 40 $\mu g.m^{-3}$. The highest PEC was experienced at receptor R37; this receptor is located within the Haven Bridge AQMA and was predicted to experience concentrations in exceedance of the annual mean Objective both without construction of the Facility and with construction. The total increase in annual mean NO_2 at this receptor, as a result of the Facility construction, was 0.27 $\mu g.m^{-3}$, or 0.7 % of the Objective.

14.7.17 The contribution of the Facility during construction to concentrations of all other pollutants was predicted to be less than 1 % of the respective air quality Objectives. At the receptors experiencing the highest total pollutant concentrations, the air quality Objectives were not exceeded.

14.7.18 IAQM and EPUK guidance (IAQM and EPUK, 2017) provides impact descriptors which take into account the predicted change in concentration at a receptor, and the total concentration in relation to the Objective (see **Table 14-6**). An overview of the number of receptors which fall into each impact descriptor category is provided in **Table 14-21**. The full results are presented in **Appendix 14.3**. Note that impact descriptors are only provided for pollutants with annual mean averaging times, as IAQM and EPUK guidance notes that the impact matrix is not intended for short-term averaging periods (IAQM and EPUK, 2017).

Table 14-21 Construction Phase Impact Descriptors

Pollutant and Averaging Period	Receptor Count for each Impact Descriptor			
	Negligible	Slight	Moderate	Substantial
Construction Phase (2021)				
NO_2 Annual Mean	37	1	1	0
PM_{10} Annual Mean	39	0	0	0
$PM_{2.5}$ Annual Mean	39	0	0	0

14.7.19 A **moderate adverse** effect was predicted for annual mean NO_2 concentrations at receptor R37, and a slight adverse effect predicted at receptor R32; both receptors are located within an AQMA where existing future baseline concentrations are already close to or in exceedance of the relevant Objective. At all other receptor locations for NO_2, and at all receptor locations for PM_{10} and $PM_{2.5}$, the effect was predicted to be **negligible**. Therefore overall, the effect significance of the construction phase assessment was determined to be **minor adverse** due to potential effects at receptors within the sensitive AQMA area.

14.7.20 As short-term PEC concentrations did not exceed the relevant short-term air quality Objectives, it is concluded that these effects are **insignificant**.

Ecological Receptors

14.7.21 Impacts on The Wash SAC, SPA, SSSI and Ramsar site as a result of construction of the Facility are presented in **Table 14-22**.

Table 14-22 Construction Phase Ecological Impacts – The Wash

Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC	Biomass No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/ CL
NOx Annual Mean (µg.m-3)								
536717, 339780	0.01	0.0 %	0.059	0.07	0.2 %	9.07	9.14	30 %
NOx 24hr Mean (µg.m-3)								
536162, 339882	0.07	0.1 %	1.000	1.07	1.4 %	18.14	19.22	26 %
SO_2 Annual Mean (µg.m-3)								
536162, 339882	0.07	0.1 %	1.000	1.07	1.4 %	18.14	19.22	26 %
Nutrient Nitrogen (kgN/ha/yr)								
536717, 339780	0.0014	0.0 %	0.016	0.02	0.09 %	12.18	12.20	61 %

14.7.22 As shown in **Table 14-22**, in-combination contributions of NOx, SO_2 and nutrient nitrogen were below 1 % of the relevant annual mean and less than 10 % of the relevant short-term Critical Level or Load; as such, effects can be considered to be **insignificant** in accordance with Environment Agency guidance.

14.7.23 Effects on the locally designated ecological sites as a result of construction of the Facility are presented in **Table 14-23** to **Table 14-25**. As noted in **Section 14.4**, APIS does not provide representative Critical Loads for habitat types within the Slippery Gowt Sea Bank and South Forty Foot Drain LWSs. As such, the effect of nutrient nitrogen deposition was quantified but was not compared with a Critical Load. Total PEC concentrations of NOx and nutrient nitrogen at the South Forty Foot Drain include the modelled road traffic contribution from the A16.

Table 14-23 Construction Phase Ecological Impacts – Havenside LNR

Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/CL
NOx Annual Mean (µg.m-3)								
534041, 342731	0.03	0.1 %	1.76*	1.79	6.0 %	13.79	15.58	52 %
NOx 24hr Mean (µg.m-3)								

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Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/CL
534041, 342680	0.12	0 %	5.6	5.72	2.9 %	27.58	33.31	17 %
SO_2 Annual Mean (µg.m^{-3})								
534041, 342731	0.00	0.0 %	0.17	0.17	0.9 %	1.29	1.46	7 %
Nutrient Nitrogen (kgN/ha/yr)								
534041, 342731	0.00	0.0 %	0.18	0.18	0.9 %	17.22	17.40	87 %
*Also includes the contribution from the gas-fired peaking power plant at Lealand Way								

Table 14-24 Construction Phase Ecological Impacts – Slippery Gowt Sea Bank LWS

Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/CL
NOx Annual Mean (µg.m^{-3})								
534395, 341924	0.01	0.0 %	0.66	0.67	4.4 %	11.91	12.58	42 %
NOx 24hr Mean (µg.m^{-3})								
534649, 341723	0.07	0 %	5.6	5.67	5.6 %	23.81	29.48	15 %
SO_2 Annual Mean (µg.m^{-3})								
534395, 341924	0.00	0.0 %	0.17	0.17	1.7 %	0.88	1.05	5 %
Nutrient Nitrogen (kgN/ha/yr)								
534395, 341924	0.00	-	0.18	0.18	-	12.18	12.36	-

Table 14-25 Construction Phase Ecological Impacts – South Forty Foot Drain LWS

Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/CL
NOx Annual Mean (µg.m^{-3})								
532622, 342882	0.01	0.0 %	0.1	0.11	0.4 %	23.95	24.06	80 %
NOx 24hr Mean (µg.m^{-3})								
532622, 342882	0.06	0 %	2.8	2.86	1.4 %	47.90	50.77	25 %
SO_2 Annual Mean (µg.m^{-3})								
532622, 342882	0.00	0.0 %	0.024	0.02	0.1 %	1.29	1.31	7 %

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Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/CL
Nutrient Nitrogen (kgN/ha/yr)								
532622, 342882	0.00	-	0.026	0.03	-	17.87	17.90	-

14.7.24 As shown in **Table 14-23** and **Table 14-24** the in-combination PCs of certain annual mean Critical Levels at the Havenside LNR and Slippery Gowt Sea Bank LWS were above 1 % and therefore effects cannot be considered to be insignificant. However, the total PECs were well below the Critical Levels. Further discussion on the significance of these effects is provided in **Chapter 12 Terrestrial Ecology**.

14.7.25 Nutrient nitrogen deposition at the Havenside LNR was less than 1 % of the appropriate Critical Load and therefore effects of nitrogen deposition can be considered to be **insignificant**.

14.7.26 Annual mean in-combination PCs were below 1 % of the Critical Levels at the South Forty Foot Drain and effects at this location are therefore **insignificant**.

14.7.27 Short-term NOx PCs were below 10 % of the Critical Level at all sites, and therefore short-term effects can be considered to be **insignificant**.

Impact 3: Potential Odour Impacts During Construction – Capital Dredging

14.7.28 Capital dredging would be required to dredge the berthing pocket and dredged material would be disposed of on land. The decomposition of organic matter under anaerobic conditions can lead to odorous emissions, primarily as a result of hydrogen sulphide (H_2S). A risk-based assessment was undertaken to determine the potential odour effects of the capital dredging works in accordance with IAQM guidance (IAQM, 2018).

14.7.29 The first step of the assessment requires an estimation of the odour-generating potential of the site activities, taking into account the magnitude of release, how inherently odorous the release is and the relative pleasantness/unpleasantness of the odour (hedonic tone).

14.7.30 The principal source of odour as a result of dredged sediments is the initial release of H_2S. H_2S has a relatively low detection threshold and is therefore relatively odorous. However, the effect would be limited in duration as, once the gas has been fully released and has dispersed, there would be limited potential for further odour. The capital dredge would, by its nature, be a one-off event rather than a continual long-term operation.

14.7.31 The hedonic tone of the odour relates to an individual's perception of whether the odour is pleasant or unpleasant; this can differ widely based on personal experience. H_2S is typically classed as having the odour of rotten eggs. The St Croix Sensory Inc. environmental odour descriptor wheel (St Croix Sensory Inc., 2003) groups a number of different odours into eight categories; 'rotten egg' odours are grouped within the 'offensive' category. Environment Agency odour guidance (Environment Agency, 2011) states that most processes fall into the category of 'moderately offensive'; the most offensive odours include processes involving decaying fish or animal remains, septic effluent or sludge, or biological landfill. The dredged material is not considered to fall into one of these 'most offensive' categories, and the odour is therefore considered to be 'moderately offensive'.

14.7.32 Given the above, although the potential for odours is short-lived and intermittent, the overall source odour potential is considered to be **medium** based on the potential offensiveness of the odour and its low detection threshold.

14.7.33 The second step of the assessment requires consideration of the effectiveness of the odour pathway. The closest receptors to the Facility were identified for the air quality assessment and are shown in **Figure 14.4**. The closest receptor is located to the west of the Application Site boundary; however, the odour source for the capital dredge would be at the wharf only, located further to the east. The closest receptors to the wharf are described in **Table 14-26**.

Table 14-26 Nearest Receptors to the Wharf

Receptor ID	Receptor Location	Type	Distance to Wharf	Direction from Wharf
R1	Haven Way	Residential	745 m	South-west
R2	Beeston Farm	Residential	200 m	West
R5	Powell Street	Residential	165 m	North-east
R10	Ivy House	Residential	690 m	South-west
R14	Marsh Lane	Residential	640 m	South-west

Receptor ID	Receptor Location	Type	Distance to Wharf	Direction from Wharf
R15	Slippery Gowt Lane	Residential	890 m	South-west
R16	River Way	Residential	168 m	North-east

14.7.34 As shown, the closest receptors are located to the north-east of the Facility and would therefore be downwind of the odour sources with regard to the prevailing wind. However, the receptors are not located immediately adjacent to the Application Site and some dispersion and dilution of odours would take place between source and receptor. All other receptors are situated upwind of the wharf and are located at a greater distance from the source. The odour pathway is therefore considered to be **moderately effective** at receptors R5 and R16 due to their proximity to the Application Site, and **ineffective** at all other receptors.

14.7.35 The source odour potential is then combined with the pathway effectiveness to determine the risk of odour effect, using the matrix provided in **Table 14-2**. The sensitivity of the receptor is then included to determine the likely odour effect at each receptor, as detailed in **Table 14-3**. This is summarised in **Table 14-27**.

Table 14-27 Summary of Likely Odour Effects at Receptors

Receptor ID	Source Odour Potential	Pathway Effectiveness	Odour Exposure	Receptor Sensitivity	Likely Odour Effect
R1 Haven Way (Residential, 745 m upwind)	Medium	Ineffective pathway	Negligible risk	High sensitivity	Negligible effect
R2 Beeston Farm (Residential, 200 m upwind)	Medium	Ineffective pathway	Negligible risk	High sensitivity	Negligible effect
R5 Powell Street (Residential, 165 m downwind)	Medium	Moderately effective pathway	Low risk	High sensitivity	Slight adverse effect
R10 Ivy House (Residential, 690 m upwind)	Medium	Ineffective pathway	Negligible risk	High sensitivity	Negligible effect
R14 Marsh Lane	Medium	Ineffective pathway	Negligible risk	High sensitivity	Negligible

Receptor ID	Source Odour Potential	Pathway Effectiveness	Odour Exposure	Receptor Sensitivity	Likely Odour Effect
(Residential, 640 m upwind)					effect
R15 Slippery Gowt Lane (Residential, 890 m upwind)	Medium	Ineffective pathway	Negligible risk	High sensitivity	Negligible effect
R16 River Way (Residential, 168 m downwind)	Medium	Moderately effective pathway	Low risk	High sensitivity	Slight adverse effect

14.7.36 The assessment identified that there would be a **negligible** effect of odour impact at all receptors with the exception of R5 and R16, which were found to have slight adverse effects. These **slight adverse** effects would be temporary in nature, occurring only in the construction phase during the capital dredge period. As such, the overall effect is considered to be **not significant**.

Potential Impacts during Operation – Air Quality

Impact 1: Potential Impacts During Operation - Stack, Vessel and Road Traffic Emissions

Human Receptors

14.7.37 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. 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 14-28** details the maximum predicted Facility contribution, and the maximum total pollutant concentrations, for each pollutant and averaging time; however, it should be noted that these do not necessarily occur at the same receptor, as depicted in the table. A full breakdown of the results by source is provided in **Appendix 14.3**.

14.7.38 Predicted concentrations of Group III metals were adjusted in accordance with Environment Agency guidance (Environment Agency, 2016), as discussed in **Appendix 14.2**.

14.7.39 The predicted PCs were added to the relevant background component as detailed in **Table 14-14** and **Table 14-15**, and the Biomass UK No. 3 Ltd PC values, to provide a Predicted Environmental Concentration (PEC) at each selected receptor location.

Table 14-28 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/ EAL (%)	PEC/ EAL (%)
NO_2	Annual mean	R35	3.89	R28	37.57	10 %	94 %
	99.79 percentile of 1 hour means	R35	27.03	R28	84.72	14 %	42 %
PM_{10}	Annual mean	R35	0.24	R37	21.52	1 %	54 %
	90.41 percentile of 24 hour means	R35	0.79	R37	42.83	2 %	86 %
$PM_{2.5}$	Annual mean	R35	0.24	R37	12.99	1 %	52 %
SO_2	99.73 percentile of 1 hour means	R35	19.09	R35	33.61	5 %	10 %
	99.18 percentile of 24 hour means	R10	9.62	R35	15.98	8 %	13 %
	99.9 percentile of 15 minute means	R35	21.04	R35	39.46	8 %	15 %
CO	8 hour running mean	R35	28.58	R3	548.12	0 %	5 %
	1 hour mean	R35	34.50	R3	558.12	0 %	2 %
NH_3	Annual mean	R35	0.46	R35	2.32	0 %	1 %

Pollutant	Averaging Time	Max PC Receptor	PC ($\mu g.m^{-3}$)	Max PEC Receptor	PEC ($\mu g.m^{-3}$)	PC/ EAL (%)	PEC/ EAL (%)
	1 hour mean	R35	6.90	R35	10.84	0 %	0 %
HCl	Annual mean*	R35	0.28	R35	0.48	1 %	2 %
	1 hour mean	R35	4.14	R35	7.75	1 %	1 %
HF	~~Annual mean~~Monthly average**	R35	0.05	R35	0.05	0 %	0 %
	1 hour mean	R35	0.69	R35	0.90	0 %	1 %
Hg	Annual mean	R35	0.001 ~~0.001~~	R35	0.002~~0.003~~	0%~~1 %~~	1%~~1 %~~
	1 hour mean	R35	0.01	R35	0.02	0 %	0 %
Cd	Annual mean	R35	0.001	R35	0.001	18 %	24 %
Tl***	Annual mean	R35	0.001	R35	0.001	0 %	0 %
	1 hour mean	R35	0.01	R35	0.02	0 %	0 %
As	Annual mean	R35	0.001~~0.001~~	R35	0.003~~0.003~~	19%~~11 %~~	57%~~50 %~~
Co	Annual mean	R35	0.0003~~0.0002~~	R35	0.0020~~0.0019~~	0%~~0 %~~	1%~~1 %~~
	1 hour mean	R35	0.21	R35	0.24	3 %	4 %
Cr(VI)	Annual mean	R35	0.000006~~0.000004~~	R35	0.000222~~0.000220~~	2%~~2 %~~	89%~~110 %~~
Cr(III)	Annual mean	R35	0.004~~0.003~~	R35	0.006~~0.005~~	0%~~0 %~~	0%~~0 %~~
	1 hour mean	R35	0.21	R35	0.21	0 %	0 %
Mn	Annual mean	R35	0.003 ~~0.002~~	R35	0.007~~0.006~~	2%~~1 %~~	5%~~4 %~~
	1 hour mean	R35	0.21	R35	0.24	0 %	0 %

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Pollutant	Averaging Time	Max PC Receptor	PC ($\mu g.m^{-3}$)	Max PEC Receptor	PEC ($\mu g.m^{-3}$)	PC/ EAL (%)	PEC/ EAL (%)
Ni	Annual mean	R35	0.002~~0.002~~	R35	0.005~~0.004~~	12%~~8 %~~	24%~~20 %~~
Pb	Annual mean	R35	0.002~~0.001~~	R35	0.008~~0.007~~	1%~~1 %~~	3%~~3 %~~
Sb***	Annual mean	R35	0.0005~~0.0003~~	R35	0.0022~~0.0020~~	0%~~0 %~~	0%~~0 %~~
	1 hour mean	R35	0.21	R35	0.24	0 %	0 %
Cu	Annual mean	R35	0.0013 ~~0.0008~~	R35	0.0052~~0.0047~~	0%~~0 %~~	0%~~0 %~~
	1 hour mean	R35	0.21	R35	0.24	0 %	0 %
V	Annual mean	R35	0.0003 ~~0.0002~~	R35	0.0029~~0.0028~~	0%~~0 %~~	0%~~0 %~~
	1 hour mean	R35	0.21	R35	0.23	21 %	23 %
TOC (as benzene)	Annual mean	R35	0.46	R35	0.95	9 %	19 %
	24-hour mean	R10	4.80	R10	5.67	16%	19%
PCDD/F***	Annual mean	R35	0.0037*****	R35	0.033*****	-	-

* No Biomass UK No. 3 Ltd long-term concentration reported
** The long-term EAL for HF is a monthly mean; however monthly averaging periods cannot be run in the ADMS 5 model. Therefore, the annual average PC has been used in the assessment as the monthly average PC
*** No background data available
**** No EAL
***** $pg.m^{-3}$

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

- Five years of meteorological data (2015 – 2019) were considered in both the stack and vessel emissions assessment and the highest predicted concentrations for the five year dataset is reported for each receptor.
- All pollutant releases, with the exception of Group III metals, were modelled at the relevant BAT-AELs, the maximum concentration which cannot be exceeded under the Environmental 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 upper value in the BAT-AEL ranges were used in the assessment.

14.7.41 As detailed in **Table 14-28**, the maximum predicted concentrations at human receptors were below the relevant Objectives or EALs for all pollutants considered in the assessment., with the exception of chromium VI which was predicted to be in exceedance of the EAL due to an elevated background concentration. The contribution of the Facility to the annual mean was predicted to be, at worst, 2 % of the EAL.

14.7.42 The highest predicted PCs were predominantly experienced at receptor R35; this receptor is located immediately downwind of the Facility stacks.

14.7.43 IAQM and EPUK guidance (IAQM and EPUK, 2017) provides impact descriptors which take into account the predicted change in concentration at a receptor, and the total concentration in relation to the Objective (see **Table 14-6**). An overview of the number of receptors within each impact descriptor category is provided in **Table 14-29**. The full results are presented in **Appendix 14.3**. Contour plots are provided in **Figures 14.6 - 14.15**. Note that impact descriptors are only provided for pollutants with annual mean averaging times, as IAQM and EPUK guidance notes that the impact matrix is not intended for short-term averaging periods (IAQM and EPUK, 2017).

Table 14-29 Operational Phase Impact Descriptors

Pollutant and Averaging Period	Receptor Count for each Impact Descriptor			
	Negligible	Slight	Moderate	Substantial
Operational Phase (2025)				
NO_2 Annual Mean	34	5	0	0
PM_{10} Annual Mean	39	0	0	0
$PM_{2.5}$ Annual Mean	39	0	0	0
NH_3 Annual Mean	39	0	0	0
HCl Annual Mean	39	0	0	0
HF Annual Mean	39	0	0	0
Hg Annual Mean	39	0	0	0
Cd Annual Mean	32	3	4	0
Tl Annual Mean	39	0	0	0
As Annual Mean	3234	24	51	0
Co Annual Mean	39	0	0	0

Pollutant and Averaging Period	Receptor Count for each Impact Descriptor			
	Negligible	Slight	Moderate	Substantial
Operational Phase (2025)				
Cr(III) Annual Mean	39	0	0	0
Cr(VI) Annual Mean	35~~30~~	4~~0~~	0~~6~~	0~~3~~
Mn Annual Mean	39	0	0	0
Ni Annual Mean	33~~36~~	4~~3~~	2~~0~~	0
Pb Annual Mean	39	0	0	0
Sb Annual Mean	39	0	0	0
Cu Annual Mean	39	0	0	0
V Annual Mean	39	0	0	0
TOC (as Benzene) Annual Mean	35	4	0	0

14.7.44 **Slight adverse** effects were predicted at five receptors for annual mean NO_2 concentrations. All of these receptors are located outside of the Boston AQMAs and were predicted to experience these effects due to the process contribution from the Facility which was, at worst, 9.7 % of the annual mean Objective. However, the total PEC at each of these receptors is 'well below' the annual mean NO_2 Objective (including the contribution from the Biomass UK No. 3 Ltd facility) as these receptors are not located in the vicinity of any other significant pollution sources or major roads. The highest PEC at a receptor experiencing a **slight adverse** effect for NO_2 was 13.8 $\mu g.m^{-3}$; as such, there is no risk of the Objective being exceeded.

14.7.45 **Slight** and **moderate adverse** effects were also experienced for concentrations of cadmium, nickel, arsenic, chromium VI and TOC. Cadmium was modelled at the Group I BAT-AEL which is considered to be conservative. It was also assumed that all TOC was benzene, which is a conservative assumption as other organic species will form a proportion of TOC. The total concentrations of these pollutants were 'well below' (less than 75 % of) the respective EALs. The chromium VI background concentration is more elevated; however, total PEC values were, at worst, 89% of the EAL. These effects are therefore considered to be ~~**insignificant**~~**not significant**.

14.7.46 The contributions of nickel and arsenic in the total Group III BAT-AEL were determined using the maximum percentages detailed within Environment Agency guidance (Environment Agency, 2016), which is based on measured values from 18 municipal waste incinerators and waste wood co-incinerators. Some elevated PCs were experienced at receptors immediately downwind of the Facility; however, the total PECs were 'well below' (less than 75 % of) the relevant EALs and therefore these effects are not considered to be significant. The Environment

Agency guidance was also applied to chromium VI contributions. The PC at receptors was, at worst, 2% of the EAL; however, there is a higher background concentration of chromium VI and therefore the total PEC was 89% of the EAL. Given that the EAL was not exceeded and the PC from the Facility is low, these effects are also ~~not~~ considered to be **not significant.**

~~14.7.47 Effects of chromium VI ranged from **negligible** to **substantial adverse**. As the chromium VI background concentration is in exceedance of the EAL, **substantial** and **moderate adverse** effects were experienced at receptor locations where the PC was marginally above 1 % of the EAL, and therefore could not be considered to be insignificant. The contributions of chromium VI in the total Group III BAT-AEL were also determined using the maximum percentages detailed within Environment Agency guidance (Environment Agency, 2016). The guidance also provides the mean and minimum values; application of these results in a maximum PC of 0.7 % and 0.03 % of the ELV respectively. The background of chromium VI was obtained from a rural monitoring station and was assumed to be 20 % of the total chromium background, as recommended by the Environment Agency. The annual average was derived from monthly data; some months reported that concentrations were less than a certain value. For the purposes of deriving an annual mean, it was assumed that monitored concentrations were at the reported value, which is likely to be conservative. Monitored chromium VI backgrounds, using the maximum reported monthly average, were above the EAL in 2015, 2016, 2017 and 2019. Only 2018 reported annual mean chromium VI concentrations below the EAL (95 %). Effects at the majority of receptors were predicted to be **negligible**.~~

~~14.7.48~~14.7.47 Given that the annual mean Objectives or EALs were not exceeded at any receptor ~~(with the exception of chromium VI which is already in exceedance of the EAL due to elevated background concentrations)~~, the overall significance of effects during the operational phase was determined to be **minor adverse**.

~~14.7.49~~14.7.48 As short-term PECs did not exceed the relevant short-term air quality Objectives or EALs, it is concluded that these effects are insignificant.

Designated Ecological Sites

~~14.7.50~~14.7.49 Impacts on The Wash SAC, SPA, SSSI and Ramsar site as a result of the operation of the Facility are presented in **Table 14-30**.

Table 14-30 Operational Phase Ecological Impacts – The Wash

Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/ CL
NOx Annual Mean (µg.m^{-3})								
535960, 339958	0.78	2.6 %	0.059	0.84	2.8 %	7.94	8.78	29 %
NOx 24hr Mean (µg.m^{-3})								
535985, 339806	11.85	6 %	1	12.85	6.4 %	15.88	28.73	14 %
SO_2 Annual Mean (µg.m^{-3})								
535960, 339958	0.19	1.0 %	0.015	0.21	1.0 %	0.88	1.09	5 %
NH_3 Annual Mean (µg.m^{-3})								
535960, 339958	0.06	2.1 %	0.0015	0.07	2.2 %	0.85	0.92	31 %
HF 24hr Mean (µg.m^{-3})								
535985, 339806	0.10	2.0 %	0.0065	0.10	2.1 %	0.0000025	0.10	2 %
HF Weekly Mean (µg.m^{-3})								
535985, 339806	0.01	2.3 %	0.00076	0.01	2.4 %	0.0000025	0.01	2 %
Nutrient Nitrogen (kgN/ha/yr)								
535960, 339958	0.41	2.05 %	0.016	0.43	2.13 %	12.18	12.61	63 %

~~14.7.51~~14.7.50 As shown in **Table 14-30**, in-combination contributions of all pollutants were above 1 % of the relevant annual mean Critical Levels or Loads; as such, effects cannot be considered to be insignificant. Including the contribution of background pollutant concentrations and nitrogen deposition, the Critical Levels and Loads were not exceeded for any modelled parameter.

~~14.7.52~~14.7.51 Short-term PCs were below 10 % of the respective Critical Levels; as such, short-term effects can be considered to be insignificant.

~~14.7.53~~14.7.52 A discussion on the significance of the predicted in-combination impacts is provided in **Chapter 17 Marine and Coastal Ecology**.

~~14.7.54~~14.7.53 Effects on locally designated ecological sites and the habitat mitigation area as a result of the Facility's operation are presented in **Table 14-31** to **Table 14-34**. As noted in the **Critical Load Section** of **Section 14.4**, APIS does not provide representative Critical Loads for habitat types within the Slippery Gowt Sea Bank and South Forty Foot Drain LWSs. As such, the impact of nutrient nitrogen deposition was quantified but was not compared with a Critical Load. Total PEC concentrations of NOx and nutrient nitrogen at the South Forty Foot Drain include the modelled road traffic contribution from the A16.

Table 14-31 Operational Phase Ecological Impacts – Havenside LNR

Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/CL
NOx Annual Mean (µg.m-3)								
534294, 342378	5.21	17.4 %	1.76*	6.97	23.2 %	12.26	19.23	64 %
NOx 24hr Mean (µg.m-3)								
534243, 342428	56.92	28 %	5.6	62.52	31.3 %	24.52	87.04	44 %
SO_2 Annual Mean (µg.m-3)								
534294, 342378	1.29	6.5 %	0.17	1.46	7.3 %	1.29	2.75	14 %
NH_3 Annual Mean (µg.m-3)								
534294, 342378	0.43	14.3 %	0.017	0.45	14.9 %	1.84	2.29	76 %
HF 24hr Mean (µg.m-3)								
534243, 342428	0.47	9.5 %	0.035	0.51	10.2 %	0.0000025	0.51	10 %
HF Weekly Mean (µg.m-3)								
534243, 342428	0.10	19.5 %	0.0072	0.10	20.9 %	0.0000025	0.10	21 %
Nutrient Nitrogen (kgN/ha/yr)								
534294, 342378	2.76	13.8 %	0.18	2.94	14.7 %	17.22	20.16	101 %
*Also includes the contribution from the gas-fired peaking power plant at Lealand Way								

Table 14-32 Operational Phase Ecological Impacts – Slippery Gowt Sea Bank LWS

Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/CL
NOx Annual Mean (µg.m-3)								
534547, 341773	2.63	8.8 %	0.66	3.29	11.0 %	10.54	13.82	46 %
NOx 24hr Mean (µg.m-3)								
534395, 341874	28.41	14 %	5.6	34.01	17.0 %	21.07	55.08	28 %
SO_2 Annual Mean (µg.m-3)								
534547, 341773	0.65	3.3 %	0.17	0.82	4.1 %	0.88	1.70	9 %
NH_3 Annual Mean (µg.m-3)								
534547, 341773	0.22	7.2 %	0.017	0.23	7.8 %	0.85	1.08	36 %

Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/CL
HF 24hr Mean (µg.m^{-3})								
534395, 341874	0.24	4.7 %	0.035	0.27	5.4 %	0.0000025	0.27	5 %
HF Weekly Mean (µg.m^{-3})								
534395, 341874	0.05	9.7 %	0.0072	0.06	11.2 %	0.0000025	0.06	11 %
Nutrient Nitrogen (kgN/ha/yr)								
534547, 341773	1.39	-	0.18	1.57	-	12.18	13.75	-

Table 14-33 Operational Phase Ecological Impacts – South Forty Foot Drain LWS

Grid Ref of Max Impact Location	Project Alone		In-Combination					
	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/CL
NOx Annual Mean (µg.m^{-3})								
532622, 342882	0.67	2.2 %	0.1	0.77	2.6 %	19.17	25.63	85 %
NOx 24hr Mean (µg.m^{-3})								
532571, 342882	14.69	7 %	2.8	17.49	8.7 %	38.34	67.20	34 %
SO_2 Annual Mean (µg.m^{-3})								
532622, 342882	0.17	0.8 %	0.024	0.19	0.9 %	1.29	1.48	7 %
NH_3 Annual Mean (µg.m^{-3})								
532622, 342882	0.05	1.8 %	0.0024	0.06	1.9 %	1.84	1.90	63 %
HF 24hr Mean (µg.m^{-3})								
532571, 342882	0.12	2.4 %	0.015	0.14	2.7 %	0.0000025	0.14	3 %
HF Weekly Mean (µg.m^{-3})								
532571, 342882	0.01	2.6 %	0.0016	0.01	2.9 %	0.0000025	0.01	3 %
Nutrient Nitrogen (kgN/ha/yr)								
532622, 342882	0.35	-	0.026	0.38	-	17.66	18.49	-

Table 14-34 Operational Phase Ecological Impacts - Habitat Mitigation Area

	Project Alone	In-Combination

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Grid Ref of Max Impact Location	PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/ CL
NOx Annual Mean (µg.m^{-3})								
534547, 341773	2.63	8.78%	0.66	3.29	10.98%	10.5	13.8	46%
NOx 24hr Mean (µg.m^{-3})								
534446, 341874	26.8	13.4%	5.6	32.4	16.2%	21.1	53.5	27%
SO_2 Annual Mean (µg.m^{-3})								
534547, 341773	0.653	3.27%	0.17	0.82	4.12%	0.88	1.70	11%
NH_3 Annual Mean (µg.m^{-3})								
534547, 341773	0.217	7.24%	0.017	0.23	7.81%	1.84	2.07	69%
HF 24hr Mean (µg.m^{-3})								
534547, 341773	0.098	1.96%	0.035	0.133	2.66%	0.0000025	0.13	3%
HF Weekly Mean (µg.m^{-3})								
534446, 341874	0.047	9.39%	0.0072	0.054	10.8%	0.0000025	0.05	11%
Nutrient Nitrogen (kgN/ha/yr)								
534547, 341773	1.39	6.97%	0.180	1.575	7.87%	17.2	18.8	94%

~~14.7.55~~14.7.54 As shown in **Table 14-31** to **Table 14-34** the Facility alone and in-combination PCs were above 1 % and 10 % of the respective Critical Levels for most pollutants; as such, effects cannot be considered to be insignificant. However, the total PECs did not exceed the Critical Level for any pollutant. Further discussion on the significance of these effects is provided in **Chapter 12 Terrestrial Ecology**.

14.7.55 Effects of nutrient nitrogen deposition were compared to the Critical Load for saltmarsh at the Havenside LNR. Given the LNRs location immediately downwind of the Facility, the predicted effect was greater than 1 % of the Critical Load for the alone and in-combination. The total PEC was predicted to be marginally above the most stringent of the Critical Load range (20 – 30 kgN/ha/yr). The significance of these effects are discussed in **Chapter 12 Terrestrial Ecology**.

14.7.56 Additional areas of saltmarsh to the north of the ~~f~~Facility on both banks of The Haven were also considered in this assessment. The results of the modelling are included below in **Table 14-35**. The pollutant concentrations and deposition are expressed as a range across 29 receptor points in these saltmarsh areas, which are demarcated on **Figure 14.9**.

Table 14-35 Operational Phase Ecological Impacts - Additional Saltmarsh Area

Project Alone		In-Combination					
PC	PC/CL	Biomass UK No. 3 Ltd PC	In-Combination PC	% CL	BG	PEC	PEC/ CL
NOx Annual Mean (µg.m⁻³)							
0.16-2.34	0.5-7.8%	0.66	0.81-3.00	2.7-9.9%	12.3-14.8	13.1-16.8	43.6-53.1%
NOx 24hr Mean (µg.m⁻³)							
4.4-39.5	2.2-19.7%	5.6	10.0-45.1	5.0-22.5%	24.5-29.6	34.5-71.9	17.5-35.9%
SO_2 Annual Mean (µg.m⁻³)							
0.03-0.57	0.1-2.8%	0.17	0.20-0.74	1.0-3.7%	1.88	1.27-2.47	7.6-11.6%
NH_3 Annual Mean (µg.m⁻³)							
0.01-0.18	0.3-5.9%	0.017	0.03-0.19	0.9-6.5%	1.84	1.9-2.0	62.2-67.8%
HF 24hr Mean (µg.m⁻³)							
0.01-0.08	0.1-1.64%	0.04	0.04-0.12	0.8-2.3%	-	0.04-0.12	0.8-2.3%
HF Weekly Mean (µg.m⁻³)							
0.01-0.07	1.5-13.8%	0.01	0.02-0.08	3.0-15.2%	-	0.02-0.08	3.0-15.2%
Nutrient Nitrogen (kgN/ha/yr)							
0.07-1.2	0.4-5.8%	0.18	0.25-1.33	1.3-6.7%	17.22	17.5-18.6	87.3-92.8%

~~14.7.56~~14.7.57 The results in the above Table show that, for the range of saltmarsh receptors, the PCs were above 1% and 10% of the Critical Levels and Loads, the PECs were within the Critical Levels and lower range of the Critical Load for deposited nitrogen.

Impact 2: Potential Impacts During Operation – Odour

~~14.7.57~~14.7.58 There is the potential for the Facility to generate odour during its operation, primarily due to handling and processing of RDF. Maintenance dredging will be undertaken during the operational phase which may be a source of odour; however, this activity is already undertaken within The Haven and it is considered unlikely that significant decomposition of organic material would occur between each maintenance dredging cycle which would give rise to significant odour effects. As such, operational phase odour effects from dredging have not been considered further. A risk-based assessment was undertaken to determine the potential odour effects of RDF processing in accordance with IAQM guidance (IAQM, 2018).

~~14.7.58~~14.7.59 The first step of the assessment requires an estimation of the odour-generating potential of the site activities, taking into account the magnitude of release, how inherently odorous the release is and the relative pleasantness/unpleasantness of the odour (hedonic tone).

~~14.7.59~~14.7.60 The Facility will employ a number of measures to ensure that the magnitude of any odour releases is minimal. These are as follows:

- Baled RDF will be unloaded from vessels directly onto conveyors for transfer to the shredding building. These conveyors would be open at the wharf to facilitate loading but are covered thereafter.
- Air from inside the shredding building and the RDF storage bunker will be continually extracted and fed to the thermal treatment process for use as combustion air with a sufficient residence time to destroy odours. Whilst each EfW line undergoes routine maintenance, the remaining two will continue to be operational and therefore the odorous air would continue to be combusted.
- The building will require maintenance access and will therefore be fitted with fast-acting roller shutter doors to minimise the time in which odours could be released.
- The RDF bunker will include a partition so that one side can be completely emptied; this will prevent build-up of odorous materials.
- A temporary RDF storage area will be provided on the wharf to enable storage of bales when the bunker reaches full capacity. The area would accommodate two days of feedstock (approximately 6,500 tonnes) and bales would be stored for a maximum of five days before being delivered to the shredding building. The bales will be tightly wrapped in plastic to prevent any odours.
- Should any bales become damaged whilst in storage or during unloading from vessels, the bales would be transferred to a covered damaged bale storage area and rebaled prior to reinstatement in the storage area. As such, any odorous releases would be limited in magnitude and duration.

~~14.7.60~~14.7.61 The RDF would, by its nature, be made up of many different items and so no single compound's odour detection threshold could be applied to the odour. Any odour releases are not anticipated to be significantly odorous; the primary mechanism by which odour may be released would be very short-term in nature, arising only from the shredding and RDF storage building when the door is briefly opened for maintenance access or from damage to individual bales.

~~14.7.61~~14.7.62 The St Croix Sensory Inc. environmental odour descriptor wheel (St Croix Sensory Inc., 2003) classifies the hedonic tone of 'garbage' odours within the 'offensive' category. Environment Agency odour guidance (Environment Agency, 2011) states that most processes fall into the category of 'moderately offensive'; the most offensive odours include processes involving decaying fish or animal remains, septic effluent or sludge or biological landfill. The RDF would be received and processed within the thermal treatment facility within three months of first being baled and wrapped and therefore odours are not considered to be comparable to landfill odours.

~~14.7.62~~14.7.63 Given the above, the overall source odour potential is considered to be **small** due to the employment of odour management methods.

~~14.7.63~~14.7.64 The second step of the assessment requires consideration of the effectiveness of the odour pathway. The closest receptors to the Facility were identified for the air quality assessment and are shown in **Figure 14.4** and described in **Table 14-36**.

Table 14-36~~14-34~~ Nearest Receptors to the Facility

Receptor ID	Receptor Location	Type	Distance to Site Boundary	Direction from Site
R1	Haven Way	Residential	232 m	South-west
R2	Beeston Farm	Residential	21 m	North
R5	Powell Street	Residential	117 m	East
R10	Ivy House	Residential	230 m	South
R14	Marsh Lane	Residential	157 m	West
R15	Slippery Gowt Lane	Residential	410 m	South-west
R16	River Way	Residential	115 m	North-east

~~14.7.64~~14.7.65 As shown, the closest receptor is located to the north of the Facility and is therefore not located downwind of the odour sources with regard to the prevailing wind, although short-term odours may still be experienced at this location. Receptors located downwind of the RDF storage area (R5 and R16) are not located immediately adjacent to the Application Site and some dispersion and dilution of odours would take place between source and receptor. The odour pathway is therefore considered to be **moderately effective** at receptor R2 due to its proximity to the Application Site, and at R5 and R16 due to their location downwind of the source, and **ineffective** at all other receptors.

~~14.7.65~~14.7.66 The source odour potential is then combined with the pathway effectiveness to determine the risk of odour effect, using the matrix provided in **Table 14-2**. The sensitivity of the receptor is then included to determine the likely odour effect at each receptor, as detailed in **Table 14-3**. This is summarised in **Table 14-37**.

Table 14-37~~14-35~~ Summary of Likely Odour Effects at Receptors

Receptor ID	Source Odour Potential	Pathway Effectiveness	Odour Exposure	Receptor Sensitivity	Likely Odour Effect
R1 Haven Way (Residential, 232 m upwind)	Small	Ineffective pathway	Negligible risk	High sensitivity	Negligible effect
R2 Beeston Farm (Residential, 21 m upwind)	Small	Moderately effective pathway	Negligible risk	High sensitivity	Negligible effect
R5 Powell Street (Residential, 117 m downwind)	Small	Moderately effective pathway	Negligible risk	High sensitivity	Negligible effect
R10 Ivy House (Residential, 230 m upwind)	Small	Ineffective pathway	Negligible risk	High sensitivity	Negligible effect
R14 Marsh Lane (Residential, 157 m upwind)	Small	Ineffective pathway	Negligible risk	High sensitivity	Negligible effect
R15 Slippery Gowt Lane (Residential, 410 m upwind)	Small	Ineffective pathway	Negligible risk	High sensitivity	Negligible effect
R16 River Way (Residential, 115 m downwind)	Small	Moderately effective pathway	Negligible risk	High sensitivity	Negligible effect

~~14.7.66~~14.7.67 The assessment identified that there would be a negligible effect of odour effect at all receptors. As such, the overall effect is considered to be **not significant**.

Impact 3: Potential Impacts During Operation – Visible Plumes

14.7.68 Plume visibilities for the EfW and LWA stacks were assessed for five years of observed meteorological data. All meteorological files include the relative humidity and temperature required for plume visibility calculation. The total number of visible plumes during daylight hours are shown in **Table 14-38**.

Table 14-38 Forecast Occurrence of Visible Plumes during Daylight Hours

Parameter	Met. Year	EfW Stack x 3 (h)	1 LWA 1 (h)	LWA 2 (h)
Modelled water-condensed plume (hours per year)	2015	549	1,763	1,199
	2016	665	2,034	1,447
	2017	619	1,791	1,216
	2018	755	1,795	1,421
	2019	609	1,941	1,413
Frequency of water-condensed plumes (% of the day light hours per year)	2015	10.8%	34.7%	23.6%
	2016	13.1%	40.0%	28.5%
	2017	12.2%	35.2%	23.9%
	2018	14.9%	35.3%	28.0%
	2019	12.0%	38.2%	27.8%

14.7.69 Of the assessed stack sources, the EfW stacks are predicted to have the lowest frequency of forming plumes, with a maximum frequency of 14.9% of all daylight hours predicted for 2018. The LWA 1 stack has the highest frequency of plumes at 40% of all daylight hours predicted for 2016.

14.7.70 A plume with condensed water is visible during daytime without fog or lower cloud. The extension of visible plumes beyond the site boundary is an important factor in determining impact significance, as detailed in **Appendix 14.2 – Dispersion Modelling Methodology**. The distances to the site boundary for this assessment are 77 m for stacks LWA 1 and LWA 2 and 96 m for the EfW stacks.

14.7.71 **Table 14-39** shows the total number of plumes which exceed the site boundary during daylight hours for all stacks, and **Table 14-40** shows the plume lengths during daylight hours.

Table 14-39 Visible Plumes Daylight Site Boundary Exceedances

Meteorological Parameters		Stacks					
		EfW	LWA 1	LWA 2	EfW	LWA1	LWA2
Year	Total hours	Daylight boundary exceedances			% Of total daylight hours		
2015	5,084	85	525	262	1.67	10.3	5.15
2016	5,085	175	798	431	3.44	15.7	8.48
2017	5,106	123	576	286	2.41	11.3	5.60
2018	5,006	161	703	403	3.22	14.0	8.05
2019	5,048	126	817	385	2.50	16.2	7.63

Table 14-40 Formed Plume Lengths for each Stack During Daylight Hours

Met. Year	Stack								
	EFW			LWA 1			LWA 2		
	Max Length (m)	Min Length (m)	Average Length (m)	Max Length (m)	Min Length (m)	Average Length (m)	Max Length (m)	Min Length (m)	Average Length (m)
2015	282	0.73	57	526	0.21	67	359	0.12	51

2016	403	0.96	72	570	0.19	84	412	0.13	63
2017	385	0.77	61	571	0.21	69	348	0.14	53
2018	457	1.26	69	732	0.18	87	460	0.17	61
2019	508	0.53	67	793	0.16	87	486	0.14	60

14.7.72 The highest percentage of visible plumes generated by the EfW stacks that exceed the site boundary (more than 96 m visible plume length) is 3.22%, less than 5% of daylight hours. Therefore, although there are potentially sensitive local receptors in the vicinity, the impact from visible plumes on the local amenity is described as low magnitude in accordance with. The significance criteria are derived from Horizontal Guidance Note IPPC H1 'Environmental Assessment and Appraisal of BAT' SEPA Amenity Risk Assessment criteria. The significance criteria for visible plume emissions are summarised in **Table A14.2-11** of **Appendix 14.2**. As shown in **Table 14-40**, tThe maximum length of plumes from the EfW stacks are predicted to be 508 m. As the nearest receptors are 390 m from the stack, visible plumes from the EfW stacks could result in visual effects at residential properties for a limited number of hours per year.

14.7.73 The highest percentage of visible plumes generated by LWA 1 and LWA 2 that exceed the site boundary (more than 77 m visible plume length) are 16.2% and 8.48% respectively, greater than 5% of daylight hours. The impact from visible plumes on the local amenity is described as medium magnitude. The significance criteria for a classification of medium magnitude of visible plume emissions is summarised in **Table A14.2-11** of **Appendix 14.2**. The maximum length plumes from the LWA1 and LWA2 stacks are predicted to be 793 m and 486 m respectively. As the nearest receptors are 390 m from the stacks, visible plumes from the LWA stacks could result in visual effects at residential properties for a limited number of hours per year.

14.7.74 The amenity risk assessment indicates that the EfW stacks are described as having a low significance impact on the local amenity, and the LWA Stacks are described as having a medium significance impact. It should also be noted that these figures are considered to be conservativea reasonable worst-case as plumes would be most noticeable against clear blue skies and less noticeable as cloud cover increases. As such, during daytime periods with a dense cloud cover, the plume would be less noticeable and visual effects would be greatly reduced. Scottish Environmental Protection Agency (SEPA) H1 guidance (SEPA, 2003) states "Conditions that result in medium or lower impacts can be considered

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acceptable"; as such, no mitigation measures are required and impacts are **not significant**.

Impact 4: Potential Impacts During Operation – Human Health Risk Assessment

14.7.75 The possible impacts on human health arising from dioxins and furans (PCDD/F) and dioxin-like PCBs and trace metals emitted from the Facility have been assessed under the worst-case scenario, namely that of an individual exposed for a lifetime to the effects of the highest airborne concentrations and consuming mostly locally grown food. This equates to a hypothetical farmer consuming food grown on the farm, situated at the closest proximity to the F~~f~~acility. Where there are no active farming areas in close proximity, a residential receptor is considered where it is assumed that the resident consumes locally grown vegetables.

14.7.76 The assessment has identified and considered the most plausible pathways of exposure for the individuals considered (farmer and resident). Deposition and subsequent uptake of the compounds of potential concern (COPCs) into the food chain is likely to be the more numerically significant pathway over direct inhalation. The assessment also considered the cumulative impact with the adjacent Biomass UK No. 3 Ltd facility. This considered the additional contribution from the Biomass plant at the receptors identified for the Facility. The full assessment methodology and results are presented in **Appendix 14.5** (document reference 9.9).

14.7.77 For PCDD/Fs and dioxin-like PCBs, the maximum contribution of the ~~f~~Facility to the Committee on Toxicity (COT) Tolerable Daily Intake (TDI) is 15.1% for the farmer receptors and 1.5% for the residential receptors. For the farmer this assumes as a worst-case that these receptors are located at the closest farming area to the ~~f~~Facility and all of their food is reared and grown at this location and represents an extreme worst-case. Combined with the background intake of PCDD/Fs and dioxin-like PCBs (i.e. from other sources), the total intake (BAEF plus background) is well below the COT TDI. Therefore, the impact of PCCD/F emissions on local sensitive receptors is considered to be **not significant**.

14.7.78 For trace metals, predicted intakes vary between 0.0% and 153% of the lower background intake and 0.0% and 15.7% of the upper background intake for the worst-case farmer receptor. For the worst-case resident, predicted intakes vary between 0.0% and 7.9% of the lower background intake and 0.0% and 0.8% of the upper background intake. The predicted intakes for child receptors are lower than for adult receptors. Highest intakes are predicted for thallium for farmer receptors. However, the predicted intakes represent worst-case conditions with the farmer receptor located at the point of maximum impact and consuming entirely home grown and home reared foods. Furthermore, predicted intakes are for worst-case emissions for thallium which are assumed to be 50% of the Group 1 limit of 0.02 mg Nm-3. Actual emissions are likely to be substantially less than this as published in the 2020 annual report on UK Energy from Waste Statistics provided by Tolvik Consulting. Therefore, taking into consideration the conservative assumptions adopted, the impact of trace metal emissions on local sensitive receptors is considered to be **not significant**.

14.7.79 The cumulative effect of emissions from the Facility and Biomass UK No. 3 Ltd showed that, at the Farmer North receptors, the combined impacts are around 14% higher compared to the ~~FacilityBAEF alone~~Facility alone, and total intakes (combined facility plus background) are well below the COT TDI. For trace metals, predicted combined intakes are between 10% and 26% higher than for the Facility alone.

14.7.80 The risk assessment methodology used in this assessment has been structured so as to create worst case estimates of risk. A number of features in the methodology give rise to this degree of conservatism. Taking into account the conservative nature of the assessment, it has been demonstrated that for the maximally exposed individual, exposure to dioxins, furans and dioxin-like PCBs and trace metals is **not significant**.

Impact 5: Potential Impacts During Operation – Abnormal Emissions

14.7.81 An impact assessment of abnormal operating conditions of the EfW lines and LWA lines was undertaken and is presented in **Appendix 14.6**. The predicted impact on air quality associated with the identified predicted abnormal emissions was calculated by increasing pro-rata the process contribution (PC) associated with normal operations by the ratio between the normal and predicted abnormal emission limit values. This is considered a highly conservative assessment, as it assumes that the predicted abnormal emissions coincide with the worst-case meteorological conditions, over a five year period, at a worst-case receptor. It was also conservatively considered that all three lines of the EfW or both lines of the LWA plant would operate under abnormal conditions at the same time, which is unlikely to ever occur.

14.7.82 No exceedances of any of the short- or long-term air quality Objectives or Environmental Assessment Levels (EALs) were predicted during abnormal operating conditions of the EfW or LWA lines. The full methodology and tabulated results are contained in **Appendix 14.6** (document reference 9.10).

14.7.83 The maximum predicted short term PC as a percentage of the Objective/EAL is

79% (vanadium) and the maximum predicted long term PC as a percentage of the Objective/EAL is 25% (cadmium). The maximum predicted short term PEC (see Appendix A of **Appendix 14.6**)) as a percentage of the Objective/EAL is 81% (vanadium) and the maximum predicted long term PEC as a percentage of the Objective/EAL is 89% (chromium VI, note 87% of this is the 'total background concentration' and the abnormal emission PC contributes to only 2% of the EAL).

14.7.84 It is concluded that under abnormal operating conditions, all air quality impacts are considered to be **not significant**.

Potential Impacts during Decommissioning

~~14.7.67~~14.7.85 The decommissioning of the Facility would form part of an overall Decommissioning Plan for the site. Air quality effects 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 Dust Emissions

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 an Air Quality and Dust Management Plan (AQDMP) 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 AQDMP will ensure that any potential dust releases associated with the construction phase will be reduced. The AQDMP will be included within the Code of Construction Practice (CoCP) before construction can begin. An OCoCP (document reference 7.1) is provided with this DCO application.

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 AQDMP approved by BBC, which may include measures to control other emissions.
- 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 AQDMP, 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 Traffic Management Plan (CTMP) 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.

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 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 on-site 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.

Construction Phase Road Traffic Emissions

14.8.7 A **moderate adverse** effect was predicted at a receptor within the Haven Bridge AQMA as a result of construction traffic emissions; whilst the project-related impact was relatively small in magnitude, due to the elevated pollutant concentrations in this area the impact is classified as a greater magnitude.

14.8.8 A commitment will be included within the CTMP which will require all construction vehicles to comply with the Euro VI emission standard where practicable (it is noted that some specialist vehicles may not be able to comply with this requirement). Project-related emissions would therefore be minimised insofar as is possible.

Operational Phase

14.8.9 The Facility was not predicted to lead to any significant effects during its operation which would require mitigation measures. As the Facility would be required to operate under the conditions of its Environmental Permit, this is considered to be an adequate mechanism to ensure that significant impacts are not experienced.

14.8.10 Any mitigation measures relating to the predicted impacts on designated ecological sites are discussed in **Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**.

14.9 Cumulative Impacts

14.9.1 An assessment was undertaken to determine the potential for cumulative air quality impacts with other projects. A list of cumulative projects was provided by BBC for consideration in the ES which comprises major applications; this list was combined with the projects already identified at Preliminary Environmental Information Report (PEIR) stage. The total list of cumulative projects which required consideration is provided in **Appendix 6.1** (document reference 6.4.2).

14.9.2 The construction and operational air quality assessments undertaken for the Facility were inherently cumulative in regard to the following:

- Road traffic generated by all identified cumulative projects is included within the 2021 and 2025 baseline traffic flows used in the construction and operational phase assessments respectively;
- The contribution of the Biomass UK No. 3 Ltd project, located adjacent to the Application Site, was included for all pollutants at both human and ecological receptors considered in the assessment; and
- As ecological impacts must be considered 'in-combination', the contribution of annual mean NO_x concentrations from a consented gas-fired peaking power facility on Lealand Way to the nearest designated ecological site (the Havenside LNR) was included in the assessment.

14.9.3 The remaining considerations for the cumulative impact assessment with regard to air quality are therefore as follows:

- The potential for cumulative dust impacts where the zone of influence and the duration of construction works would overlap with the Facility;
- The potential for cumulative odour impacts; and
- The potential for cumulative impacts of pollutant concentrations from other industrial facilities within the area.

14.9.4 Cumulative impacts from construction phase dust emissions would only occur where developments are within 700 m of each other, i.e. where the zones of influence (up to 350 m from the site boundary) would overlap. Beyond this distance, cumulative impacts are considered to be negligible.

14.9.5 No projects were identified which could give rise to cumulative odour impacts.

14.9.6 The remaining projects which have the potential to give rise to cumulative air quality impacts are included in **Table 14-41**.

Table 14-41~~14-36~~ Summary of Projects Considered for the CIA in Relation to Air Quality

Project	Status	Development Period	Distance from the Application Site	Project Definition	Project Data Status	Included in CIA	Rationale
Boston Barrier Flood Defence	Transport and Works Act Order consented	2017 – ongoing (completed August 2021)	Boston Barrier at closest point to the Application Site is 500 m.	ES	Complete / high	No	Based on the latest Boston Barrier Flood Defence timescales, it is determined that the scheme will complete by August 2021 ahead of the planned earliest start date of construction of the Facility.
Battery Energy Storage Plant (Marsh Lane) (B/17/0467)	Application approved	2017 - ongoing	Beeston Farm less than 10 m from the Application Site	Detailed application	Incomplete / low	Yes	The project is within the zone of influence for cumulative construction dust impacts
Land to the west of Stephenson Close Residential Development of up to 85 dwellings (B/17/0515)	Application not yet determined	2017 - ongoing	From the most eastern part of the Scheme to the Application Site is 550 m.	Outline only	Incomplete/ low	Yes	The project is within the zone of influence for cumulative construction dust impacts
Phase 2 Heron Park Construction of 32 dwellings (B/18/0489)	Application approved	2018 - ongoing	0.61 km south west of the Application Site	Detailed application	Complete / high	Yes	The project is within the zone of influence for cumulative construction dust impacts

Project	Status	Development Period	Distance from the Application Site	Project Definition	Project Data Status	Included in CIA	Rationale
Land off Lealand Way, Marsh Lane Industrial Estate, Boston, PE21 7SW. Installation of a 6.0 MW Gas Fired Power Generation Site, associated infrastructure and new means of access (B/19/0474)	Application approved	2019 – ongoing	422 m north of the Application Site	Detailed Application	Incomplete / low	Yes	The project is within the zone of influence for cumulative construction dust impacts. Emissions from the gas-fired plant may give rise to cumulative air quality impacts at human receptors.

14.9.7 With regard to cumulative construction dust impacts, it is considered that the identified projects within 700 m of the Application Site would have been required to undertake an assessment of construction phase dust impacts and would implement the appropriate best-practice dust mitigation measures to ensure that significant impacts would not be experienced at receptors. As such, significant cumulative dust impacts are unlikely to occur.

14.9.8 The consented gas-fired peaking power facility at Lealand Way, approximately 400 m north of the Application Site, was considered ‘in-combination’ with regard to designated ecological sites, as described above, and the resulting significance of this in-combination assessment is presented in **Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**.

14.9.9 The air quality assessment undertaken for the gas-fired peaking power plant application predicted that air quality impacts at human receptors would be negligible at all assessed receptors. The plant would utilise gas-fired generators which would be compliant with the NO_x and CO emission limits stipulated within the Medium Combustion Plant Directive to minimise the impact on receptors. Given that the assessment predicted negligible impacts, and that the NO_2 and CO air quality Objectives were not predicted to be exceeded as a result of the construction or operation of the Facility, significant cumulative effects are not anticipated.

14.10 Transboundary Impacts

14.10.1 Pollutants emitted from the Facility (e.g. NOx, SO_2, NH_3 and TOC) can contribute to the formation of secondary particulates. Secondary particulates are formed in the atmosphere by chemical reactions over a relatively long time period; as such, this pollution can travel significant distances.

14.10.2 The European Monitoring and Evaluation Programme (EMEP) operates under the United Nations Economic Commission for Europe’s (UNECE’s) Convention on Long-Range Transboundary Air Pollution (CLRTAP). The EMEP programme provides scientific information to Governments and subsidiary bodies to support international protocols and emissions reductions requirements determined under the Convention. This includes secondary particulate matter.

14.10.3 The Facility would operate in accordance with an Environmental Permit. The Environmental Permitting Regulations are transposed from European Directives and the associated emission limits which industrial installations are required to meet are continually under review. The most recent review of BAT for waste incineration plants introduced new, more stringent, emission limits (the BAT-AELs) than those previously prescribed in the IED. This continuous tightening of emission limits will give rise to a gradual reduction in pollutants from these sources which could form secondary particulates. Furthermore, as this legislation is European, the cumulative transboundary impact of secondary particulate matter across the continent will reduce over time. As such, it is not considered that any significant transboundary effects would occur as a result of the Facility.

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 air emissions generated by the Facility during its construction and operation:

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

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 are detailed in **Table 14-42**.

Table 14-4244 37 Interactions Between Impacts

Potential interaction between impacts				
Construction				
	1 Construction phase dust and particulate matter emissions	2 Construction phase plant emissions	3 Construction phase odour emissions from capital dredging	4 Construction phase road traffic and vessel emissions
1 Construction phase dust and particulate matter emissions	-	Yes	No	Yes
2 Construction phase plant emissions	Yes	-	No	Yes
3 Construction phase odour emissions from capital dredging	No	No	-	No
4 Construction phase road traffic and vessel emissions	Yes	Yes	No	-
Operation				
	1 Operational phase stack, vessel and road traffic emissions		2 Operational phase odour emissions	
1 Operational phase stack, vessel and road traffic emissions	-		No	
2 Operational phase odour emissions	No		-	
Decommissioning				
It is anticipated that decommissioning impacts would be of no greater magnitude than those assessed for construction.				

14.13 Summary

14.13.1 An air quality assessment was carried out to determine the likely significant effects in respect of air quality impacts associated with the Facility during its construction, operation and decommissioning.

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 effects of construction phase dust emissions is considered to be **not significant**.

14.13.3 Air quality impacts of road traffic and vessel emissions at human receptors during construction of the Facility were predicted to be of 'minor adverse' significance, in accordance with IAQM and EPUK guidance (IAQM and EPUK, 2017). Total concentrations were predicted to be below the relevant air quality Objectives for all pollutants. However, a temporary **moderate adverse** effect was experienced at once receptor within the Haven Bridge AQMA at a receptor which experienced elevated pollutant concentrations. As such, the overall significance of effect was considered to be **minor adverse**.

14.13.4 Construction phase effects at The Wash SAC, SPA, SSSI and Ramsar site were found to be **insignificant** in-combination with other plans and projects. Impacts at locally designated ecological sites were predicted to be greater than 1 % of the appropriate Critical Levels or Loads and could therefore not be screened out as insignificant. The conclusion of the significance of these effects is discussed in **Chapter 12 Terrestrial Ecology**.

14.13.5 Impacts of odour generated during construction as a result of capital dredging were considered using the risk-based approach detailed in IAQM guidance (IAQM, 2018). The assessment concluded that the capital dredging works would give rise to **insignificant** odour emissions at the nearest sensitive receptors.

14.13.6 Total pollutant concentrations from road traffic, vessel and stack emissions generated by the Facility during its operation were found to be below the respective air quality Objectives and EALs for all pollutants ~~with the exception of chromium VI which has background concentrations in exceedance of the EAL~~. The overall significance of effects was considered to be **minor adverse**.

14.13.7 There were predicted to be increases above 1 % of the Critical Loads and Levels at all designated ecological sites considered. Impacts therefore cannot be considered to be insignificant, and the significance of effects at these sites is discussed in **Chapter 17 Marine and Coastal Ecology** and **Chapter 12 Terrestrial Ecology**.

14.13.8 Operational phase odour emissions from the unloading, processing and storage of RDF were considered in the same manner as construction. Given that the Facility would employ a number of odour control measures, the effect of any potential odour was considered to be **not significant**.

14.13.9 Impacts associated with visible plumes arising from the EfW and LWA stacks were considered in accordance with industry guidance. The assessment identified that impacts of visible plumes would be **not significant**.

14.13.10 A Human Health Risk Assessment was undertaken and is presented in **Appendix 14.5**. The assessment considered impacts of dioxins and furans, dioxin-like PCBs and certain heavy metals on human health arising from exposure routes through inhalation and ingestion routes through the food chain. Impacts were found to be **not significant**.

~~14.13.8~~14.13.11 The potential for abnormal emissions during operation of the Facility to give rise to impacts at receptors was considered. Impacts on short-term and long-term standards were considered and impacts were found to be **not significant**.

~~14.13.9~~14.13.12 A summary of the air quality assessment is provided in **Table 14-43**.

Table 14-43~~14-38~~ Summary

Potential Impact	Receptor	Value/ Sensitivity	Magnitude	Significance	Mitigation	Residual Effect
Construction						
Impact 1: Construction phase dust and particulate matter	Human and ecological receptors	Dust soiling: low Human health: low	Large	Assessment methodology does not assign significance before mitigation	Best practice mitigation measures to be detailed within CoCP.	Not significant
Impact 2: Vessel and road traffic emissions	Human receptors	High	Moderate adverse at one receptor, slight adverse at one receptor, negligible at 37 receptors.	Minor adverse	Use of Euro VI vehicles during construction.	Minor adverse
	Ecological receptors	High	Insignificant at The Wash SAC, SPA SSSI and Ramsar and South Forty Foot Drain LWS Above the threshold of insignificanc	Not significant at The Wash SAC, SPA SSSI and Ramsar and South Forty Foot Drain LWS Significance of effects on other sites is detailed in	Use of Euro VI vehicles during construction.	Not significant at The Wash SAC, SPA SSSI and Ramsar and South Forty Foot Drain LWS Significance of effects on other sites is

Potential Impact	Receptor	Value/ Sensitivity	Magnitude	Significance	Mitigation	Residual Effect
			e at other sites.	**Chapter 12 Terrestrial Ecology**.		detailed in **Chapter 12 Terrestrial Ecology**.
Impact 3: Odour emissions from capital dredging	Human receptors	High	Slight adverse at two receptors, negligible at five receptors.	Not significant	None required	Not significant
Operation						
Impact 1: Stack, road traffic and vessel emissions	Human receptors	High	Few receptors experienced slight to ~~substantial~~ moderate adverse impacts. Most receptors experienced negligible impacts.	Minor adverse	None required	Minor adverse
	Ecological receptors	High	Impacts above the threshold of insignificance.	Significance of effects on designated sites is detailed in **Chapter 12**	See **Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**.	**Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and**

Potential Impact	Receptor	Value/ Sensitivity	Magnitude	Significance	Mitigation	Residual Effect
				Terrestrial Ecology and **Chapter 17 Marine and Coastal Ecology**.		**Coastal Ecology**.
Impact 2: Odour emissions from RDF processing	Human receptors	High	Negligible	Not significant	None required	Not significant
Impact 3: Visible plumes from EfW and LWA stacks	Human receptors	High	Low to Medium	Minor adverse	None required	Not significant
Impact 4: Human Health Risk Assessment	Human receptors	High	N/A	Not significant	None required	Not significant
Impact 5: Abnormal Emissions	Human receptors	High	Few receptors experienced slight to moderate adverse impacts. Most receptors experienced negligible impacts.	Minor adverse	None required	Minor adverse
Transboundary impacts	Human and ecological receptors	High	Negligible	Not significant	None required	Not significant

Potential Impact	Receptor	Value/ Sensitivity	Magnitude	Significance	Mitigation	Residual Effect
Decommissioning						
It is anticipated that decommissioning impacts would be of no greater magnitude than those assessed for construction.						

14.14 References

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