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Tables

8. Air Quality

8.1. Introduction

8.1.1. This chapter of the Environmental Statement (ES) addresses the potential air quality effects of the Proposed Development.

8.1.2. Impacts during the construction, operation and decommissioning phases of the Proposed Development are assessed. In particular, the chapter considers potential impacts on identified human health and ecological receptors in terms of:

- dust generation during construction;
- emissions from road traffic and Non-Road Mobile Machinery (NRMM) during construction;
- process emissions from the operational phase of the Proposed Development; and
- the potential effects of the eventual decommissioning of the Proposed Development.

8.1.3. This chapter is supported by:

- **ES Volume II Appendix 8A**: Air Quality – Construction Assessment (**Appendix Document Ref. 6.3**);
- **ES Volume II Appendix 8B**: Air Quality – Operational Assessment (**Appendix Document Ref. 6.3**); and
- **ES Volume III Figures 8.1 to 8.10** (**Appendix Document Ref. 6.4**).

8.2. Legislation, Planning Policy and Guidance

Legislative Background

Air Quality Legislation

8.2.1. The principal air quality legislation within the United Kingdom is the Air Quality Standards Regulations 2010 ('the 2010 Regulations'), which transpose the requirements of the European Ambient Air Quality Directive 2008 (European Commission, 2008) and the 2004 fourth Air Quality Daughter Directive (European Commission, 2004). The 2010 Regulations set air quality limits for a number of major air pollutants that have the potential to impact public health, such as nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), and particulate matter (PM_{10}, which is particulate matter of 10 micrometres (µm) diameter or less). The 2010 Regulations also include an exposure reduction objective for $PM_{2.5}$ in urban areas and a national target value for $PM_{2.5}$ ($PM_{2.5}$ is particulate matter of 2.5µm diameter or less).

8.2.2. For $PM_{2.5}$, the objective set by Defra for local authorities is to work toward reducing concentrations without setting any specific numerical value. In the absence of a numerical objective, it is convention to assess local air quality impacts against the limit value, originally set at 25µg/m^3 and currently set at 20µg/m^3.

8.2.3. Through the Environmental Targets (Fine Particular Matter) (England) Regulations 2023 two new targets and two new interim targets for $PM_{2.5}$ concentrations in England have been set (H.M. Government, 2023). One set of targets focuses on absolute concentrations with a long-term target to achieve an annual mean $PM_{2.5}$ concentration of 10µg/m^3 by the end of 2040, and an interim target of 12µg/m^3 by the start of 2028. The second set of targets relate to reducing overall population exposure to $PM_{2.5}$. By the end of 2040, overall population exposure to $PM_{2.5}$ should be reduced by 35% compared with 2018 levels, with the interim target being a reduction of 22% by the start of 2028.

8.2.4. The Environment Act 2021 ('the Environment Act') amended the Environment Act 1995, which requires the UK Government to produce a National Air Quality Strategy (NAQS), last reviewed in 2007 (Department for Environment, Food and Rural Affairs (Defra), 2007), containing air quality objectives and timescales to meet those objectives. These objectives apply to outdoor locations where people are regularly present and do not apply to occupational, indoor or in-vehicle exposure. The human health objectives that are applicable to this assessment are set out in **Table 8.1**.

Table 8.1: National Air Quality Strategy objectives (NAQS) – Protection of Human Health

Pollutant	Source	Concentration (µg/m^3)	Measured as
Nitrogen dioxide (NO_2)	EU air quality limit values	40	Annual mean
		200	1-hour mean, not to be exceeded more than 18 times a year
Particulate matter (PM_{10})	EU air quality limit values	40	Annual mean
		50	24-hour mean, not to be exceeded more than 35 times a year
Particulate matter ($PM_{2.5}$)	EU air quality target value	20	Annual mean
	Environmental Targets (Fine Particular Matter)	12*	(to be achieved by 2028)
		10*	(to be achieved by 2040)

Pollutant	Source	Concentration ($\mu g/m^3$)	Measured as
	(England) Regulations 2023		
Carbon monoxide (CO)	EU air quality limit value	10,000	Maximum daily running 8-hour mean

8.2.5. The Environment Act requires local authorities to undertake an assessment of local air quality to establish whether the objectives are being achieved, and to designate Air Quality Management Areas (AQMA) if improvements are necessary to meet the objectives. Where an AQMA has been designated, the local authority must draw up an Air Quality Action Plan (AQAP) describing the measures that will be put in place to assist in achieving the objectives. Defra has responsibility for coordinating assessments and AQAP for the UK as a whole.

8.2.6. No AQMA have been declared for the Site or surrounding nearby areas. The nearest is approximately 6.3km to the east of the Site in Scunthorpe and is designated for the exceedance of the 24-hour PM_{10} limit value. Based on Defra forecast models and local authority monitoring data, no exceedances of the EU standards have been identified in the vicinity of the Site.

8.2.7. The impact of emissions from the Proposed Development on sensitive ecological receptors are quantified within this assessment in two ways:

- as direct impacts arising due to increases in atmospheric pollutant concentrations, assessed against defined ‘critical levels’; and
- as indirect impacts arising through deposition of acids and nutrient nitrogen to the ground surface, assessed against defined ‘critical loads’.

8.2.8. The critical levels for the protection of vegetation and ecosystems are defined as “concentrations of pollutants in the atmosphere above which direct adverse effects on...plants [and] ecosystems...may occur according to present knowledge,” and critical loads are defined as “a quantitative 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) and Air Pollution Information System (APIS) website).

8.2.9. The critical levels applied in this assessment are set out in **Table 8.2** and apply regardless of the habitat type present at the habitat receptor. In the case of ammonia (NH_3), the greater sensitivity of lichens and bryophytes to this pollutant is reflected in the application of two critical levels, with a stricter critical level to be applied to locations where such species are present.

Table 8.2: Critical Levels (CL) – Protection of Vegetation and Ecosystems

Pollutant	Source	Concentration (µg/m^3)	Measured as
Oxides of nitrogen (NOx)	EU air quality limit value	30	Annual mean
	UK target value	75	Daily mean
Ammonia (NH_3)	UK target value for lichen and bryophytes	1	Annual mean
	UK target value	3	Annual mean

8.2.10. Critical load criteria for the deposition of nutrient nitrogen and acidifying species are dependent on the habitat type and species present and are specific to the sensitive receptors considered within the assessment. The relevant critical loads are detailed on the APIS website and are expressed as a range, to account for the variation in ecosystem response across the whole of Europe (CEH and APIS). The critical load criteria adopted for the sensitive ecological receptors considered in the assessment are presented in **ES Volume II Appendix 8B**: Air Quality - Operational Assessment (**Appendix Document Ref. 6.3**), and the assessment has used the lower end of the critical load range to ensure a conservative assessment is carried out.

Industrial Emissions Directive

8.2.11. The EU's Industrial Emissions Directive (IED) (European Commission, 2010) provides operational limits and controls to which regulated plant must comply, including Emission Limit Values (ELV) for pollutant releases into the air from plant combusting various fuel types, including gaseous fuels such as natural gas, hydrogen-containing gas and syngas. The Combined Cycle Gas Turbine (CCGT) of the Proposed Development falls under the Large Combustion Plant (LCP) requirements (Chapter III) of the IED, since it will have a capacity of greater than 50MW thermal input.

8.2.12. The operator of a plant covered by the IED is required to employ Best Available Techniques (BAT) for the prevention or minimisation of emissions to the environment, to ensure a high level of protection of the environment as a whole. European BAT reference documents ('BRefs') and BAT Conclusions (BATc) are published for each industrial sector under the IED, and they include BAT-Associated Emission Levels (BAT-AEL) which are expected to be met through the application of BAT. These levels may be the same as those published in the IED, or they may be more stringent. The current (2021 version of the LCP BATc (European Commission, 2021) includes annual average BAT-AEL for NOx and an indicative value for CO from natural gas-fired CCGTs which are more stringent than the ELV included in the IED.

8.2.13. The combustion of 100% hydrogen in a gas turbine will result in a reduction in the normalised flue gas volume (at 0°C, 1 atmosphere, dry gas and 15% O_2) compared with natural gas by approximately 27%. This is due to the

fundamental combustion chemistry of the respective fuels and inherent gas turbine design characteristics with respect to high excess air. This means that for the same BAT-AEL, the mass pollutant release when the CCGT is fired on natural gas would be higher than when fired on hydrogen. To achieve parity between the mass pollutant release rates for the two fuels, the ELVs for hydrogen firing therefore need to be increased.

8.2.14. There are currently no BAT-AELs associated with hydrogen firing, however the Environment Agency have developed Guidance on Emerging Technologies (GET) for hydrogen fired combustion plant (Environment Agency 2024) to provide ELVs for hydrogen combustion within the scope of IED. The GET details the application of a correction factor (1.37) to be applied to the IED NOx ELV of 50 mg/Nm^3 for hydrogen fired plant to allow for the reduction in flue gas volume. This will result in equivalent mass release rates of NOx between the two fuels, based on the IED NOx ELV.

8.2.15. The emission limits assessed for the Proposed Development are discussed in **ES Volume II Appendix 8B**: Air Quality - Operational Assessment (**Appendix Document Ref. 6.3**).

Environmental Permitting Regulations

8.2.16. The Environmental Permitting (England and Wales) Regulations 2016 (EPR) as amended, apply to all new installations and transpose the requirements of the IED into UK legislation. Combustion activities are listed activities under the EPR, and therefore they require an Environmental Permit to operate, issued by the Environment Agency. Performance against the relevant ELV or BAT-AEL, as defined in the IED, associated BRefs,BATc and GET, would be regulated through the Environment Permit.

8.2.17. Where legislative ambient air quality limits or objectives are not specified for the pollutant species potentially released from the Proposed Development, Environmental Assessment Levels (EAL), published in the Environment Agency's Risk Assessments for Specific Activities: Environmental Permits guidance, referred to as the 'EA's Risk Assessment Guidance' (Defra and Environment Agency, 2016) can be used to assess potential health effects on the general population. This includes an additional EAL for hourly concentrations of CO and annual average and hourly EAL for NH_3, which can result from the operational CCGT plant.

8.2.18. The EAL applicable for this assessment for the protection of human health are presented in **Table 8.3**. No other pollutants will be released from the operational Proposed Development.

Table 8.3: Environmental Assessment Levels (EAL) – human health

Pollutant	Concentration (µg/m^3)	Measured as	Source of EAL
CO	30,000	Hourly mean	

Pollutant	Concentration (µg/m^3)	Measured as	Source of EAL
NH_3	180	Annual mean	EA's Risk Assessment Guidance.
	2,500	Hourly mean	

8.2.19. Throughout the remainder of this chapter and the associated technical appendices, NAQS objectives, critical levels and EAL are collectively referred to as Air Quality Assessment Levels (AQAL).

Sensitive ecosystems

8.2.20. The UK is bound by the terms of Council Directive 92/43/EEC, on the conservation of natural habitats and of wild fauna and flora ('Habitats Directive'), Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds ('Wild Birds Directive') and the Convention on Wetlands of International Importance especially as Wildfowl Habitats ('Ramsar sites') (United Nations, 1994). The Conservation of Habitats and Species Regulations 2017 as amended ('the 2017 Regulations') provide for the protection of European Sites created under these, i.e. Special Areas of Conservation (SAC) designated pursuant to the Habitats Directive and Special Protection Areas (SPA) and provisional SPA (pSPA) classified under the Wild Birds Directive. Specific provisions of the European Directives are also applied to SAC, and candidate SAC (cSAC), which requires these sites to be given special consideration, and for further assessment to be undertaken for any development which is likely to lead to a significant effect upon them. Special consideration within this quality chapter has also been given to SPA, pSPA and Ramsar sites.

Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018

8.2.21. The Non-Road Mobile Machinery (NRMM) Regulations provide the requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery. This regulation transposes the European Directive 97/68/EC (as amended) into UK law.

Planning Policy Context

National Planning Policy

8.2.22. National Policy Statements (NPS) are the primary basis for the assessment and determination of applications for Nationally Significant Infrastructure Projects (NSIP), such as the Proposed Development. The Overarching NPS of relevance to the Project are the NPS on Energy EN-1 ('NPS EN-1') and the NPS for Natural Gas Electricity Generating Infrastructure EN-2 ('NPS EN2') (Department for Energy Security & Net Zero (DESNZ), 2023 and 2023a). NPS EN-1 states that:

> "The planning and pollution control systems are separate but complementary. The planning system controls the development and use of land in the public interest…Pollution control is concerned with preventing pollution through the use of measures to prohibit or limit the releases of substances to the environment from different sources to the lowest practicable level. It also ensures that ambient air and water quality meet standards that guard against impacts to the environment or human health." (paragraph 4.12.2)

8.2.23. NPS EN-1 also requires the consideration of significant air emissions, their mitigation and any residual effects, the predicted absolute emission levels after application of mitigation, the relative change in air quality from existing concentrations and any potential eutrophication impacts as a result of the Proposed Development project stages, including contributions from additional road traffic. Where a project could result in deterioration in air quality in an area where national air quality limits are not being met or may lead to a new area breaching national air quality limits, or where substantial changes in air quality concentrations are predicted, such effects would be expected to be given substantial weight in consideration of the acceptability of the proposal. Where a project is likely to lead to a breach of statutory air quality limits, the developer should work with the relevant authorities to secure appropriate mitigation measures to allow the proposal to proceed.

8.2.24. NPS EN-2 (DESNZ, 2023a) states that whilst the document has been drafted in respect of natural gas-fired electrical generating infrastructure, it may also be important and relevant to hydrogen-fired electricity generating infrastructure. In terms of emissions to air it goes on to state:

> "Natural gas generating stations are likely to emit nitrogen oxides (NOx). To meet the requirements of the Government's legislation on industrial emissions, including Schedule 15 to the Environmental Permitting Regulations 2016 and Best Available Techniques Conclusions for Large Combustion Plant, natural gas generating stations must apply a range of mitigation to minimise NOx and other emissions." (paragraph 2.6.5)

8.2.25. On 24 April 2025, DESNZ published a consultation on revisions to the NPS, which concluded on 29 May 2025. The outcome of the Consultation is still awaited, however it is not anticipated to result in changes which would materially alter the conclusions as set out in this Chapter.

8.2.26. Table 8.4 provides a summary of relevant NPS advice regarding air quality and emissions and presents an assessment of where matters are assessed within this chapter.

Table 8.4: Summary of relevant NPS advice regarding air quality and emissions

Summary of NPS	Consideration within the Chapter
NPS EN-1	
Paragraph 5.2.1 states: *"Energy infrastructure development can have adverse effects on air quality…. Air emissions include particulate matter (for example dust) up to a diameter of ten microns (PM_{10}) and up to a diameter of 2.5 microns ($PM_{2.5}$) as well as gases such as sulphur dioxide, carbon monoxide and nitrogen oxides (NOx).*	Particulate emissions have been included in the assessment of construction dust and traffic impacts. NOx and carbon monoxide emissions from the operational development have also been considered. Sulphur dioxide and particulate emissions are negligible from a natural gas-fired power station and are not applicable to hydrogen firing and therefore have not been assessed for the operational Proposed Development.
Paragraph 5.2.2 states: *"Legal limits for pollutants in ambient air are set out in the Air Quality Standards Regulations 2010 and…national objectives set out in the Air Quality (England) Regulations 2000…"*	Predicted impacts from construction and operational activities have been assessed against the relevant limits, as set out in Table 8.1 of this Chapter.
Paragraph 5.2.3 states: *"For many air pollutants there is not a threshold value below which there is no health impact, so it is important that energy infrastructure schemes consider not just how a scheme may impact statutory air quality limits, objectives or targets but also measures to mitigate all emissions in order to minimise human exposure to air pollution, especially for those who are more susceptible to the impacts of poor air quality."*	Emissions from the Proposed Development will be controlled in line with the applicable BAT-AEL and ELV, which are set at levels to protect human health.
Paragraph 5.2.4 states: *"…a particular effect of air emissions from some energy infrastructure may be eutrophication, which is the excessive enrichment of nutrients in the environment. Eutrophication from air pollution results mainly from emissions of NOx and ammonia"*	Air quality impacts associated with NOx, NH_3 and nitrogen deposition on designated ecological receptors have been assessed in **ES Volume II Appendix 8B:** Air Quality – Operational Assessment (**Application Document Ref. 6.3**) and summarised in Section 8.6.
Paragraph 5.2.5 states: "*Design of exhaust stacks, particularly height, is the primary driver for the delivery of optimal*	A stack height evaluation has been carried out and is detailed in **ES Volume II Appendix 8B:** Air Quality –

Summary of NPS	Consideration within the Chapter
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 Secretary of State 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".	Operational Assessment (**Application Document Ref. 6.3**) and summarised in Section 8.5, to support the justification of the proposed height for **ES Volume I Chapter 14:** Landscape and Visual Amenity (**Application Document Ref. 6.2**) and to determine the maximum stack height to support the Rochdale Envelope approach. The final stack height will however be determined as part of the Environmental Permitting process.
Paragraph 5.2.8 states: "*The ES should describe:* • *existing air quality concentrations and the relative change in air quality from existing levels;* • *any significant air quality effects, mitigation action taken and any residual effects, distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project;* • *the predicted absolute emissions, concentration change and absolute concentrations as a result of the proposed project, after mitigation methods have been applied; and* • *any potential eutrophication impacts."*	The air quality impacts of all project stages have been assessed in this chapter including consideration of residual effects in Section 8.9.
NPS EN-2	
Paragraph 2.6.5 states: *"Natural gas generating stations are likely to emit nitrogen oxides (NOx) … natural gas generating stations must apply a range of mitigation to minimise NOx and other emissions."*	NOx emissions have been considered in the assessment of operational air impacts. Consideration has also been given to baseline air quality conditions in the locality and the ELV that are achievable for the proposed plant

Summary of NPS	Consideration within the Chapter
	technology, based on legislative limits and use of BAT.
Paragraph 2.5.2 states: *"In line with Section 5.2 of EN-1 the Secretary of State, in consultation with the EA and NRW, should be satisfied that any adverse impacts of mitigation measures to emissions proposed by the applicant have been described in the ES and taken into account in the assessments"*	Selective Catalytic Reduction (SCR) is proposed for the Proposed Development to achieve the BAT-AEL associated with gas firing and the NOx ELV detailed in the EA's GET, to demonstrate BAT. The impact assessment has included the potential for emissions to air of NH_3, as a result of the use of SCR.

8.2.27. Table 8.5 provides a summary of relevant NPS advice regarding dust, odour, smoke and steam.

Table 8.5: Summary of relevant NPS advice regarding dust, odour, smoke and steam

Summary of NPS	Consideration within the Chapter
NPS EN-1	
Paragraph 5.7.1 states: *"During the construction, operation and decommissioning of energy infrastructure there is potential for the release of a range of emissions such as odour, dust, stream, smoke artificial light and infestation of insects. All have the potential to have a detrimental impact on amenity or cause a common law nuisance or statutory nuisance under Part III, Environmental Protection Act 1990. However, they are not regulated by the environmental permitting regime, so mitigation of their impacts will need to be included in the Development Consent Order"*	An assessment of the impacts of dust during construction has been carried out and is detailed in **ES Volume II Appendix 8A:** Air Quality – Construction Assessment (**Application Document Ref. 6.3**). The operation of the Proposed Development is not considered to have the potential to cause insect infestation, odour, dust, steam or smoke impacts, based on the choice of fuel and nature of plant operation. A strategy to mitigate the effects of artificial light associated with the Proposed Development is included in the **Outline Lighting Strategy (Application Document Ref. 5.11).** A **Statutory Nuisance Statement (Application Document Ref. 5.3)** also accompanies the Application which assesses whether the Proposed

Summary of NPS	Consideration within the Chapter
	Development could cause statutory nuisance to occur and where required, sets out mitigation measures to limit the effects.
Paragraph 5.7.6 states: *"In particular, the assessment provided by the applicant should describe:* • The type, quantity and timing of emissions; • Aspects of the development which may give rise to emissions; • Premises or locations that may be affected by the emissions; • Effects of the emission on identified premises or locations; • Measures to be employed in preventing or mitigating the emissions."	This chapter identifies sensitive receptors in the vicinity of the Site, describes the current baseline air quality conditions, outlines the assumptions regarding the nature, duration and scale of emissions and the predicted effect of emissions on identified sensitive receptors. The Rochdale Envelope and conservative assumptions have been applied in order to derive a worst-case scenario. Embedded mitigation measures are also included.
Paragraph 5.7.7 states: *"The applicant is advised to consult the relevant local planning authority and, where appropriate, the EA about the scope and methodology of the assessment."*	North Lincolnshire Council (NLC) as local planning authority and the Environment Agency have been consulted at scoping stage, informal consultation and at formal (statutory) consultation stages regarding the proposed approach to assessment of air impacts. Their views have been incorporated into the air impact assessment as discussed in Section 8.3.

8.2.28. The revised National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government 2024) does not contain specific policies for NSIPs (these are determined in accordance with the decision making framework in the Planning Act 2008, and relevant NPSs) but its policies may have relevance to the development of such projects on conserving and enhancing the natural environment, Paragraph 187 of the NPPF states that:

"Planning polies and decisions should contribute to and enhance the natural and local environment by:

(e) preventing new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability."

8.2.29. Air quality in the UK has been managed through the Local Air Quality Management (LAQM) regime using NAQS objectives. The effect of a proposed development on the achievement of such policies and plans are matters that may be a material consideration by planning authorities, when making decisions for individual planning applications. Paragraph 199 of the NPPF states 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. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

8.2.30. The different roles of a planning authority and a pollution control authority are addressed by the NPPF in paragraph 201:

"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

8.2.31. The Planning Practice Guidance (PPG) on Air Quality was updated on 1 November 2019 (Ministry of Housing, Communities and Local Government , 2019), with specific reference to air quality. The PPG states that the planning system should consider the potential effect of new developments on air quality where relevant limits have been exceeded or are near the limit. Concerns also arise where the development is likely to adversely affect the implementation of air quality strategies and action plans and/ or, in particular, lead to a breach of EU legislation (including that applicable to wildlife). In

addition, dust can also be a planning concern, for example, because of the effect on local amenity.

8.2.32. When deciding whether air quality is relevant to an application, the PPG states that a number of factors should be taken into consideration including if the development will:

- significantly affect traffic in the immediate vicinity of the proposed development Site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;
- introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled Combined Heat and Power (CHP) plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area;
- expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality;
- give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations; and
- affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites.

8.2.33. Regarding how detailed an air quality assessment needs to be, the PPG states:

> "Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific."

Local Development Plan Policy

8.2.34. Similarly, local planning policy may be something which the Secretary of State considers is both important and relevant to the determination of the Application for the Proposed Development.

8.2.35. The North Lincolnshire Local Plan (the 'Local Plan') was adopted in 2003 (North Lincolnshire Council (NLC) 2003), and a number of the policies have been replaced by the North Lincolnshire Local Development Framework Core Strategy ('the Core Strategy'), adopted in 2011 (NLC, 2011). It should be noted that NLC are in the process of preparing a new Local Plan.

8.2.36. A number of policies from the 2003 Local Plan were not directly replaced by the Core Strategy and have been saved. These include:

8.2.37. Policy DS1 – General Requirements states:

> "A high standard of design is expected in all developments in both built-up areas and the countryside and proposals for poorly designed development will be refused. All proposals will be considered against the criteria set out below:
>
> …
>
> Amenity
>
> iii) No unacceptable loss of amenity to neighbouring land uses should result in terms of noise, smell, fumes, dust or other nuisance, or through the effects of overlooking or overshadowing; and
>
> …
>
> v) no pollution of water, air or land should result which poses a danger or creates detrimental environmental conditions."

8.2.38. Policy DS11 – Polluting Activities states:

> "Planning permission for development, including extensions to existing premises and changes of use, will only be permitted where it can be demonstrated that the levels of potentially polluting emissions, including effluent, leachates, smoke, fumes, gases, dust, steam, smell or noise do not pose a danger by way of toxic release; result in land contamination; pose a threat to current and future surface or underground water resources; or create adverse environmental conditions likely to affect nearby developments and adjacent areas."

8.2.39. From the Core Strategy, Spatial Objective 7: Efficient Use and Management of Resources states:

"To ensure the efficient use of resources, maximising recycling of minerals and waste products, minimising pollution, maintaining and improving air, soil and water quality, and employing sustainable building practices in new development."

8.2.40. While there are no policies that are specifically targeted at air quality and pollution, pollution is considered in several other policies, namely:

- Spatial Objective 10: Creating A Quality Environment; and
- CS5: Delivering Quality Design in North Lincolnshire.

8.2.41. Pollution is also considered as part of the section covering transport and the environment.

Other guidance

8.2.42. Defra has published technical guidance LAQM TG 22 (Defra, 2022) to assist local authorities in fulfilling their duties in relation to Local Air Quality Management. Parts of this guidance, and associated tools, are also useful in assessing the impacts of individual developments within the planning process.

8.2.43. The National Highways (NH) publication the Design Manual for Roads and Bridges (DMRB) (NH, 2024) has been used to screen potential traffic air quality impacts to determine those impacts that may require more detailed assessment, and in the assessment of traffic air quality effects and the evaluation of significance.

8.2.44. The Institute of Air Quality Management (IAQM) in collaboration with Environmental Protection UK (EPUK) has published several guidance documents relating to the potential effects of dust generation during construction works and development control including:

- Guidance on the assessment of dust from demolition and construction v2.2, (IAQM, 2024);
- Guidance on the assessment of mineral dust impacts for planning version 1.1 (IAQM 2016); and
- Land-Use Planning & Development Control: Planning for Air Quality. v1.2. (IAQM and EPUK, 2017).

8.2.45. In addition, IAQM have also published a guide to the assessment of air quality impacts on designated nature conservation sites (IAQM 2020).

8.3. Assessment Methodology

Consultation

8.3.1. The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised *via* the formal Scoping Opinion (**ES Volume II, Appendix 1B** in **Application Document Ref. 6.3**) and in

response to the formal consultation and other pre-application engagement, is summarised in Table 8.6.

Table 8.6: Consultation Responses

Consultee or organisation	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
Secretary of State	June 2024 Scoping Opinion	The Inspectorate did not agree to the proposal to scope out the assessment of potential fugitive emissions of dust from demolition and construction works and emissions from plant equipment on the basis that the implementation of best practice control measures would result in negligible impacts. This was on the basis that insufficient information on the type and distance to air quality receptors had been provided, nor the type of control measures proposed.	A construction dust assessment has been carried out in **ES Volume II Appendix 8A**: Air Quality Construction Assessment (**Application Document Ref. 6.3**).
		The Inspectorate requested a prediction of activities and works (including duration) likely to be required during decommissioning which could impact human health and ecological receptors, highlighting the differences between construction and decommissioning.	Appropriate best practice mitigation measures will be applied during any decommissioning works and documented in a Decommissioning Environmental Management Plan (DEMP), the approval and submission of which is secured by requirement 39; no additional mitigation for decommissioning of the Proposed Development beyond such best practice is considered necessary at this stage. The predicted air quality effects of eventual decommissioning of the Proposed Development

Consultee or organisation	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
			are considered to be comparable to, or less than, those assessed for construction activities.
		The Inspectorate agreed that emissions of sulphur dioxide and particulates from natural gas fired power stations are likely to be negligible and therefore not require assessment.	Noted.
		The Inspectorate requested that an explanation of how the baseline data used in the assessment is representative of the Proposed Development and that a figure depicting all locations of air quality monitoring stations is provided. It was requested that data was agreed with the relevant statutory consultees.	Available baseline monitoring data, and its applicability for the assessment is explained in Section 8.4 and **ES Volume III Figure 8.5** (**Application Document Ref. 6.3**) shows the locations of the air quality monitoring stations.
		A figure showing the study area was requested, showing the locations of air quality monitoring stations and sensitive receptors.	Sensitive Receptors are shown in **ES Volume III Figures 8.1 – 8.3** (**Application Document Ref. 6.4**). **ES Volume III Figure 8.5:** Study Area – Monitoring Locations (**Application Document Ref. 6.4**) shows the locations of the air quality monitoring stations.

Consultee or organisation	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		The Inspectorate requested that uncertainties or assumptions used in the dispersion modelling assessment of the waste gases from the CCGT are described, in relation to determining the height of the stack.	A stack height assessment and sensitivity analysis has been carried out and is presented in **ES Volume II Appendix 8B**: Air Quality Operational Assessment (**Application Document Ref. 6.3**).
		Given that the Proposed Development may need to operate using natural gas prior to the provision of hydrogen, the ES should set out the worst-case scenario for each fuel option and consider the associated emissions for the identified worst case scenario at sensitive receptors.	The impacts of 100% natural gas firing and 100% hydrogen firing have both been assessed, and the worst case results presented in the assessment. If a blend of natural gas and hydrogen were to be used at any stage of the operation of the Proposed Development, it is considered that the impacts would be lower than the worst-case impacts presented in this assessment.
		The Inspectorate is content with an assessment of the effects of operational traffic being scoped out of the ES, provided traffic levels are below the relevant screening thresholds.	A detailed assessment of operational traffic emissions has not been undertaken, as the numbers of additional vehicles associated with the operational phase of the Proposed Development are below the DMRB and IAQM screening criteria for requiring such assessment.
Natural England	June 2024 Scoping Opinion	Expect dust impacts from demolition and construction to be assessed at the Humber Estuary SAC/ Ramsar/ SSSI.	A construction dust assessment has been carried out in **ES Volume II Appendix 8A**: Air Quality

Consultee or organisation	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
			Construction (**Application Document Ref. 6.3**) and includes all relevant receptors.
		Designated sites within 200m of a road which will experience a significant increase in traffic movements should be assessed for impacts due to air pollution from traffic. When undertaking an assessment of the potential impacts during the construction or operation phase of the development there will need to be clarification provided on which roads will be used to access the development site, and the number of predicted vehicle movements. Ammonia emissions from road traffic could make a significant difference to nitrogen deposition close to roads. As traffic composition transitions toward more petrol and electric cars (i.e., fewer diesel cars on the road) – catalytic converters may aid in reducing NOx emissions but result in increased ammonia emissions – therefore	The methodology and assessment for Traffic emissions is provided in **ES Volume II Appendix 8A**: Air Quality Construction (**Application Document Ref. 6.3**). Designated sites within 200m have been included in the assessment in line with the relevant guidance. NH_3 emissions from road traffic have been assessed using the National Highways tool ~~– *Calculator for Road Emissions of Ammonia (CREAM)*~~.

Consultee or organisation	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		consideration of the potential for impacts is needed.	
		Natural England advises that an air quality assessment should be undertaken of both the hydrogen and natural gas processes which the Proposed Development is capable of, with a view to establishing the potential impacts on designated sites.	The impacts of 100% natural gas firing and 100% hydrogen firing have both been assessed, and the worst case results presented in the assessment. If a blend of natural gas and hydrogen were to be used at any stage of the operation of the Proposed Development, it is considered that the impacts would be lower than the worst-case impacts presented in this assessment.
UK Health Security Agency (UK HSA)	June 2024 Scoping Opinion	Pollutants associated with road traffic or combustion, particularly particulate matter and oxides of nitrogen are non-threshold; i.e, an exposed population is likely to be subject to potential harm at any level and that reducing public exposure to non-threshold pollutants (such as particulate matter and nitrogen dioxide) below air quality standards will have potential public health benefits. We support approaches which minimise or mitigate public exposure to non-threshold air pollutants, address inequalities (in exposure) and maximise	Formulation of mitigation measures, where appropriate, will be reported to ensure any adverse effects on air quality are minimised.

Consultee or organisation	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		co-benefits (such as physical exercise). We encourage their consideration during development design, environmental and health impact assessment, and development consent.	
Environment Agency	June 2024 Scoping Opinion	The applicant should ensure that the air quality assessment for the operational proposed Development should include natural gas or hydrogen and blending of the two fuel types.	The assessment has considered 100% hydrogen firing and 100% natural gas firing scenarios and the results of the scenario generating the worst case results has been presented. It is considered that any blend of the two fuel types would result in impacts that are lower than the worst-case 100% firing scenarios assessed, and therefore this has not been considered.
North Lincolnshire Council	February 2025 PEI Report Consultation	The council agreed with the approach proposed for modelling construction traffic and scoping out modelling of decommissioning traffic impacts based on them being comparable to construction impacts.	No further action.
		The council agreed with the proposed approach for a qualitative assessment of impacts from NRMM.	No further action.

Consultee or organisation	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		The council expects that, in order to scope out modelling of operational traffic impacts, the operational traffic movements should be detailed and compared to the appropriate IAQM/EPUK screening criteria.	Vehicle movements for operational traffic are detailed in **ES Volume II Appendix 8B**: Air Quality – Operational Assessment (**Application Document Ref. 6.3**) and compared to the relevant screening criteria.
		The council made no comment on the proposed operational emissions assessment.	No further action.
Natural England	February 2025 PEI Report Consultation	Natural England noted that several protected sites with Process Contributions (PC) less than 1% of the critical level were discounted from further assessment without the consideration of in-combination impacts. Further clarification regarding the perceived omissions, was requested, as Natural England consider that in-combination effects could still be significant.	The assessment presented for the PEI Report only considered the Proposed Development scheme in isolation, with the assessment of in-combination effects being deferred to the ES, as was stated at the time. In-combination effects have now been considered and are presented and discussed in Annex C of **ES Volume II Appendix 8B:** Air Quality – Operational Assessment (**Application Document Ref. 6.3**).
		Natural England consider any PC over 1% alone or in combination, should be screened into an Appropriate Assessment (AA), whilst recognising	Following updates to the operational dispersion modelling assessment the results have been

Consultee or organisation	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		this distinction was unlikely to materially change the outcome of the assessment.	reassessed and screened into the AA where required.
		Natural England requested clear evidence that the most sensitive saltmarsh vegetation at the Humber Estuary would not be impacted.	The most sensitive saltmarsh vegetation for which the Humber Estuary's SAC is designated for is "Salicornia and other annuals colonising mud and sand" which is a pioneer community which only occurs at the estuary proper (i.e. at the mouth of the River Trent). This is shown in mapping provided by Defra (https://environment.data.gov.uk/explore/6da82900-d465-11e4-8cc3-f0def148f590?download=true). The mapping confirms the vegetation closest to the site is transitional reedbed. An isopleth of nitrogen deposition has also been provided in **ES Volume III Figure 8.10:** Nitrogen Deposition at Ecological Receptors (**Application Document Ref. 6.4**).
		Natural England requested additional justification for the methodology for the inclusion of Keadby 2 in the baseline rather than assessing it as an in-combination project.	The Keadby 2 site was modelled in isolation and the predicted impacts were added to the existing background concentrations. This is considered appropriate given that the Keadby 2 site has been operational since 2023, but the published backgrounds predate this. This would in fact

Consultee or organisation	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
			overestimate the background contributions from Keadby 2, given that the assessment assumes emissions occur 8,760 hours per year at the ELV, when actual operational hours have been less than this, and emission concentrations are below the ELV, especially in the case of NH_3. The Proposed Development impacts were then considered against this modified background. The same approach was used in the assessment of the consented Keadby 3 scheme, and therefore as well as this being considered the most appropriate way to include the impacts of Keadby 2 in the assessment, this approach was also taken to be consistent with the Keadby 3 assessment methodology. The overall Predicted Environmental Concentration would be the same whether the impacts of Keadby 2 and the Proposed Development were assessed separately or together in any case.

Overview

8.3.2. Details of the assessment methodologies are provided within **ES Volume II Appendix 8A**: Air Quality - Construction Assessment and **Appendix 8B**: Air Quality - Operational Assessment (**Application Document Ref. 6.3**). The individual technical assessments provide detailed descriptions of the sensitive human receptors used in the assessment, the ecological receptors and the methodology for assessing the impacts of construction dust, construction traffic and the operational stack emissions of the Proposed Development.

Study Area

8.3.3. The study areas for the assessments carried out have been defined according to the appropriate guidance for the type of assessment being carried out (i.e. construction dust and NRMM, construction traffic and the operational Proposed Development), and therefore vary for the individual assessments.

8.3.4. The study area for the construction dust and NRMM emissions has been applied in line with IAQM guidance (IAQM, 2024), extending:

- up to 250m beyond the Site boundary and 50m from the construction traffic route (up to 250m from the Site entrance), for human health receptors; and
- up to 50m from the Site boundary and construction traffic route (up to 250m from the Site entrance) for ecological receptors.

8.3.5. The study area for the traffic assessment is defined in the screening criterion set out in the DMRB and the IAQM/ EPUK guidance, which states that only properties and habitat sites within 200m of affected roads (roads that experience a change in traffic flow above a certain criteria) should be considered in road traffic emissions assessments.

8.3.6. The study area for the operational Proposed Development point source emissions extends up to 15km from the operational plant for ecological receptors, in line with the Environment Agency Risk Assessment Guidance (Defra and Environment Agency, 2016):

- SPA, SAC, Ramsar sites and SSSI within 15km; and
- Local Nature Sites (including ancient woodlands, Local Wildlife Sites (LWS) and National and Local Nature Reserves (NNR and LNR)) within 2km.

8.3.7. In terms of human health receptors, the predicted impacts from the operational Proposed Development become negligible well within 2km and therefore sensitive receptors for the human health impacts only are concentrated within a 2km study area.

Impact Assessment Methodology

8.3.8. The potential emissions to air from construction and operation of the Proposed Development have been determined or estimated, and key local receptors have been identified, together with the current local ambient air quality.

8.3.9. The potential pollutant concentrations resulting from the projected emissions arising from the construction and operational phases of the Proposed Development have been predicted using atmospheric dispersion modelling techniques where appropriate, which enabled the assessment of the impacts associated with the Proposed Development on the existing local ambient air quality and in particular on the identified sensitive receptors. The assessment methodology for each type of emission is outlined below, with further detail being provided in the accompanying technical appendices (**ES Volume II Appendix 8A**: Air Quality - Construction Assessment and **Appendix 8B**: Air Quality - Operational Assessment, **Application Document Ref. 6.3**).

8.3.10. The process and traffic emissions assessments are made with reference to the relevant AQAL defined in Table 8.1 to Table 8.3 in Section 8.2 of this Chapter.

Construction phase – construction dust assessment

8.3.11. The movement and handling of soils and spoil during demolition and construction activities for the Proposed Development is anticipated to lead to the generation of some short-term airborne dust. The occurrence and significance of dust generated by earth moving operations is difficult to estimate and depends heavily upon the meteorological and ground conditions at the actual time and location of the work, and the nature of the activity being carried out.

8.3.12. At present, there are no statutory UK or EU standards relating to the assessment or control of dust. The emphasis of the regulation and control of demolition/ construction dust, therefore, is through the adoption of Best Practicable Means (BPM) when working on site to mitigate any potential impacts. It is intended that significant adverse environmental effects are avoided at the design stage and through embedded mitigation where possible, including the use of good working practices to minimise dust formation which is detailed further in Mitigation and Enhancement Measures of this Chapter.

8.3.13. The IAQM provides guidance for good practice and for qualitative assessment of risk of dust emissions from construction and demolition activities (IAQM, 2024). The guidance considers the risk of dust emissions from unmitigated activities to cause human health impacts (associated with PM_{10}), dust soiling impacts, and ecological impacts (such as physical smothering, and chemical impacts for example from deposition of alkaline materials). The appraisal of risk is based on the scale and nature of activities and on the sensitivity of receptors, and the outcome of the

appraisal is used to determine the level of good practice mitigation required for adequate control of dust.

8.3.14. The assessment undertaken for the Proposed Development is consistent with the overarching approach to the assessment of the impacts of demolition/ construction, and the application of example descriptors of impact and risk set out in IAQM guidance. It considers the significance of potential impacts with no mitigation and recommends mitigation measures appropriate to the identified risks to receptors. The steps in the assessment are to:

- identify receptors within the appropriate study area for the Site;
- identify the magnitude of impact through consideration of the scale, duration and location of activities being carried out (including demolition, earthworks, construction and trackout, where construction vehicles could carry mud onto the public highway);
- establish the sensitivity of the area through determination of the sensitivity of receptors and their distance from construction activities;
- determine the risk of significant impacts on receptors occurring as a result of the magnitude of impact and the sensitivity of the area, assuming no additional mitigation (beyond the identified development design and impact avoidance measures) is applied;
- determine the level of additional mitigation required based on the level of risk, to reduce potential impacts at receptors to insignificant or negligible; and
- summarise the potential residual effects of the mitigated works.

8.3.15. The criteria for assessment of magnitude, sensitivity, and risk for construction dust are summarised in Tables 1 – 6 **ES Volume II Appendix 8A**: Air Quality – Construction Assessment (**Application Document Ref. 6.3**).

Construction phase - construction site plant (Non-Road Mobile Machinery (NRMM) Assessment

8.3.16. As described in **ES Volume I Chapter 5**: Construction Programme and Management (**Application Document Ref. 6.2**), subject to being granted development consent and following a final investment decision, it is anticipated that the early construction works including the replacement of Mabey Bridge and construction of the emergency access crossing could commence in 2027 and following a 9 month period, the main construction phase could last approximately three years, followed by a period of commissioning (i.e. to 2030).

8.3.17. There are likely to be emissions to air during construction activities arising from on-site construction plant or NRMM. The IAQM guidance (IAQM, 2024) states:

"Experience of assessing the exhaust emissions from on-site plant (NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/ vehicles and their operating hours and locations to assess whether a significant effect is likely to occur."

8.3.18. The screening criterion in the DMRB (NH, 2024) and IAQM/ EPUK (IAQM, 2017) states that only properties and habitat sites within 200m of roads should be considered in traffic assessments. This has been considered in determining the potential for impacts from NRMM associated with the Proposed Development on sensitive receptors. A qualitative assessment of the potential for impact from NO_2 and PM_{10} emissions from NRMM on identified receptors has therefore been made based on the criteria outlined in the DMRB guidance.

Construction and operational phase - road traffic assessment

8.3.19. The incomplete combustion of fuel in vehicle engines results in the presence of combustion products of CO, PM_{10}, and $PM_{2.5}$ in exhaust emissions as well as hydrocarbons (HC) such as benzene and 1,3-butadiene. Similarly, but to a lesser extent, any sulphur in the fuel can be converted to SO_2 that is then released to atmosphere. In addition, at the high temperatures and pressures found within vehicle engines, some of the nitrogen in the air and the fuel is oxidised to form oxides of nitrogen, mainly in the form of nitric oxide (NO), which is then converted to NO_2 in the atmosphere. NO_2 is associated with adverse effects on human health. Better emission control technology and fuel specifications are expected to reduce emissions per vehicle across the UK vehicle fleet in the long term.

8.3.20. Although SO_2, CO, benzene, and 1,3-butadiene are present in motor vehicle exhaust emissions, detailed consideration of the associated impacts on local air quality is not considered relevant in the context of this Proposed Development. This is because the released concentrations of these pollutants are low enough so as to not be likely to give rise to significant effects. In addition, no areas within the administrative boundaries of North Lincolnshire Council or City of Doncaster Council are considered to be at risk of exceeding the relevant objectives for these pollutants, therefore the risks to the attainment of the relevant air quality objectives in the vicinity of the Proposed Development are considered negligible. Emissions of SO_2, CO, benzene, and 1, 3-butadiene from road traffic are therefore not considered further within this assessment.

8.3.21. The exhaust emissions from road vehicles that do have the potential to affect the ambient concentrations of pollutants are NO_2, PM_{10} and $PM_{2.5}$. Therefore, the assessment of the significance of road traffic air quality impacts only considers these pollutants.

8.3.22. DMRB LA105 guidance (NH, 2024) sets out criteria to establish the need for an air quality assessment from road traffic. The guidance considers the following changes in traffic anticipated as a result of a development, to identify the need for further evaluation:

- Annual Average Daily Traffic (AADT) flows of more than 1,000 vehicles;
- 200 Heavy Duty Vehicles (HDV, all vehicles greater than 3.5 tonnes gross weight, including buses);
- a change in the speed band; or
- a change in carriageway alignment by >5m.

8.3.23. Guidance published by the IAQM/ EPUK (IAQM, 2017) proposes a lower threshold in AADT flow to warrant a detailed air quality assessment of a change of 500 Light Duty Vehicles (LDV, all vehicles less than 3.5 tonnes gross weight) or 100 HDV when outside of an AQMA. For changes in traffic below these criteria, significant changes in air quality are not expected.

8.3.24. In order to conduct a more conservative assessment of the air quality impacts of construction traffic, the lower IAQM screening criteria has been applied to this assessment. Based on the AADT associated with the construction phase of the Proposed Development (detailed in **ES Volume II Appendix 8A**: Air Quality - Construction Assessment (**Application Document Ref. 6.3**)) detailed air quality modelling is required.

8.3.25. This assessment has used the latest version of dispersion modelling software 'ADMS-Roads' (v5.0.0.1) to quantify baseline pollution levels at selected receptors due to road traffic emissions. ADMS-Roads is a modern dispersion model that has an extensive published track record of use in the UK for the assessment of local air quality impacts, including model validation and verification studies.

8.3.26. The current traffic assessment details are found in **ES Volume I Chapter 10**: Traffic and Transportation (**Application Document Ref. 6.2**). However, the figures used for the detailed modelling come from the PEI Report (PEI Report Volume I Chapter 10: Traffic and Transportation, PEI Volume I). This is because the modelled traffic numbers for the ES are lower than those assessed for the PEI, so the higher figures from the PEI Report are used to present a 'worst case' scenario. The traffic data used in this assessment includes the following scenarios:

- 2024 baseline scenario
- 2036 Do Minimum (DM) scenario, which is the future construction year traffic flows without the construction of the Proposed Development; and
- 2036 Do Something (DS) scenario, which is the same as the DM scenario but includes the construction traffic generated by the construction of the Proposed Development.

8.3.27. The assessment of construction traffic includes traffic generated by 'committed' developments and therefore is inherently cumulative. The schemes included in the assessment are detailed in **ES Volume II Appendix 8A**: Air Quality - Construction Assessment (**Application Document Ref. 6.3**).

~~8.3.27.~~8.3.28. The construction year of 2036 has been modelled due to uncertainty in the timing of the construction schedule, as this represents a 'worst-case' traffic scenario (see **ES Volume I Chapter 10**: Traffic and Transportation (**Application Document Ref. 6.2**)). Air quality is expected to improve as traffic emissions and emissions from other sources progressively decrease across the UK, and an earlier year would therefore provide a more conservative assessment of potential air quality effects. Dispersion modelling has used the 2036 traffic data (which includes additional growth) with 2030 emissions and backgrounds[1] to assess scenarios the Proposed Development construction work. On the basis of these predictions, the change in key pollutant concentrations (NO_2, PM_{10} and $PM_{2.5}$) associated with the Proposed Development have been established.

~~8.3.28.~~8.3.29. The future decommissioning baseline scenario is not included, as it is considered that the effects would be comparable to, or lower than, construction impacts, particularly given the expected improvements in vehicle fleet emissions over that time.

~~8.3.29.~~8.3.30. Data in the form of traffic flows, composition (percentage HGV), and speed is used in modelling of emissions from road traffic during the construction phase.

~~8.3.30.~~8.3.31. Consideration has also been given within the assessment to the potential cumulative traffic emissions from the construction of the Proposed Development as well as the contribution from traffic associated with other committed schemes in the area. This is discussed further in **ES Volume I Chapter 10**: Traffic and Transportation (**Application Document Ref. 6.2**).

Operational phase – operational traffic assessment

~~8.3.31.~~8.3.32. No detailed assessment of operational traffic emissions has been made, as the numbers of additional vehicles associated with the operational phase of the Proposed Development are below the DMRB and IAQM screening criteria for requiring such assessment as detailed in **ES Volume II Appendix 8B**: Air Quality - Operational Assessment (**Application Document Ref. 6.3**).

[1] Emission rates on all road sources were calculated using Defra's Emissions Factor Toolkit v12.1 for each of the scenarios assessed. The Emission Factor Toolkit only includes dates up to the year 2030, consequently 2030 emissions have been applied to the 2036 traffic flows.

Operational phase – process emissions from the operational plant

~~8.3.32.~~8.3.33. Emissions from the operational Proposed Development have been assessed using the EA's Risk Assessment Guidance (Defra and Environment Agency, 2016), in order to identify where proposed emissions can be screened out as being unlikely to cause significant effects.

~~8.3.33.~~8.3.34. Detailed dispersion modelling using the atmospheric dispersion model ADMS (currently ADMS version 6.0.0.1) has been used to calculate the concentrations of pollutants (process contributions (PC)) at identified receptors. These concentrations have been compared with the defined AQAL for each pollutant species, as summarised in Table 8.1 to Table 8.3.

~~8.3.34.~~8.3.35. Dispersion modelling calculates the predicted concentrations arising from the emissions to atmosphere, based on Gaussian approximation techniques. The model employed has been developed for UK regulatory use. **ES Volume II Appendix 8B**: Air Quality – Operational Assessment (**Application Document Ref. 6.3**) details the model inputs for the assessment.

~~8.3.35.~~8.3.36. The assessment has been based on a single CCGT unit being operated continuously, as this is considered to represent the worst-case scenario in terms of the annual average operational emissions, as detailed in **ES Volume II Appendix 8B**: Air Quality - Operational Assessment (**Application Document Ref. 6.3**).

~~8.3.36.~~8.3.37. As detailed in **ES Volume I Chapter 4**: Proposed Development (**Application Document Ref. 6.2**), although the Proposed Development will be designed for the use of hydrogen as the fuel for the operation of the CCGT, if hydrogen is not available from the start of operation, the Proposed Development will start operation using natural gas as the fuel. In addition, there may also be an interim stage of operation using a blend of natural gas and hydrogen, whilst hydrogen supply is established. As such, the operational assessment has taken into account the potential for 100% natural gas firing and 100% hydrogen firing. It is considered that these two scenarios represent the full range of potential impacts that could occur from the Proposed Development, and that impacts associated with any interim operation on blends of natural gas and hydrogen would fall within this range. The worst case results from these two scenarios have been presented in this Chapter.

~~8.3.37.~~8.3.38. Whilst it is recognised that during start-up and shut down there may be short periods where emission concentrations are higher than those assessed, at this stage in the design process, there is limited data on the duration and release concentration of these emissions. During such times, it is envisaged that although the emission concentration may be higher, the gas flow rate will be lower, therefore resulting mass emissions are likely to be reasonably comparable with steady state

operation. It is therefore considered that this will have a minimal impact on the short-term impacts from the Proposed Development. It is anticipated that detail on start-up emissions will become available following detailed design and therefore these assumptions will be reappraised when information becomes available, as part of the Environmental Permit process.

~~8.3.38.~~8.3.39. The first operation (referred to as opening) of the Proposed Development is assumed to be in 2030 for the purpose of this assessment, which is the earliest date that the Proposed Development could realistically start to operate.

~~8.3.39.~~8.3.40. The assessment of worst-case long-term (annual mean) and short-term (daily and hourly mean) emissions resulting from the operation of the Proposed Development has been undertaken by comparing the maximum PC that occurs anywhere, (in order to ensure a worst-case assessment in terms of human health impacts) with the annual mean and hourly mean AQAL, taking into consideration the baseline air quality, in accordance with Environment Agency's Risk Assessment Guidance (Defra and Environment Agency, 2016).

~~8.3.40.~~8.3.41. An assessment of nutrient nitrogen enrichment has been undertaken by applying published deposition velocities to the predicted annual average NO_2 and NH_3 concentrations at the identified ecological sites, determined through dispersion modelling, to calculate nitrogen deposition rates (expressed as kilograms of nitrogen per hectare per year, kg N/ha/yr). These deposition rates have then been compared to the lower end of the relevant habitat's critical load range for nitrogen published by UK APIS (CEH and APIS, 2016), taking into consideration the baseline air quality.

~~8.3.41.~~8.3.42. Potential increases in acidity on designated ecological receptors from depositional contributions of NO_2 and NH_3 from the process contribution have also been considered. Acid deposition is derived from nitrogen deposition modelling values using standard conversion factors and expressed as kilograms of nitrogen equivalent per hectare per year (KqN_{eq}/ha/yr). The PC acid deposition rates and baseline deposition rates have been used within the APIS Critical Load Function Tool (CEH and APIS, 2016) to determine whether the contribution will result in exceedance of the defined acidity critical loads for the most sensitive feature.

~~8.3.42.~~8.3.43. Several non-statutory habitat sites have also been assessed for both nutrient nitrogen and acid deposition, due to the proximity of these sites to the Proposed Development. These include LWS and LNR. For these sites, there is little data available with regards to habitat types present and therefore the relevant critical load classes to be applied, for the purpose of assessment the predicted PC have been considered against an assumed critical load determined for the appropriate habitat

type, as informed by **ES Volume I Chapter 11**: Biodiversity and Nature Conservation (**Application Document Ref. 6.2**).

~~8.3.43.~~8.3.44. An assessment of combined effects with the Keadby 2 Power Station emissions is considered by including Keadby 2 Power Station contributions as part of a modified baseline, given that Keadby 2 only became commercially operational in March 2023 and therefore will not be included in the baseline monitoring data available for the study area. As Keadby 1 Power Station has been operating for several years its emissions are already accounted for in baseline data.

~~8.3.44.~~8.3.45. Cumulative impacts with other committed developments that could interact with the operational impacts and effects of the Proposed Development have been considered in Annex C of **ES Volume II Appendix 8B**: Air Quality – Operational Assessment (**Application Document Ref. 6.3**).

Evaluation of significance – construction phase dust assessment

~~8.3.45.~~8.3.46. For potential amenity effects, such as those related to dust deposition, the aim is to bring forward a scheme, to include mitigation measures as necessary that minimise the potential for amenity, human health, and ecological impacts as a result of the Proposed Development construction works.

~~8.3.46.~~8.3.47. The IAQM guidance (IAQM, 2024) does not provide a method for the evaluation of impacts on receptors from construction dust, rather a means to determine the level of mitigation required to avoid significant impacts on receptors. The guidance indicates that application of appropriate mitigation should ensure that residual effects will normally be 'not significant'. Such control measures are proposed to be included in the final CEMP which will be in accordance with the **Outline CEMP** provided submitted with this application (**Application Document Ref. 7.4**).

Evaluation of significance – traffic and operational emissions assessment

~~8.3.47.~~8.3.48. The evaluation of the significance of air quality effects from the traffic and operational point sources has been based on the criteria referenced in IAQM/ EPUK guidance (IAQM, 2017), and in the EA Risk Assessment Guidance (Defra and Environment Agency, 2016). The predicted changes in pollutant concentrations are compared to AQAL to determine the magnitude of change.

~~8.3.48.~~8.3.49. For a change of a given magnitude, the IAQM publication 'Land-Use Planning & Development Control: Planning for Air Quality (IAQM, 2017) has published recommendations for describing the magnitude of long-term impacts at individual receptors and describing the significance (Table 8.~~7~~8) of such impacts. This terminology has been changed where appropriate in order to maintain consistency with the rest of this ES Report – where the IAQM uses 'substantial' this has been changed to 'major', and 'slight' has been changed to 'minor'.

Table 8.7: Air quality impact descriptors for long term changes in ambient pollutant concentrations

Long term averaging concentration at receptor	Percentage change in annual mean concentrations				
	Up To 0.5%	0.5 – 1%	2-5%	6-10%	>10%
	Imperceptible	Very Low	Low	Medium	High
75% or less of AQAL	Negligible	Negligible	Negligible	Minor	Moderate
76-94% of AQAL	Negligible	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	Negligible	Minor	Moderate	Moderate	Major
103-109% of AQAL	Negligible	Moderate	Moderate	Major	Major
110% or more of AQAL	Negligible	Moderate	Major	Major	Major

AQAL = Air Quality Assessment Level (NAQS objective or Environmental Assessment Level)

~~8.3.49.~~8.3.50. The IAQM guidance (IAQM, 2017) is not explicit in the identification of whether any of the above impact descriptors should be considered 'significant' or 'not significant' effects, rather it indicates that the descriptors should be applied to individual receptors and a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect; other factors need to be considered. However, it indicates further that 'negligible' impacts are likely to lead to effects that are 'not significant' and 'major' impacts describe the potential for 'significant' effects. The judgment of significance of effects adopted within this assessment is discussed below.

~~8.3.50.~~8.3.51. The EA's Risk Assessment Guidance screening criteria for comparison of PC with AQAL states that an emission may be considered insignificant (or negligible) where:

- Short term PC <=10% of the AQAL; and
- Long term PC <=1% of the AQAL.

~~8.3.51.~~8.3.52. Where an emission cannot be screened out as insignificant, the second stage of screening considers the PC in the context of the existing background pollutant concentrations; the predicted environmental concentration (PEC) is considered acceptable where:

- Short term PC <20% of the short-term AQAL minus twice the long-term background concentration; and
- Long term PEC (PC + background concentration) <70% of the AQAL.

~~8.3.52.~~8.3.53. For local nature sites, such as LWS, the EA's Risk Assessment Guidance states that where the short or long-term PC is less than 100% of the respective standard, then there are unlikely to be significant effects due to changes in air quality. There is no need to assess the PEC.

~~8.3.53.~~8.3.54. Where the PEC is not predicted to exceed the AQAL, and the proposed emissions comply with the BAT-AEL (or equivalent requirements) the emissions are typically considered acceptable by the Environment Agency.

~~8.3.54.~~8.3.55. The IAQM guidance indicates that the EA's Risk Assessment Guidance threshold criterion of 10% of the short term AQAL is sufficiently small in magnitude to be regarded as having an 'insignificant' effect. The IAQM guidance deviates from the EA's Risk Assessment Guidance with respect to the background contribution; the IAQM guidance indicates that severity of peak short-term concentrations can be described without the need to reference background concentrations as the PC is used to measure impact, not the overall concentration at a receptor. The peak short-term PC from an elevated source is described in the IAQM guidance as follows:

- PC <=10% of the AQAL represents an 'insignificant' (negligible) impact;
- PC 11-20% of the AQAL is small in magnitude representing a minor impact;
- PC 21-50% of the AQAL is medium in magnitude representing a moderate impact; and
- PC >51% of the AQAL is large in magnitude representing a 'substantial' (major) impact.

~~8.3.55.~~8.3.56. The impact of point source emissions on ecological receptors, through deposition of nutrient nitrogen or acidity, has been evaluated using the Environment Agency ~~and Natural England~~ insignificance criterion of 1% of the long-term objective, as above. Natural England consider the 1% threshold to demonstrate insignificance in-combination with other schemes.

~~8.3.56.~~8.3.57. Where emissions are not screened as insignificant (negligible), the descriptive terms for the air quality effect outlined in Table 8.~~6~~ 7 above have been applied.

Evaluation of significance – proposed development as a whole

~~8.3.57.~~8.3.58. Following the assessment of each individual air quality effect (construction dust, traffic and operational plant), the significance of all of the reported effects is then considered for the Proposed Development in

overall terms, recognising that construction dust and traffic will occur in the same time period, but that operational effects would occur at a later date. The potential for the Proposed Development to contribute to, or interfere with, the successful implementation of policies and strategies for the management of local air quality are considered if relevant, but the principal focus is any change to the likelihood of future achievement of the AQALs, (which also relate to compliance with local authority goals for LAQM and objectives set for the protection of human health).

~~8.3.58.~~8.3.59. In terms of the significance of the effects (consequences) of any adverse impacts, an effect is reported as being either 'not significant' or as being 'significant'. If the overall effect of the development on local air quality or on amenity is found to be 'moderate' or 'major' this is deemed to be 'significant' for EIA purposes. Effects found to be 'minor' or 'negligible' are considered to be 'not significant'.

Sources of information/ data

~~8.3.59.~~8.3.60. The physical parameters for the modelling of emissions from the Proposed Development's stack have been sourced from concept design data provided by design studies prepared for the Proposed Development, and the pollutant mass emission rates have been calculated based on relevant BAT-AEL or the GET ELV. They are summarised in **ES Volume II Appendix 8B**: Air Quality - Operational Assessment (**Application Document Ref. 6.3**), Table 1 - Table 3.

~~8.3.60.~~8.3.61. The dispersion modelling of point source emissions has taken into consideration the sensitivity of predicted results to model input variables, and to ultimately identify the realistic worst-case results for inclusion in the assessment. These variables include:

- meteorological data, for which five years' recent data (2018 - 2022) from a representative meteorological station (Doncaster Robin Hood Airport) have been used; and
- inclusion of buildings, structures and local topography that could affect dispersion from the source into the modelling scenarios.

Use of the Rochdale Envelope

~~8.3.61.~~8.3.62. A focused use of the Rochdale Envelope approach has been adopted to present a worst-case assessment of potential environmental effects of the different parameters of the Proposed Development that cannot yet be fixed. The parameters included within the Rochdale Envelope are described in **ES Volume I Chapter 4**: Proposed Development (**Application Document Ref. 6.2**).

~~8.3.62.~~8.3.63. For this assessment, the preferred CCGT technology provider has not yet been selected and will be subject to further design and commercial engagement. Therefore, the emission parameters for the

CCGT unit proposed by the different technology providers under consideration have been compared and the worst-case emissions leading to the worst-case predicted impacts have been used in the assessment, in order to ensure that it is conservative.

~~8.3.63.~~8.3.64. The operational Site has been assumed to be running 24 hours a day for 8,760 hours per year for the purpose of carrying out a worst-case assessment, however it is likely that the plant may operate in dispatchable mode, with much lower running hours annually. Operation for 8,760 hours per year has been considered because continuous operation throughout the year is considered to lead to worst-case annual average impacts.

~~8.3.64.~~8.3.65. Whilst it is recognised that during start-up and shut down there may be short periods where emissions concentrations from the CCGT stack are higher than those assessed, there is limited data on the duration and release concentration of these emissions. Nevertheless, based on current understanding of the likely emissions during start-up, their duration and the fact that gas flow rates will be lower during start-up (thereby reducing mass emission rates), it is considered that effects will be comparable to or lower than those assessed for continuous operation.

~~8.3.65.~~8.3.66. The building dimensions included within the assessment are the maximum dimensions under consideration. It is envisaged that should the actual buildings be smaller in size, specifically in height, than those used in the assessment, then this would have the potential to reduce the plume downwash effects associated with buildings in close proximity to the CCGT stack, therefore improving emission dispersion. This would lead to a reduction in the level of impact predicted in the assessment.

~~8.3.66.~~8.3.67. A range of stack heights have been assessed and in terms of the air quality impacts, the lowest stack height considered to be appropriate for the operational Proposed Development has been used to provide the results presented in the assessment.

8.3.68. It is also recognised that the actual stack location has not been fixed, however it is considered that should the stack be located within 30m of its assessed location, the effect on the assessment results would not change the assessment outcome, considering all the worst-case assumptions that have been applied.

~~8.3.67.~~8.3.69. Should the location or height of the stack vary from those presented in this assessment through detailed design, the impacts will be

reassessed through dispersion modelling to ensure that there is no increase to the impacts presented in this assessment.

Assessment Assumptions and Limitations

~~8.3.68.~~8.3.70. The data presented in this ES is based on the current understanding of the emissions performance of the Proposed Development. The assessed parameters and methodology used in the assessment of air quality impacts is detailed within this chapter and the supporting appendices (**ES Volume II Appendix: 8A**: Air Quality - Construction Assessment and **Appendix: 8B**: Air Quality - Operational Assessment (**Application Document Ref. 6.3**).

~~8.3.69.~~8.3.71. The final height of stack for the operational Proposed Development is still to be determined, however the results reported in this assessment are based on the lowest height of stack that could be used, if the maximum building heights used in the assessment are representative of the final design, and therefore represent a worst-case. Therefore, should the maximum building heights be reduced through detailed design, there may be potential to reduce the height of stack accordingly, without increasing the predicted impacts. Any such reduction in stack height would be subject to further modelling to ensure that predicted impacts remained within those presented in this ES and controlled under the Environmental Permit.

~~8.3.70.~~8.3.72. Whilst ecological impacts are considered in this Chapter and **ES Volume II Appendix 8B:** Air Quality - Operational Assessment (**Application Document Ref. 6.3**), further information on the potential effects of the operational emissions from the Proposed Development is discussed in **ES Volume I Chapter 11:** Biodiversity and Nature Conservation (**Application Document Ref. 6.2**).

8.4. Baseline Conditions

Existing Baseline -Sensitive Receptors

8.4.1. During the construction phase, based on IAQM guidance (IAQM, 2024) explained in paragraph 8.3.4, receptors potentially affected by dust soiling and short-term concentrations of PM_{10} generated during construction activities are limited to:

- human receptors: located within 250m of the nearest construction activity, and/ or within 50m of a public road used by construction traffic that is within 250m of the construction site entrance; and
- ecological receptors: located within 50m of the nearest construction activity and/ or within 50m of a public road used by construction traffic that is within 250m of the construction site entrance.

8.4.2. As described in **ES Volume I Chapter 5**: Construction Programme and Management (**Application Document Ref. 6.2**) construction traffic would use the existing access road off the A18. Several properties are identified as relevant receptors along this construction route.

8.4.3. Receptors potentially affected by the exhaust emissions associated with construction phase vehicle movements are those located within 200m of a public road used by construction traffic to access the Site.

8.4.4. Receptors potentially affected by operational emissions from the Proposed Development including local residential and amenity receptors have been identified through site knowledge, desk study of local mapping and consultation. Through the dispersion modelling, isopleth figures of pollutant concentration dispersion have been examined, to identify the receptors that will receive the highest point source contributions so that the assessment of impact can be made at these receptors. Those receptors considered to be representative of impacts in the vicinity of the Proposed Development have been modelled as discrete receptors.

8.4.5. Ecological receptors potentially affected by operational emissions have been identified through desk study of Defra Magic mapping (Defra, 2020a) and consultation (see **ES Volume I Chapter 11**: Biodiversity and Nature Conservation (**Application Document Ref. 6.2**)). Statutory designated sites including SAC, SPA, Ramsar sites and SSSI up to 15km from the Site have been considered. Several non-statutory designated sites including LNR and LWS within 2km have also been considered. Further details of these sites and reasons for designations are provided in **ES Volume I Chapter 11**: Biodiversity and Nature Conservation (**Application Document Ref. 6.2**).

8.4.6. Identified receptors are detailed in Table 8.8 below and are shown in **ES Volume III Figure 8.1**: Air Quality – Operation Study Area Human Health Receptors, **Figure 8.2**: Air Quality – Operation Study Area Ecological Health Receptors and **Figure 8.3**: Air Quality – Construction Study Area (**Application Document Ref. 6.4**). (HR = Human Receptor (for traffic impacts), ER = Ecological Receptor (for traffic impacts), OR = Operational Receptor (for human health impacts), OE = Operational Ecology).

Table 8.8: Identified receptors with potential for air quality impacts from the Proposed Development

ID (refer to Figure 8.3 in ES Volume III)	Receptor name	Designation	Grid reference		Shortest Distance to Road Source (m)	Distance and direction from the operational Main Site
			X	Y		
HR1	Pilfrey Farm, A18	Residential	480758	409987	50	-
HR2	Residential Property on Crowle Bank Road	Residential	482615	409594	20	-
HR3	Residential Property on Kelsey Lane	Residential	483281	409791	15	-
HR4	Residential Property on Old School Lane, Keadby	Residential	483863	410650	20	-
HR5	Little Hurst Cottages, A161	Residential	478182	409794	20	-
HR6	Hirstwood Farm, A161	Residential	478346	409479	30	-

ID (refer to Figure 8.3 in ES Volume III)	Receptor name	Designation	Grid reference		Shortest Distance to Road Source (m)	Distance and direction from the operational Main Site
			X	Y		
HR7	Residential property at Mosswood Court, A161	Residential	478458	409229	70	-
HR8	Residential Property, A18	Residential	475005	409846	25	-
HR9	Residential Property on High Levels Bank 1	Residential	474311	409829	15	-
HR10	Residential Property on High Levels Bank 2	Residential	471715	410667	15	-
HR11	Residential Property on High Levels Bank 3	Residential	471561	410692	10	-

ID (refer to Figure 8.3 in ES Volume III)	Receptor name	Designation	Grid reference		Shortest Distance to Road Source (m)	Distance and direction from the operational Main Site
			X	Y		
HR12	Residential Property on High Levels Bank 4	Residential	470750	410961	15	-
ER1a-j[1]	Humber Estuary	Ramsar, SSSI and SAC	484102 – 484065	410665 -410865	5 - 180	-
ER2	Hatfield Chase Ditches	SSSI	478707	410333	10	-
ER3	Crowle Barrow Pits	SSSI	479056	410468	200	-
OR1	Holly House	Residential	483035	411880	-	780m north-east
OR2	1 Trent Side, Keadby	Residential	483370	411285	-	1.2km south-east
OR3	North Pilfrey Farm	Residential	480855	411405	-	990m south-west
OR4	Keadby Grange	Residential	481565	410910	-	800m south

ID (refer to Figure 8.3 in ES Volume III)	Receptor name	Designation	Grid reference		Shortest Distance to Road Source (m)	Distance and direction from the operational Main Site
			X	Y		
OR5	Pharon-Ville, Gunness	Residential	484060	411660	-	1.8km east
OR6	Boskeydyke Farm, Amcotts	Residential	483860	413350	-	2.0km north-east
OR7	Grange Cottage, Gunness	Residential	484710	412315	-	2.5km north-east
OR8	Pilfrey Farm	Residential	480770	409995	-	2.1km south-west
OR9	Thorne Village	Residential	469570	412680	-	12.2km west
OR10	Vazon Bridge House		482510	411500	-	455m south-east
OR11	North Moor Farm		482875	412620	-	740m north-west
OR12	Trent Road	Residential	483400	411620		1km east

ID (refer to Figure 8.3 in ES Volume III)	Receptor name	Designation	Grid reference		Shortest Distance to Road Source	Distance and direction from the operational Main Site
			X	Y	(m)	
OE1 - 5[2]	Humber Estuary	Ramsar, SSSI and SAC	483573 – 483951	411823 -412817	-	1.3km – 1.8km east
OE6	Crowle Borrow Pits	SSSI	479102	410825	-	2.9km south-west
OE7	Hatfield Chase Ditches	SSSI	478769	410293	-	3.3km south-west
OE8	Eastoft Meadow	SSSI	478772	414311	-	3.6km north-west
OE9	Belshaw	SSSI	476961	406079	-	7.7km south-west
OE10	Thorne Moor	SAC, SPA and SSSI	475934	414720	-	6.3km north-west
OE11	Epworth Turbary	SSSI	475690	404195	-	9.8km south-west
OE12	Risby Warren	SSSI	491180	413564	-	9.1km east

ID (refer to Figure 8.3 in ES Volume III)	Receptor name	Designation	Grid reference		Shortest Distance to Road Source	Distance and direction from the operational Main Site
			X	Y	(m)	
OE13	Hatfield Moor	SAC, SPA and SSSI	471828	408178	-	10.4km west
OE14	Messingham Heath	SSSI	487748	403574	-	9.9km south-east
OE15	Tuetoes Hills	SSSI	484361	401698	-	10.4km south
OE16	Haxey Turbary	SSSI	475107	401866	-	11.9km south-west
OE17	Rush Furlong	SSSI	478141	400564	-	11.9km south
OE18	Hewson's Field	SSSI	478493	399614	-	12.7km south
OE19	Messingham Sand Quarry	SSSI	491394	404065	-	12.0km south-east
OE20	Manton and Twigmoor	SSSI	492895	405918	-	12.2km south-east

ID (refer to Figure 8.3 in ES Volume III)	Receptor name	Designation	Grid reference		Shortest Distance to Road Source	Distance and direction from the operational Main Site
			X	Y	(m)	
OE21	Scotton and Laughton Forest Ponds	SSSI	485863	399966	-	12.4km south
OE22	Broughton Far Wood	SSSI	495776	410821	-	13.6km east
OE23	Broughton Alder	SSSI	495914	409994	-	13.9km east
OE24	Scotton Beck Field	SSSI	487885	399177	-	13.9km south-east
OE25	Scotton Common	SSSI	486951	398641	-	14.1km south
OE26	Laughton Common	SSSI	483534	397224	-	14.7km south
OE27	Stainforth and Keadby Canal Corridor	LWS	482055	411529	-	330m south
OE28	Keadby Wetland	LWS	482773	411433	-	695m east
OE29	Keadby Wet Grassland	LWS	482785	411409	-	710m east

ID (refer to Figure 8.3 in ES Volume III)	Receptor name	Designation	Grid reference		Shortest Distance to Road Source (m)	Distance and direction from the operational Main Site
			X	Y		
OE30	Three Rivers	LWS	482956	411068	-	1.1km south-east
OE31	Ash Tip	N/A	481797	412068	-	Adjacent to west
OE32	Humber Estuary (at Blacktoft Sands)	Ramsar, SSSI, SAC and SPA	486210	421275	-	10.3km north-east

1 Assessed along a transect at approximately 20m intervals to determine rate of decrease in pollutant.

2 Locations along the riverside closest to the Proposed Development to determine likely area of maximum impact.

8.4.7. In addition, there are two additional SSSI within 15km of the Proposed Development (Conesby Quarry and Manton Stone Quarry) which are designated due to their geological features. It is therefore considered that these sites will not be affected by emissions from the Proposed Development, as the critical levels and critical loads assigned to such sites are for the protection of vegetation and ecosystems only, and therefore they have been screened from further assessment.

8.4.8. Six LWS (Keadby Boundary Drain, South Soak Drain, Keadby Warping Drain, Hatfield Waste Drain, North Engine Drain, Belton and the River Torne) have not been included in the assessment as the relevant habitats are aquatic, and therefore not considered to be sensitive to air quality impacts from nitrogen. Guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM, 2021) states that *"Freshwater systems are generally phosphorus-limited....While the presence of nitrogen is not irrelevant, in most freshwater systems it is more important to control phosphorus inputs than nitrogen inputs. This is why phosphate discharge limits are often introduced on wastewater treatment works in order to protect freshwater habitats, but why nitrogen limits are rarely introduced to achieve the same objective. Phosphorus does not typically deposit from the atmosphere."*

Baseline Air Quality

8.4.9. Existing air quality conditions in the vicinity of the Site have been evaluated through a review of Local Authority air quality management reports, Defra published data and other sources. The key pollutants of concern resulting from construction and operation of the Proposed Development and that have potentially elevated background concentrations from other sources are NO_x, NO_2, CO, NH_3, PM_{10} and $PM_{2.5}$, therefore the assessment of baseline conditions within this chapter considers these pollutants only.

8.4.10. There is a single AQMA designated within the administrative boundary of NLC. The AQMA is approximately 6.3km from the Proposed Development and covers an area surrounding the steelworks to the east of Scunthorpe and was designated due to the exceedance of the PM_{10} 24 hour mean National Air Quality Objective. It is not considered that the Proposed Development will impact upon the air quality within the AQMA as the AQMA has not been declared for a pollutant species emitted from the operational Proposed Development.

8.4.11. NLC undertook automatic monitoring at 6 sites within their administrative area in 2022 (the most recent data available)and undertook monitoring for NO_2 using diffusion tubes at 24 locations.

8.4.12. The nearest automatic monitors are located approximately 7.5km from the Site, within the AQMA on the eastern side of Scunthorpe. The main focus of these monitors is for PM_{10} due to the steelworks. Of the seven monitors

within the study area, only two of them monitor NO_2 – CM1 (Scunthorpe Town AURN) and CM3 (Low Santon).

8.4.13. The annual mean concentration for NO_2 and for PM_{10} at CM1 (Scunthorpe Town AURN) in 2022 were 13µg/m^3 and 19 µg/m^3. At CM3 (Low Santon) the annual mean concentration for NO_2 was 13µg/m^3 and for PM_{10} was 29µg/m^3.

8.4.14. There is one PM_{10} monitor located at an Urban Background location in Scunthorpe – CM2. The 2022 annual mean concentration of PM_{10} at this location is 22µg/m^3.

8.4.15. The nearest NO_2 diffusion tubes to the Proposed Development are approximately 4.5km to the east, located on Doncaster Road (DT3 and DT4) and Scotter Road (DT2, near junction with Doncaster Road). Doncaster Road is a major road from the A18 and M181 into the centre of Scunthorpe. Annual mean concentrations of NO_2 at these locations range between 20 - 24µg/m^3, well below the national objective value of 40µg/m^3.

8.4.16. The results of the monitoring indicate that air quality with NLC's administrative area is good, with only isolated short-term incidents of elevated concentration of PM_{10} due to the steelworks. The area surrounding the Proposed Development is not expected to experience these short-term incidents, and air quality at nearby receptors is expected to be better than that at the monitoring locations located in the more urban area around Scunthorpe.

8.4.17. The data for the monitoring sites that are considered to be relevant for the study area of the Proposed Development are detailed in Table 8.9 and Table 8-10. in **ES Volume II Appendix 8B:** Air Quality – Operational Assessment (**Application Document Ref. 6.3**) and the locations of all the monitoring sites (automatic and diffusion tubes) used in the assessment are shown in **ES Volume III Figure 8.5** (**Application Document Ref. 6.4**).

Table 8.9: NLC Monitored Annual Mean Nitrogen Dioxide Concentrations

Site ID	Monitoring location	Site type	Grid reference		2022 Annual Mean conc[n] (µg/m^3)
			X	Y	
CM1	Scunthorpe Town AURN	Industrial (automatic)	490320	410831	13
CM3	Low Santon	Industrial	492945	411931	13

		(automatic)			
DT2	Scotter Road	Roadside (Diffusion Tube)	487239	411259	24
DT3	B&Q	Roadside (Diffusion Tube)	486699	411110	20
DT4	Hilton Avenue	Roadside (Diffusion Tube)	486928	411156	21

Table 8.10: NLC Monitored Annual Mean PM_{10} Concentrations

Site ID	Monitoring location	Site type	Grid reference		2022 Annual mean conc[n]
			X	Y	(µg/m^3)
CM1	Scunthorpe Town AURN	Industrial (automatic)	490320	410831	19
CM2	East Common Lane	Urban Background (automatic)	490663	409789	22
CM3	Low Santon	Industrial (automatic)	492945	411931	29

8.4.18. Background data has also been obtained from Defra published maps (Defra, 2020b) for the locations of likely maximum impact from point source emissions from the Proposed Development, and at identified sensitive receptor locations.

8.4.19. Background mapping data for 2021 (based on 2021 background maps) (Defra, 2020b) is conservatively assumed to be representative of the opening (2030) baseline; as general trends are showing a reduction in both NO_2 and PM_{10} concentrations over time, this is considered to be a conservative assumption.

8.4.20. Background data from the Defra background maps for the receptors and roads in the vicinity of the Proposed Development is provided in Table 8.11 and indicates NO_2, CO, PM_{10} and $PM_{2.5}$ concentrations are consistently well below the relevant AQAL. Short term background

concentrations are assumed to be twice the annual mean, in line with the Environment Agency's guidance, and are shown in brackets in Table 8.11.

Table 8.11: Defra Background Maps Pollutant Concentrations - 2021

Receptors	Grid Reference of Centre Point	Annual Mean Concentration (µg/m^3)				
		NOx	NO_2	CO[a]	PM_{10}	$PM_{2.5}$
TR1, OR8	480500, 409500	7.9 (15.9)	6.3 (12.6)	115.5 (231.0)	14.0 (28.0)	6.2
TR2	482500, 409500	8.1 (16.1)	6.4 (12.7)	117.3 (234.6)	14.0 (27.9)	6.1
TR3	483500, 409500	8.4 (16.8)	6.6 (13.3)	11.7 (235.5)	13.9 (27.8)	6.3
TR4, TR5, TR6	483500, 410500	8.8 (17.6)	6.9 (13.8)	114.6 (229.2)	13.4 (26.8)	6.3
TR7, TR8, TR9, OR1, OR2	483500, 411500	8.4 (16.9)	6.6 (13.3)	114.6 (229.2)	12.7 (25.5)	6.1
TR10, TR11, TR12	478500, 409500	8.2 (16.4)	6.5 (12.9)	116.4 (232.8)	14.3 (28.7)	6.2
OR3	480500, 411500	8.1 (16.3)	6.4 (12.8)	112.4 (224.8)	13.7 (27.5)	6.0
OR4	481500, 410500	7.7 (15.5)	6.1 (12.2)	113.3 (226.6)	13.7 (27.5)	6.0
OR5	484500, 411500	9.2 (18.3)	7.2 (14.3)	117.3 (234.6)	13.2 (26.5)	6.2
OR6	483500, 413500	7.9 (15.9)	6.3 (12.5)	112.8 (225.7)	13.7 (27.4)	6.0
OR7	484500, 412500	8.7 (17.3)	6.8 (13.6)	129.3 (258.7)	12.7 (25.3)	6.0

Receptors	Grid Reference of Centre Point	Annual Mean Concentration (µg/m^3)				
		NOx	NO_2	CO[a]	PM_{10}	$PM_{2.5}$
OR9	469500, 412500	10.6 (21.1)	8.2 (16.4)	129.3 (258.7)	12.4 (24.8)	6.2
OR10	482500, 411500	8.4 (16.9)	6.6 (13.3)	114.6 (229.3)	13.3 (26.5)	6.0
OR11	482500, 412500	7.8 (15.6)	6.2 (12.3)	113.7 (227.5)	13.7 (27.3)	6.0
OR12	483500, 411500	8.4 (16.9)	6.6 (13.3)	114.6 (229.2)	12.7 (25.5)	6.1

[a] Background concentrations of CO are from the 2001 background maps scaled to 2021 concentrations.

Note: Numbers in brackets represent the short-term background concentrations.

8.4.21. The Defra NO_2 background mapping data is lower than the automatic monitoring data from the Urban Background monitoring locations in NLC's administrative area. The Defra background concentrations for PM_{10} are also below the monitored annual mean PM_{10} concentrations shown in Table 8.10.

8.4.22. The background data selected for the assessment is detailed and justified within the accompanying appendices to this chapter (**ES Volume II Appendix 8A**: Air Quality - Construction Assessment and **Appendix 8B**: Air Quality - Operational Assessment (**Application Document Ref. 6.3**)).

8.4.23. Baseline pollutant concentrations at human health receptors show that concentrations of all pollutants are well below all AQAL for all pollutants, indicating that there are no potential breaches of the standards in the vicinity of the Proposed Development.

8.4.24. The baseline NO_x pollutant concentrations and acid and nutrient nitrogen deposition rates at the identified statutory designated ecological receptors have been obtained from APIS and are provided in **ES Volume II Appendix 8B**: Air Quality - Operational Assessment (**Application Document Ref. 6.3**).

Future Baseline Air Quality

8.4.25. Background concentrations of pollutants are expected to decrease in the future due to changes in technology and the types of emission sources; however, to provide a conservative prediction of pollutant concentrations in the future, the current baseline background concentrations are used for

the future operational assessment scenarios, assuming no decrease in background concentrations.

8.5. Development Design and Impact Avoidance

Construction

Construction Environmental Management Plan (CEMP)

8.5.1. Emissions of dust and particulates from the construction phase of the Proposed Development will be controlled in accordance with industry best practice, through incorporation of appropriate control measures according to the risks posed by the activities undertaken, as determined through this assessment process. The management of dust and particulates and application of adequate mitigation measures will be enforced through embedding measures in the CEMP. An **Outline CEMP** has been submitted (**Application Document Ref. 7.4)**. The final CEMP will be developed in accordance with the principles set out in the **Outline CEMP** (**Application Document Ref. 7.4)**.

8.5.2. Based on an initial assessment of the Site and surrounding area, of its sensitivity to dust impacts and the likely risk of impacts arising from each of the key construction activities (earthworks, construction, demolition and 'trackout' of material onto roads (see **ES Volume II Appendix 8A**: Air Quality - Construction Assessment (**Application Document Ref. 6.3**)), appropriate embedded measures to be implemented during construction (good site techniques drawn from the 'high risk' site schedule in IAQM guidance) that have been identified are:

- avoid mechanical roughening or grinding of concrete surfaces, where appropriate;
- store sand and aggregates in bunded areas and store cement powder and fine materials in silos, where appropriate;
- use water suppression and regular cleaning to minimise mud on roads, and control dust during earth moving activities;
- cover vehicles leaving the construction site that are carrying waste materials or spoil;
- employ wheel wash systems at site exits;
- restrict, where practicable, the use of unmade road accesses;
- minimising duration of storage of topsoil or spoil during pipeline construction; and
- prohibit open fires on site.

8.5.3. Good practice will also be employed for the siting and operation of NRMM to control associated emissions, including:

- minimise vehicle and plant idling;

- where reasonably practicable, locating static plant away from sensitive boundaries or receptors; and
- minimise operating time outside of core working hours/ daylight hours.

Operation

IED/ BAT-AEL Emission Limit Value (ELV) compliance

8.5.4. The Proposed Development will be designed such that process emissions to air comply with the relevant ELV requirements specified in either the IED, or, if tighter, the LCP BRef/ BATc or the Environment Agency's GET. This will be regulated by the Environment Agency through the Environmental Permit required for the operation of the Proposed Development.

Stack height

8.5.5. The proposed stack height for the Proposed Development has been assessed as a worst-case acceptable height with consideration given to minimisation of ground-level air quality impacts and the visual impacts of a taller stack, based on current worst-case building massings of the main structures of the Proposed Development.

8.5.6. Dispersion modelling has been undertaken to determine the optimum height of the stack at the current stage of design, through comparison of the maximum impacts at human health and ecological receptors, to result in impacts at sensitive receptors that are considered to be acceptable.

8.5.7. At the detailed design stage, should the final building dimensions be reduced from those assessed in this ES, a lower stack height may be able to be used to achieve the same level of effect as presented in this chapter.

Emissions Control

8.5.8. The impact assessment is based on emissions performance from the CCGT that technology providers have confirmed is achievable through combustion control techniques. Emissions of NOx from the CCGT will be controlled by primary combustion techniques, low-NOx burners and SCR, if required, so as to minimise NOx emissions to the required ELV.

Decommissioning

8.5.9. Appropriate best practice mitigation measures will be applied during any decommissioning works and documented in a Decommissioning Environmental Management Plan (DEMP), the approval and submission of which is secured by requirement 39; no additional mitigation for decommissioning of the Proposed Development beyond such best practice is considered necessary at this stage. The predicted air quality effects of eventual decommissioning of the Proposed Development are considered to be comparable to, or less than, those assessed for construction activities.

8.6. Likely Impacts and Effects

Construction

Assessment of construction dust

8.6.1. The area sensitive to dust soiling and PM_{10} health effects has been assessed, as detailed in **ES Volume II Appendix 8A**: Air Quality – Construction Assessment (**Application Document Ref. 6.3**), from the sensitivity of receptors and the proximity of the Proposed Development activities to these receptors. Identified sensitive receptors to dust soiling and PM_{10} effects from construction works are detailed in Table 8 of **ES Volume II Appendix 8A**: Air Quality – Construction Assessment (**Application Document Ref. 6.3**).

8.6.2. A number of residential receptors (high sensitivity) and ecological receptors (low to medium sensitivity where they are local wildlife sites; high sensitivity where they are internationally/ nationally designated i.e. the Humber Estuary RAMSAR, SAC and SSSI) have been identified within 250m of the site boundary or site exit (Table 8 in **ES Volume II Appendix 8A:** Air Quality - Construction Assessment (**Application Document Ref. 6.3**)). The assessment has considered risks from demolition/ site clearance works, earthworks, construction and trackout (of mud to the road) and, based on the potential scale of activities and the sensitivity of the receptor area, (as defined in **ES Volume II Appendix 8A:** Air Quality - Construction Assessment (**Application Document Ref. 6.3**)) unmitigated dust impacts are considered to be 'high risk' for ecological impacts, 'medium to high risk' for dust soiling impacts, and 'low to medium risk' for human health impacts. Therefore, mitigation measures appropriate to the scale of perceived risk would be applied as part of the CEMP.

Assessment of construction traffic

8.6.3. Table 15 - Table 17 of **ES Volume II Appendix 8A**: Air Quality - Construction Assessment (**Application Document Ref. 6.3**) shows the predicted annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ respectively. Table 18 of **ES Volume II Appendix 8A:** Air Quality - Construction Assessment (**Application Document Ref. 6.3**) show the relevant information and assessment results for the significance of construction traffic impacts on ecological receptors.

8.6.4. The impact at all human receptors can be considered negligible, as both the change between the Do Minimum and Do Something scenarios for all receptors is less than 1% of the AQAL; and all receptors are below 75% of the AQAL.

8.6.5. For ecological receptors, impacts can be considered negligible as the predicted nitrogen deposition, ammonia and acid deposition is less than 1% of the lower critical load for all receptors assessed.

8.6.6. The effect of changes in traffic flows due to construction traffic on human health and ecological receptors is therefore considered to be negligible (**not significant**).

Assessment of emissions from construction site plant (NRMM)

8.6.7. The assessment has identified no sensitive human receptors within 200m of the Main Site, however there are a number close to the Water Connection Corridors, Waterborne Transport Off-loading Area, Construction Access Route and the Biodiversity Mitigation area. Construction activities in these areas are described in **ES Volume I Chapter 5**: Construction Programme and Management (**Application Document Ref. 6.2**). As works within these areas will be phased, NRMM and site plant will only be required to be operational at that nearest location for a limited duration over the overall construction period, and only operational on an 'as and when required' basis during that particular phase. Emissions from site plant and NRMM will also be controlled by measures set out in the **Outline CEMP**, provided (**Application Document Ref. 7.4)** to reduce emissions associated with this source, including restriction of their operation within designated areas only, prohibiting of idling, the enforcement a minimum engine emissions standard and enforcement of maximum site speed limits. Due to these proposed controls, it is considered that the potential for NRMM emissions within the Site to result in air quality impacts on local human health receptors is considered negligible with reference to the IAQM/ EPUK screening criterion. The effect of NRMM emissions on human health receptors at the Main Site is therefore considered to be **not significant**.

8.6.8. It is considered that there would be no requirement for NRMM plant to be located closer than 600m to any ecological receptor. Given the size of such plant (likely to be less than 1MW in size), and the distance to the habitat receptors it is considered that the impacts at these sites would be **not significant**.

Abnormal loads (waterborne transport)

8.6.9. **ES Volume I Chapter 5**: Construction Programme and Management (**Application Document Ref. 6.2**) explains that a number of AIL movements are expected during the construction programme associated with the delivery of large items of plant and equipment. The exact number and size/ weight is not known at this stage and is based on specific construction methodologies that will be confirmed during front end engineering design (FEED).

8.6.10. Consistent with the AIL delivery strategy for the operational Keadby 2 Power Station whilst it was undergoing construction, it is expected that the largest abnormal loads will be received at the Port of Immingham and barged down the River Trent to the Waterborne Transport Offloading Area at Railway Wharf, which is included within the Order Limits for the Application (refer to **ES Volume III Figure 3.3:** Indicative Parts of the Site

Plan (**Application Document Ref. 6.4**)). The components will then be lifted using a mobile crane onto a hauled trailer and transported to the Site crossing the B1392 onto the temporary haul road that runs to the east of PD Port Services. This is an existing haul road and is also included within the Order Limits.

8.6.11. The smaller abnormal loads are expected to be transported by road from Immingham Dock via the M180 to Junction 2 and then from the A161 to the A18, entering the Site via Mabey Bridge. Should it be necessary, there is an alternative access route used during the construction of Keadby 2 Power Station, which is via Ealand village from the A161, New Trent Road and Bonnyhale Road. As this is already an established route and no works are required for the purposes of the Proposed Development, this route is not included within the Order Limits Site boundary.

8.6.12. Due to the limited number of vehicles and river vessels accessing these routes, the limited duration of activities and the intermittent hours that the routes will be used, it is considered that the impact on the RAMSAR/ SSSI/ SAC and human health receptors is likely to be negligible (**not significant**).

Operation

Process Emissions from the Operational Proposed Development

8.6.13. The impact of point source emissions from the Proposed Development at human health receptors has been determined from isopleth figures of pollutant dispersion and maximum model outputs at discrete receptor locations. The maximum hourly, daily and annual mean predicted concentrations have been compared with the relevant AQAL, as summarised in Table 8-12.

8.6.14. The results have been initially presented as the maximum concentration that occurs anywhere from just the operation of the Proposed Development, whether this corresponds to a receptor location or not. The detailed concentrations at all identified receptor locations are provided in Table 11 – Table 16 of **ES Volume II Appendix 8B**: Air Quality – Operational Assessment (**Application Document Ref. 6.3**).

8.6.15. Isopleth figures showing the maximum predicted annual and short-term process contributions of NO_2 and NOx are provided in **ES Volume III Figures 8.6 – 8.9** (**Application Document Ref. 6.4**) and an isopleth figure showing the predicted nitrogen deposition is provided in **ES Volume III Figure 8.10:** Nitrogen Deposition at Ecological Receptors (**Application Document Ref. 6.4**).

8.6.16. The dispersion modelling includes a number of conservative assumptions in combination, including:

- the operational Proposed Development has been assumed to operate on a continuous basis i.e. for 8,760 hour per year, although in practice

the plant would require routine maintenance periods meaning that actual operation would be less than this;

- the operational Proposed Development has been assumed to operate at full load, however this will not always be the case;
- reporting of the worst-case results from the five years of meteorological data modelled, other years therefore result in lower impacts;
- maximum building sizes within the assessed Rochdale Envelope;
- operation of the plant at proposed emission limits, or maximum concentrations provided by all technology providers, when annual average emissions are likely to be below these;
- presentation of the worst-case impacts from assessment of firing on 100% natural gas or 100% hydrogen; and,
- conservative estimates of background concentrations for the commencement of operation at the receptor locations.

Table 8.12: Results of operational impact assessment for human health impacts – maximum location

Species	AQAL ($\mu g/m^3$)	Proposed Development Only			Background Concentrations (BC)		PEC ($\mu g/m^3$)	PEC/ AQAL %	Significance of effect
		PC ($\mu g/m^3$)	PC/ AQAL %	Magnitude of impact	Existing ($\mu g/m^3$)	With K2 ($\mu g/m^3$)			
NO_2 hourly mean (as the 99.79th percentile)	200	36.6	18%	Minor	13.2	14.7	51.3	26%	Negligible adverse (**not significant**)
NO_2 annual mean	40	1.8	5%	Low	6.6	7.3	9.2	23%	Negligible adverse (**not significant**)
CO 1-hour mean (as the 100th percentile)	30,000	209	<1%	Insignificant	229	514	723	2%	Negligible adverse (**not significant**)
CO 8-hour rolling average	10,000	142	1%	Insignificant	229	514	657	7%	Negligible adverse (**not significant**)

Species	AQAL ($\mu g/m^3$)	Proposed Development Only			Background Concentrations (BC)		PEC ($\mu g/m^3$)	PEC/ AQAL %	Significance of effect
		PC ($\mu g/m^3$)	PC/ AQAL %	Magnitude of impact	Existing ($\mu g/m^3$)	With K2 ($\mu g/m^3$)			
NH_3 1-hour mean	2,500	8.0	0.3%	Insignificant	4.9	5.1	13.1	0.5%	Negligible adverse (**not significant**)
NH_3 annual mean	180	0.17	0.1%	Imperceptible	2.4	2.6	2.7	2%	Negligible adverse (**not significant**)

PC = Process Contribution, AQAL = Air Quality Assessment Level, BC = Background Concentration, PEC = Predicted Environmental Concentration

8.6.17. The impacts of all pollutant species released from the operational Proposed Development are predicted to result in negligible adverse effects at all receptors within the study area. The impact of NO_2, CO, NH_3 can therefore be considered to be **not significant** at all human health receptors.

8.6.18. As stated previously, at this stage in the design process, information on the potential for higher short term emissions during start-up is not available. However, it should be noted that the predicted effects of short-term emissions when assessed against long term average emissions are well below the criteria to show insignificance against the short term AQAL, so in the event that start-up emissions are higher, there is significant headroom in the assessment before significant effects would be realised.

8.6.19. The impact of point source emissions at ecological receptors has been determined from isopleth figures of pollutant dispersion and maximum model output at the discrete receptor locations. The maximum daily and annual mean predicted NOx concentrations have been compared with the relevant AQAL, as summarised in Table 8.13. The full results for each receptor are provided in Tables 13 - 14 with depositional impacts presented in Tables 15 – 16 **ES Volume II Appendix 8B**: Air Quality – Operational Assessment (**Application Document Ref. 6.3**).

Table 8.13: Results of operational impact assessment for worst-case ecological receptor impacts

Species	AQAL (µg/m³)	Proposed Development Only			Background Concentrations		PEC (µg/m³)	PEC/ AQAL %	Significance of effect
		PC (µg/m³)	PC/ AQAL %	Magnitude of impact	Existing (µg/m³)	With K2 (µg/m³)			
Worst-case receptor NO_x daily mean (as the 100th percentile) OE 28 Keadby Wetland LWS	75	24.9	33%	Medium	13.2	13.2	~~35.5~~38.1	~~51~~47%	**Not significant**[2]
Worst-case receptor NO_x annual mean	30	0.81	2.7%	Low	9.2	9.4	10.2	34%	Negligible adverse (**Not significant**)

[2] As described in paragraph 8.3.54, for local nature sites, such as LWS, the Environment Agency's guidance states that where the short or long-term PC is less than 100% of the respective standard, then there are unlikely to be significant effects due to changes in air quality.

Species	AQAL ($\mu g/m^3$)	Proposed Development Only			Background Concentrations		PEC ($\mu g/m^3$)	PEC/ AQAL %	Significance of effect
		PC ($\mu g/m^3$)	PC/ AQAL %	Magnitude of impact	Existing ($\mu g/m^3$)	With K2 ($\mu g/m^3$)			
OE 1-5 Humber Estuary Ramsar/ SAC/ SSSI									
Worst-case receptor NH_3 annual mean OE1–5 Humber Estuary Ramsar/ SAC/ SSSI	3	0.05	1.7%	Low	1.9	2.0	2.0	67%	Negligible adverse (**not significant**)
Worst-case receptor NH_3 annual mean OE12 Risby Warren SSSI	1	0.010	1.0%	Low	1.9	1.91	1.92	192%	Negligible adverse (**not significant**)

PC = Process Contribution, AQAL = Air Quality Assessment Level, BC = Background Concentration, PEC = Predicted Environmental Concentration

8.6.20. The impacts of the daily NO_x PC at the worst-affected ecological receptor (Keadby Wetland LWS) has been assessed as a medium magnitude of impact. The PEC (38.1µg/m^3) indicates that an exceedance of the daily critical level (75µg/m^3) is very unlikely, with impacts at 5147% of the critical level. It is therefore considered that the effect of this is **not significant**, given that the Environment Agency guidance states that where the short or long term PC at LWS is <100% of the critical level, there are unlikely to be significant effects due to changes in air quality (refer to paragraph 8.3.54).

8.6.21. Annual average impacts of NO_x at the worst-affected receptor (Humber Estuary Ramsar/ SAC/ SSSI) are considered to have a negligible adverse impact and therefore effects are considered to be **not significant**. This is because emissions are under the threshold to be determined as not significant (70%), given that the PEC is 34% of the relevant critical level.

8.6.22. The annual mean NH_3 impacts at the worst-affected ecological receptor (Humber Estuary Ramsar/ SAC/ SSSI) represent 1.7% of the relevant critical level and therefore represents a low magnitude of impact. When combined with the background concentration of NH_3 in the area, the PEC represents 67% of the critical level, resulting in a negligible adverse impact. The impact on the habitat site as a whole is considered to be **not significant**.

8.6.23. Annual average impacts of NH_3 for the worst-affected receptor sites that are assigned the lower NH_3 critical level for the protection of lichens and bryophytes also has a low magnitude of impact at 1.0% of the critical level. This level of impact is predicted to occur at Risby Warren SSSI circa 9km from the Main Site, where the background concentration of NH_3 is already exceeding the critical level by nearly two times.

8.6.23.8.6.24. The APIS website indicates that most NH_3 emissions come from agricultural sources, and this is likely to be the prevailing source at Risby Warren given it is surrounded by arable cultivation. Industrial sources within Scunthorpe, which is closer to the SSSI than the Proposed Development, are also likely to be substantive contributors to the NH_3 received at the SSSI. Until these more significant sources of NH_3 are addressed, it is considered that NH_3 concentrations are not likely to fall sufficiently to allow recolonisation by lichens and bryophytes at this site. It is therefore considered that the effects of NH_3 from the Proposed Development are not significant. This results in a negligible adverse magnitude of impact on this site. This level of impact from the Proposed Development is therefore **not significant**.

8.6.24.8.6.25. The significance of this effect is further considered further in **ES Volume I Chapter 11:** Biodiversity and Nature Conservation (**Application Document Ref. 6.2**) together with discussion of the depositional impacts.

Decommissioning

8.6.25.8.6.26. The predicted air quality effects of eventual decommissioning of the Proposed Development are considered to be comparable to, or less than, those assessed for construction activities i.e. **not significant**. This is based upon the assumption that groundwork, traffic movements and site work likely to be required to decommission the Proposed Development would be less than that required for its construction. Appropriate best practice mitigation measures will be applied during any decommissioning works and documented in a DEMP; no additional mitigation for decommissioning of the Proposed Development beyond such best practice is considered necessary at this stage.

8.7. Mitigation, Monitoring and Enhancement Measures

8.7.1. The management of construction phase emissions, including dust and particulates, and the application of adequate mitigation measures will be enforced through the final CEMP, and through the application of appropriate mitigation according to the risk of dust emissions from Site activities as identified in this assessment.

8.7.2. The environmental effects from construction traffic associated with the Proposed Development have been identified as not significant, therefore no specific additional mitigation has been identified as necessary for the construction phase of the Proposed Development, other than the measures outlined in Section 8.6 and 8.7 of this Chapter.

8.7.3. The air quality assessment of operational impacts has assumed that the ELV will be met for the operational plant as required under the IED and GET and in accordance with use of BAT under the environmental permitting regime. The environmental effects from operation of the Proposed Development have been identified as not significant at all human health and ecological receptors for the operation of the Proposed Development.

8.7.4. No specific additional mitigation has been identified as necessary for the operation or decommissioning phases of the Proposed Development other than the embedded mitigation measured outlined in the Assessment of Likely Impacts and Effects Section.

8.7.5. The measures proposed to avoid and reduce, where possible, significant adverse effects on the environment are set out in Sections 8.6 and 8.7 of this chapter. The monitoring strategies to track the delivery and success of design elements and proposed mitigation for construction phases are set out in the **Outline CEMP** (**Application Document Ref 7.4**).

8.7.6. Monitoring strategies for the operational plant will be enshrined within the Environmental Permit and are likely to require continuous monitoring of key pollutant emissions from stack, with annual reporting of results to the

Environment Agency and annual independent validation of the monitoring results.

8.8. Limitations or Difficulties

8.8.1. Until the preferred technology provider is selected, there will be some degree of uncertainty in the operational emissions used in the assessment. Therefore, in order to minimise the likelihood of under-estimating the predicted impacts for the operational emissions, a number of conservative assumptions have been made in the assessment. The conservative assumptions used in the assessment are detailed in paragraph 8.6.16).

8.8.2. There is also uncertainty associated with any modelling assessment, due to the inherent uncertainty of the dispersion modelling process itself, as detailed in **ES Volume II Appendix 8B**: Air Quality – Operational Assessment (**Application Document Ref. 6.3**). Despite this, the use of dispersion modelling is a widely applied and accepted approach for the prediction of impacts from industrial and transport sources.

8.9. Summary of Likely Significant Residual Effects

Construction and decommissioning

8.9.1. The air quality assessment of construction impacts assumes that the measures outlined within Section 8.6 of this Chapter would be incorporated into the design of the Proposed Development, as they are standard best practice measures that are routinely applied across UK construction sites. No additional mitigation has been identified as necessary for the construction phase of the Proposed Development. For this reason, the residual effects would be as reported within Section 8.7 of this Chapter (i.e. **not significant**).

8.9.2. Consistent with construction mitigation, it has been assumed that relevant best practice mitigation measures would be in place during any decommissioning works. No additional mitigation has been identified as necessary for the decommissioning phase of the Proposed Development.

Operation

8.9.3. The air quality assessment of impacts at opening has assumed that the ELV will be met for the operational plant as required and in accordance with use of BAT under the environmental permitting regime.

Cumulative Effects

8.9.4. An assessment of cumulative impacts with other proposed developments that could interact with the impacts and effects of this Proposed Development has been carried out in **ES Volume I Chapter 21**: Cumulative and Combined Effects (**Application Document Ref. 6.2**) this

indicates that there are unlikely to be any developments that could result in significant cumulative effects with the Proposed Development.

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