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TABLES

8.0 AIR QUALITY

8.1 Introduction

8.1.1 This chapter of the Environmental Statement (ES) addresses the potential effects of the Proposed Development near Eggborough, North Yorkshire on air quality.

8.1.2 The assessment considers:

- the present-day and future baseline conditions during construction and in the opening year of the Proposed Development;
- the effects of construction of the Proposed Development on air quality for human health and ecosystems, with respect to associated construction traffic, construction plant emissions and construction dust;
- the effects of operational process emissions associated with the Proposed Development on air quality for human health and ecosystems; and,
- the cumulative effects of emissions associated with the Proposed Development and other committed developments in the vicinity.

8.1.3 This chapter is supported by Figures 8.1-8.4, provided in ES Volume II and Appendices 8A and 8B provided in ES Volume III. Appendix 8A details the dispersion modelling assumptions and results undertaken to support this Chapter, and Appendix 8B describes the cooling system plume visibility assessment.

8.2 Legislation and Planning Policy Context

Legislative Background

Air Quality Legislation

8.2.2 The principal air quality legislation within the United Kingdom is the Air Quality Standards Regulations 2010, which transposes 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 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 10µm diameter or less). The 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).

8.2.3 The Environment Act 1995 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. It 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 AQAPs for the UK as a whole.

8.2.4 It is recognised that the UK is being challenged on national compliance with the EU Air Quality Directives and the effectiveness of the AQAPs in achieving attainment of the NO_2 air quality objectives. For the Site and surrounding area, no AQMAs have been declared (the nearest being 4.9 km to the west of the Site) and based on Defra forecast models, local authority monitoring data and air quality monitoring undertaken be EPL, no exceedances of the EU standards have been identified, as the air quality is generally good. Therefore even if the UK Government is required to improve its performance of achievement of air quality objectives, this is very unlikely to affect attainment targets around the Site.

8.2.5 The current objectives and assessment criteria applicable in this assessment for the protection of human health are presented in Table 8.1. Concentrations are expressed in micrograms per cubic metre ($\mu g/m^3$), unless otherwise stated.

Table 8.1: Air Quality Strategy Objectives (NAQS) – protection of human health

Pollutant	Objective ($\mu g/m^3$)	Averaging period	Percentile	To be met by
Nitrogen dioxide (NO_2)	200	1 hour mean	99.79th (or not to be exceeded more than 18 times/year)	31 Dec 05
	40	Annual mean	-	31 Dec 05
Particulate matter (PM_{10})	50	24 hour mean	90.4th (or not to be exceeded more than 35 times/ year)	31 Dec 04
	40	Annual mean	-	31 Dec 04
Particulate matter ($PM_{2.5}$)	25	Annual mean	-	2020
Carbon monoxide (CO)	10,000	8 hour, daily running mean	-	31 Dec 03

8.2.6 For the protection of vegetation and ecosystems, a number of Critical Levels have been developed; the Critical Levels applicable to this assessment are shown in Table 8.2 below.

Table 8.2: Critical Levels for the protection of vegetation and ecosystems

Pollutant	Objective ($\mu g/m^3$)	Averaging period	Notes
Oxides of nitrogen (NO_x)	75	Daily mean	-
	30*	Annual mean	-
Ammonia (NH_3)	1 [1] 3 [2]	Annual mean	[1] For lichens and bryophytes [2] For all higher plants

** denotes objective set in Air Quality Standards Regulations 2010*

8.2.7 In addition to the above Critical Levels set in the legislation, there are non-legislative limits, called Critical Loads that have been derived for different habitats covering the deposition of nitrogen and acidifying species. These are discussed further in Section 8.3 and habitat-specific Critical Loads are presented in Appendix 8A (ES Volume III).

Environmental Permitting Regulations

8.2.8 The Environmental Permitting (England and Wales) Regulations 2016 (EPR) apply to all new installations and transpose the requirements of the EU Industrial Emissions Directive (IED) (European Commission, 2010) into UK legislation. Under the IED and EPR, the operator of an installation 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. Generating stations exceeding 50 MW thermal input rating (50 MWth) (such as the Proposed Development) are covered by the IED and EPR.

8.2.9 Where legislative ambient air quality limits or objectives are not specified for the pollutant species potentially released from the Proposed Development, Environmental Assessment Levels (EALs), published in the Environment Agency's (EA) Risk Assessments for Specific Activities: Environmental Permits guidance (Defra and EA, 2016) can be used to assess potential health effects on the general population. The EALs applicable in this assessment for the protection of human health from pollutants that could be emitted from the Proposed Development are presented in Table 8.3. Concentrations are expressed in micrograms per cubic metre ($\mu g/m^3$), unless otherwise stated.

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

Pollutant	Objective ($\mu g/m^3$)	Averaging period
Ammonia (NH_3)	2,500	Hourly mean
	180	Annual mean
Carbon monoxide (CO)	30,000	Hourly mean

Industrial Emissions Directive

8.2.10 The IED (European Commission, 2010) provides operational limits and controls to which plant must comply, including Emission Limit Values (ELVs) for pollutant releases to air. The operational generating station at the Proposed Development will fall under the Large Combustion Plant (LCP) requirements (Chapter III) of the IED, since it will be greater than 50 MWth in capacity.

8.2.11 In addition, European BAT reference documents (BRefs) are published for each industrial sector regulated under the IED, and they include BAT-Achievable Emission Values (BAT-AELs) which are expected to be met through the application of BAT. These values may be the same as those published in the IED, or they may be more stringent. The current version of the LCP BRef has been in publication since July 2006. However, this BRef is currently undergoing revision and a final draft of the revised LCP BRef was issued in June 2016 (European Commission, 2016), with the final version expected to be published around September 2017. As the BAT-AELs to be published in the final version are not known at this stage, the IED ELVs and current BRef performance levels have been applied in this assessment. This approach is conservative for the impact assessment, since the revised BRef will either maintain current performance levels or improve them.

8.2.12 The proposed high efficiency new gas turbines for the Proposed Development are able to comply with the current IED requirements without the need for secondary abatement for the control of any pollutant; primary combustion control measures and burner designs mean that emissions of nitrogen oxides and carbon monoxide can meet the IED emission limits, while

emissions of sulphur dioxide and particulates are expected to be negligible based on the use of natural gas fuel.

8.2.13 Subject to the outcome of the revised BRef and the UK interpretation of the application of that BRef, tighter nitrogen oxide BAT-AELs may be applied as emission limits for plant built post the publication of the revised BRef; such limits could therefore apply to this Proposed Development, as it would not be constructed before 2019. Whilst unknown at this stage, the plant could therefore include the need for secondary abatement for controlling nitrogen oxide emissions, such as the use of Selective Catalytic Reduction (SCR), to meet ELVs more stringent than those required under IED. The Environment Agency is currently reviewing whether the potentially tighter BAT-AELs in the forthcoming revision to the BRef need to apply to high efficiency gas-fired plant, since any improvement in nitrogen oxide emissions is offset by emissions of ammonia from the use of SCR and also compromises the efficiency of the generating station. The design and use of any secondary abatement would also be subject to the outcome of a Best Available Techniques (BAT) assessment for the plant, in accordance with EA guidance. Therefore, while SCR may not be required for the Proposed Development, at this stage, space has been allowed within the plant layout design to accommodate its future installation, should that be required. For the purposes of this air quality impact assessment, it has been conservatively assumed that emissions will be at the current IED limits for nitrogen oxide emissions, but consideration has also been given to the potential use of SCR, which results in slightly lower nitrogen oxide emissions but also ammonia emissions to air.

Planning Policy Context

National Planning Policy

8.2.14 National Policy Statements (NPS) are, where in place, the primary basis for the assessment and determination of applications for nationally significant infrastructure projects (NSIPs), such as the Proposed Development. The Overarching National Policy Statement on Energy EN-1 (Department of Energy and Climate Change, 2011)) 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.*
>
> *In considering an application for development consent, the* [Secretary of State] *should focus on whether the development itself is an acceptable use of the land, and on the impacts of that use, rather than the control of processes, emissions or discharges themselves. The IPC should work on the assumption that the relevant pollution control regime and other environmental regulatory regimes…will be properly applied and enforced by the relevant regulator*" (paragraphs 4.10.2-4.10.3).

8.2.15 EN-1 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.

8.2.16 The Overarching National Policy Statement on Fossil Fuel Electricity Generating Infrastructure EN-2 (Department of Energy and Climate Change, 2011)), section 2.5, states that "*Fossil fuel generating stations are likely to emit nitrogen oxides (NO_x) and sulphur oxides (SO_x), although SOx emissions from gas-fired generating stations may be negligible. To meet the requirements of the Large Combustion Plant Directive (LCPD) and the Industrial Emissions Directive (IED) when it comes into force, fossil fuel generating stations must apply a range of mitigation to minimise NOx and other emissions*". The NPS goes on to state that "*Mitigation will depend on the type and design of a generating station. However…Selective Catalytic Reduction (SCR)... will have additional adverse impacts for noise and vibration, release of dust and handling of potentially hazardous materials, for example the ammonia used as a reagent. In line with Section 5.3 of EN-1 the* [Secretary of State]*, in consultation with the EA, should be satisfied that any adverse impacts of mitigation measures for emissions proposed by the applicant have been described in the ES and taken into account in the assessments*".

8.2.17 The National Planning Policy Framework (NPPF) was published in March 2012 (Department for Communities and Local Government (DCLG), 2012a); paragraph 109 of the NPPF states that: *"The planning system should contribute to and enhance the natural and local environment by: …preventing both 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…"*

8.2.18 Annex 2 of the NPPF defines 'Pollution' as *"Anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including smoke, fumes, gases, dust, steam, odour, noise and light"*.

8.2.19 There are both national and local policies for the control of air pollution and local action plans for the management of local air quality within the Selby District Council (SDC) area. The effect of the Proposed Development on the achievement of such policies and plans are matters that may be a material consideration by decision-making authorities, when determining individual planning and DCO applications. Paragraph 124 of the NPPF states that: *"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."*

8.2.20 The NPPF is accompanied by Technical Guidance to the National Planning Policy Framework (NPPF-TG) (DCLG, 2012b). The NPPF does not include any specific guidance for the assessment of air quality impacts from combustion activities, but does provide some broader guidance on assessments of dust impacts from mineral extraction sites that have been cited in the construction methodology of this assessment. Paragraph 3 of the NPPF is clear that it does not contain specific policies for NSIPs and these are to be determined in accordance with the

decision making framework set out in the Planning Act 2008 and relevant NPSs, as well as any other matters that are considered both important and relevant. The NPPF may be considered by the Secretary of State to be important and relevant, and hence this assessment has had regard to its policies.

Local Planning Policy

8.2.21 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.

8.2.22 In 2013 SDC adopted the Selby District Core Strategy Local Plan (SDC, 2013), including the key environmental objective (Objective No. 16) which is "*Protecting against pollution, improving the quality of air, land and water resources*", and Policy SP18: *Protecting and Enhancing the Environment*, states that: "*The high quality and local distinctiveness of the natural and man-made environment will be sustained by…Ensuring that new developments protects soil, air and water quality from all types of pollution*".

8.2.23 SDC has also published its Air Quality and Planning Guidance Note (SDC, 2014)) which details air quality as a material planning consideration, and states that a "*full understanding of all emissions arising from development in the district is essential to help adequately mitigate the air quality impacts*". The guidance note sets out the general requirements for an air quality impact assessment, including:

- "*Existing air quality in the vicinity of the proposed development*
- *Likely impact on local air quality as a result of the proposed development (including the impact of additional traffic movements and/or the introduction of other new emissions sources)*
- *Available measures for mitigating the air quality impact associated with the development (traffic and other emission sources)*
- *Level of increased exposure to air pollutants by members of the public as a result of the development, taking into account all mitigation measures proposed"*

Other Guidance

8.2.24 The EA Risk Assessments for Specific Activities: Environmental Permits guidance (Defra and EA, 2016) provides guidance on the assessment of Best Available Techniques and of impacts from permitted installations, primarily for the purposes of Environmental Permitting.

8.2.25 Defra has also published technical guidance (Defra, 2016a) 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.

8.2.26 The Highways Agency (HA) (now Highways England) publication the Design Manual for Roads and Bridges (DMRB) (HA, 2007) 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.

8.2.27 The Institute of Air Quality Management (IAQM) has published several guidance documents relating to the potential effects of dust generation during construction works and development control (IAQM, 2014, 2016 and 2017).

8.3 Assessment Methodology and Significance Criteria

Scope of the Assessment

8.3.1 Matters that are scoped into the ES are judged likely, without effective mitigation, to have the potential to cause significant effects. Matters that are scoped out of the ES are those which it is considered are not likely to lead to significant effects, regardless of mitigation. Where insufficient information is available in relation to a particular matter to make a reasonable judgement at this stage, a precautionary approach is adopted and that matter is scoped in. The decision to scope out matters is based upon factors such as a high degree of separation between the Proposed Development and the receptor, the lack of impact pathways, or the known low value or low sensitivity of impacted resources/ receptors.

8.3.2 Based on the above, the potential air quality impacts associated with the activities detailed in Table 8.4 have been scoped out of further assessment:

Table 8.4: Potential air quality impacts screened out of further assessment

Potential air quality impact	Detail	Rationale for screening out
Construction dust on sensitive ecological receptors (Table 8.11)	Uncontrolled demolition and construction dust effects on sensitive ecological receptors	No sensitive ecological receptors have been identified within the screening distance and therefore the effects of demolition and construction dust on ecological receptors have been screened out.
Construction (off-site) road traffic emissions (paragraph 8.3.21)	Exhaust emissions from traffic associated with the delivery or removal of plant, equipment and materials	The peak predicted construction traffic volume is below the DMRB screening criteria (1,000 vehicles AADT) along all but one road link and on that link there are no receptors within 200m of the proposed traffic route; the HGVs 2-way movements associated with construction of the Proposed Development will be below the SDC guidance criteria requiring an air quality impact assessment (>200 per day); therefore significant changes in air quality at receptors are not expected. The change in AADT construction traffic flow through the two identified AQMAs will also therefore be below these screening criteria and traffic composition at these sensitive locations is not anticipated to be significantly changed. The air quality effects from construction traffic have therefore been screened out.
Operation road traffic emissions	Exhaust emissions from traffic	The change in AADT traffic flow associated with the operational Proposed Development will be below

Potential air quality impact	Detail	Rationale for screening out
(paragraph 8.3.22)	associated with the operational phase of the Proposed Development	the DMRB screening criteria requiring an air quality assessment (as above) and traffic composition is not anticipated to be significantly changed and therefore the air quality effects from operational traffic have been screened out.

Consultation

8.3.3 The consultation undertaken with statutory consultees to inform the assessment is summarised in Table 8.5 below.

Table 8.5: Consultation summary table

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
Selby District Council (and North Yorkshire County Council joint responses)	5th August 2016 (email)	In relation to a draft scoping note issued for consultation: • identified additional receptors at Roall water works; • further details for proposed extent of diffusion tube monitoring requested	Identified receptors included within assessment scope. Monitoring discussed below
	10th October 2016 (email and subsequent discussions)	Baseline monitoring locations and initial scope – may require particulates monitoring in addition to nitrogen dioxide.	The requirements for further monitoring will be identified and discussed with the relevant consultees to inform the final ES.
	17th February 2017 (formal response to consultation on PEI Report, email)	In relation to Stage 2 Consultation: Requests that the ES contains a precis of the areas screened out for ease of cross-reference; Supports the use of best environmental option to reduce emission levels and assessment of ammonia should SCR be required.	The comments have been noted and duly incorporated within the ES (see Table 8.4 which sets out the potential air quality impacts screened out of further assessment, and paragraphs 8.6.32-39 describing the effects of potential SCR use).
	May 2017	Request for best environmental options assessment in respect of the potential for use of NH_3 SCR and impacts on ecological	The effects of use of NH_3 on air quality and ecological receptors have been assessed; a formal

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
		receptors; Concern expressed at the nutrient nitrogen and acid deposition levels at some ecological receptors; Question on the effects of buildings on peaking plant emissions dispersion.	BAT assessment will be presented, as required, once NO_x ELVs are known and therefore whether the use of SCR is required to meet such levels. Clarification of 'imperceptible' increases in N deposition and acid deposition for worst-case operation (without SCR) at receptors where existing baseline is high has been provided at paragraph 8.4.16 and 8.6.29. Sensitivity analysis presented (see above).
Secretary of State	September 2016 (scoping opinion)	Noting the proposed baseline air monitoring survey, it is suggested that the adequacy of the data is discussed with relevant consultees to ensure it is robust and representative. Noting the described worst-case scenario of combined emissions from the existing power stations and the Proposed Development, it is suggested that consideration be given to a greater relative effect if the existing power station is no longer operational.	Scope of monitoring discussed and agreed with SDC. The significance of the predicted effect of emissions from the Proposed Development is evaluated against the air quality standards independently of current background levels. Consideration has been given to the cumulative effects of the Proposed Development and the existing coal-fired power station, although the two separate generating stations will not operate at the same time. Therefore cumulative effects have focussed on the timing of construction, operation and demolition activities.

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
Environment Agency	27th February 2017 (meeting)	In relation to Stage 2 Consultation and Environmental Permitting Additional information regarding the double counting for baseline conditions and justification for not modelling other emission sources requested; Consideration to be given to statutory ecological receptors to 15 km and SSSIs beyond 2 km; EA to confirm whether the BRef or IED NO_x limit applies to the plant and therefore whether SCR BAT assessment may be required (Environmental Permit application only) Visible plume modelling requested to compare the hybrid and wet cooling options to be undertaken.	The baseline conditions with respect to other nearby emission sources are considered in paragraphs 8.4.18-19. Statutory ecological receptor study area extended to 15 km, resulting in the addition of the River Derwent SAC to the assessment. Impacts on SSSIs up to 10 km are also assessed. Response from the Environment Agency is awaited. A visible plume assessment has been completed and is included in Appendix 8B (ES Volume III). Visible plumes are also considered in the Landscape and Visual Chapter.
Environment Agency	April 2017	The sensitivity of results to a number of model/assessment assumptions should be evaluated, including surface parameters, buildings and stack heights, selection of ambient data Clarification requested on emission parameters Clarification requested on methodology for assessment of peaking plant/abnormal operation effects, and acid deposition at ecological receptor	Sensitivity analysis included (Appendix 8A, ES Volume III). Review of diffusion tube data included (paragraphs 8.4.14-15) Details of emission parameters and methodology checked and/ or amended at paragraphs 8.3.58-9 and 8.6.38-42, Table 8.10 and in Appendix 8A (ES Volume III Tables 8A.12-13, 8A.16-17 and paragraphs 8A.3.14; 8A.3.19)

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
Stage 2 public consultation	January/ February 2017	Responses provided on feedback forms confirmed: • 51% of respondents would prefer a higher (90 m) stack with slightly lower concentrations of air pollutants at receptors to a slightly shorter (80 m) stack with a slightly lower visual impact (but still no significant air quality effects), compared to 18% preferring the shorter stack and 31% don't know/ blank; and • 44% of respondents would prefer hybrid cooling to wet cooling, 13% would prefer wet cooling to hybrid cooling and 44% don't know/ blank.	The draft DCO specifies and the Environmental Permit application will stipulate a fixed stack height of 99.9 m Above Ordnance Datum (equivalent to a 90 m above finished ground level). A visible plume assessment has been completed and is included in Appendix 8B (ES Volume III). Hybrid cooling is the preferred cooling technology and agreement with the Environment Agency on hybrid cooling representing BAT for the generating station will be sought through the Environmental Permit application process.

Summary of Key Changes to Chapter 8 since Publication of the Preliminary Environmental Information (PEI) Report

8.3.4 The PEI Report was published for statutory consultation in January 2017, allowing consultees the opportunity to provide informed comment on the Proposed Development, the assessment process and preliminary findings through a consultation process prior to the finalisation of this ES.

8.3.5 The key changes since the PEI Report was published are summarised in Table 8.6 below.

Table 8.6: Summary of key changes to Chapter 8 since publication of the PEI Report

Summary of change since PEI Report	Reason for change	Summary of change to chapter text in the ES
Maximum output of the CCGT plant assessed has been increased from 2.2 GW to 2.5 GW (plus up to 299 MW peaking plant/ black start plant)	Advised by technology suppliers that the latest generation of CCGT have increased efficiency, leading to potentially higher output	Maximum emission parameters have increased, although potential impacts are comparable to those reported in the PEI Report
Effects of potential SCR use have been assessed and described	In response to consultee comments	Tabulated results and text regarding the potential effects of lower NO_x and NH_3 slip on air quality and ecological impacts
Statutory ecological receptor study area has been extended to 15 km	In response to consultee comments	Inclusion of River Derwent SAC; screening out of SACs beyond 15km (Strensall Common, North York Moors, Hatfield Moor)
Visible plumes from hybrid and wet cooling options have been assessed	In response to consultee comments	Summary of visible plume potential for hybrid cooling and forced draught wet cooling, see also Appendix 8B, ES Volume III
CCGT plant stack height has been fixed	Design evolution	Confirmation of 90 m stack height above ground
Abnormal operation of the plant has been assessed for short-term impacts	Design evolution	Tabulated results and text regarding worst-case offsite short-term impacts that are well below those predicted for normal operation
Inclusion of primary NO_2 diffusion tube data and consideration of existing point sources representation within baseline data	Completion and baseline survey and response to consultee comments	Tabulated data and sensitivity analysis included, confirming that selected baseline data is representative.

Impact Assessment and Significance Criteria

8.3.6 The potential emissions to air from construction and at time of opening of the Proposed Development have been determined or estimated, and key local receptors have been identified, together with the current local ambient air quality. The potential concentrations resulting from the projected emissions arising from the operational Proposed Development have been predicted using atmospheric dispersion modelling techniques where appropriate, which has 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 detailed below.

8.3.7 In particular the process and traffic emissions assessments have been made with reference to the national air quality standards (NAQSs) and objectives laid out in the Air Quality Standards Regulations.

Assessment of Dust Emissions Generated During Construction Works

8.3.8 'Dust' is defined in British Standard (BS) 6069-2:1994 (BSI, 1994) as particulate matter in the size range 1µm - 75µm (microns) in diameter, and is primarily composed of mineral materials and soil particles. This definition is also referred to in NPPF technical guidance (DCLG, 2012b) in the context of dust impacts from mineral extraction operations and has been adopted in this assessment.

8.3.9 Respirable particulate matter (PM_{10}) is composed of material with an aerodynamic diameter of less than 10µm, and includes the size fractions of greater concern to impacts on human health. The majority of construction dust is larger than 10µm in diameter and, therefore are typically associated with material depositing onto property and potential amenity effects, although there is evidence that PM_{10} and $PM_{2.5}$ (material with an aerodynamic diameter of less than 2.5µm) emissions may also result from construction and demolition activities. Particulate matter may therefore have an effect whilst airborne, or as a result of its deposition onto a surface. Consequently the nature of the impact requiring assessment varies between different types of receptor.

8.3.10 SDC guidance (SDC, 2014) requires an air quality impact assessment where a development proposal will give rise to potentially significant impacts during construction for nearby sensitive locations, or those that would generate large HGV flows (>200 movements per day) over a period of a year or more. The movement and handling of soils and spoil during the Proposed Development construction activities is anticipated to lead to the generation of some short-term airborne dust. There is the potential for this to occur at the same time as dust generation from the demolition of the coal-fired power station. 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 time and location of the work, and the nature of the actual activity being carried out.

8.3.11 At present, there are no statutory UK or EU standards relating to the assessment or control of dust. The NPPF Technical Guidance (DCLG, 2012b) provides an assessment framework for mineral extraction site, which indicates that where there are residential properties within 1km of site activity and the concentration of PM_{10} is not likely to exceed the NAQS then good practice measures should be employed. The IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning (IAQM, 2016) indicates that "*the level of dust deposition likely to*

lead to a change in vegetation is very high (over 1 g/m^2/day) and the likelihood of a significant effect is therefore very low except on the sites with the highest dust release close to sensitive habitats".

8.3.12 The emphasis of the regulation and control of construction dust should similarly be the adoption of Best Practicable Means (BPM) when working on site. 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.

8.3.13 The IAQM provides guidance for good practice qualitative assessment of risk of dust emissions from construction and demolition activities (IAQM, 2014). The guidance considers the risk of dust emissions from unmitigated activities to cause human health (PM_{10}) impacts, 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 this chapter is consistent with the overarching approach to the assessment of the impacts of construction, and the application of example descriptors of impact and risk set out in IAQM guidance. It considered 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 screening distance of the site boundary;
- identify the magnitude of impact through consideration of the scale, duration and location of activities being carried out (including demolition, earthworks, construction and trackout);
- 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 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 Consideration has also been given within the assessment to the potential cumulative dust emissions from the construction of the Proposed Development and the demolition of the existing coal-fired power station.

8.3.16 The criteria for assessment of magnitude, sensitivity and risk are summarised in Tables 8A.5-8A.9 in Appendix 8A (ES, Volume III).

Assessment of Construction and Opening Road Traffic

8.3.17 The incomplete combustion of fuel in vehicle engines results in the presence of hydrocarbons (HC) such as benzene and 1,3-butadiene, as well as the typical combustion products of CO, PM_{10}, $PM_{2.5}$ in exhaust emissions. Similarly but to a lesser extent, any sulphur in the fuel can be converted to sulphur dioxide (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 nitrogen dioxide in the atmosphere. Nitrogen dioxide is associated with adverse effects on human health. Better emission control technology and fuel specifications are expected to reduce emissions per vehicle in the long term.

8.3.18 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 release 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 SDC are considered to be at risk of exceeding the relevant objectives for these species, and the risks to achievement 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.

8.3.19 Exhaust emissions from road vehicles may affect the ambient concentrations of the principal road traffic pollutants, nitrogen dioxide, PM_{10} and $PM_{2.5}$, at sensitive receptors in the vicinity of the Proposed Development. Therefore, these pollutants are the focus of the assessment of the significance of road traffic impacts.

8.3.20 DMRB HA207/07 guidance (HA, 2007) and SDC guidance (SDC, 2014) set out criteria to establish the need for an air quality assessment. The guidance considers the changes in traffic anticipated as a result of a development, to identify the need for further evaluation or assessment; for example, in the DMRB guidance changes in Annual Average Daily Traffic (AADT) flows of more than 1,000 vehicles or 200 HGV movements are considered further through quantitative assessment; the SDC guidance requires an impact assessment where there will be changes in traffic composition on local roads, for example increase in the HGVs by 200 movements per day. For changes in traffic below these criteria, significant changes in air quality are not expected. The screening criterion in the DMRB also states that only properties and habitat sites within 200 m of roads should be considered in traffic assessments. This guidance has been utilised for both the construction and opening year assessments.

8.3.21 Predicted HGV movements during the construction of the Proposed Development are shown in Table 8.8. The AADT is predicted to peak at 80 two-way HGV movements accessing the Site via Tranmore Lane per day. The AADT total vehicles is predicted to peak at 1,010 two-way movements on Wand Lane (west of Hensall Gate entrance), with other road links at less than 1,000 AADT flow. There are no identified residential receptors within 200 m of Wand Lane and therefore this link can be screened out based on the guidance. On this basis, further quantitative assessment of road traffic impacts has not been undertaken, as the above screening criteria have not been exceeded.

8.3.22 Traffic associated with the operational Proposed Development has also been screened out of the assessment as this will be significantly below the criteria set out in the DMRB requiring an air quality assessment (the predicted AADT opening traffic is 123 cars arriving and departing the Site).

8.3.23 Consideration has been given within the assessment to the potential cumulative traffic emissions from the construction of the Proposed Development and the demolition of the existing coal-fired power station, as well as the cumulative effect with other committed

schemes in the area. This is discussed further in Section 8.9 (Residual Effects) and Chapter 20: Cumulative and Combined Effects.

Assessment of Emissions Generated from Construction Site Plant (Non-Road Mobile Machinery)

8.3.24 The construction phase for the Proposed Development is anticipated to last approximately three years, likely to be between 2019 and 2022.

8.3.25 There is likely to be emissions to air during construction activities arising from on-site construction plant or Non-Road Mobile Machinery (NRMM). The IAQM guidance (IAQM, 2015) states "*Experience of assessing the exhaust emissions from on-site plant … 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*". The screening criterion in the DMRB (HA, 2007), which states that only properties and habitat sites within 200 m of roads should be considered in traffic assessments, has also been considered in determining the potential for impacts from the Proposed Development NRMM on sensitive receptors. A qualitative assessment of the potential for impact from nitrogen dioxide and PM_{10} emissions from NRMM on identified receptors has therefore been made based on the criteria outlined in the above guidance.

Assessment of Process Emissions from the Operational Plant at Year of Opening

8.3.26 The IED defines ELVs for gas turbines (including CCGT and OCGT) for oxides of nitrogen, SO_2, CO and PM_{10}, however emissions of SO_2 and PM_{10} from gas-fired plant are at such low levels relative to the air quality objectives that they are considered trivial and the risk to the achievement of the PM_{10} and SO_2 air quality objectives is considered negligible. These emissions have therefore been screened from further assessment.

8.3.27 Emissions of CO are not expected to be trivial, however based on project experience and professional judgment, emissions of CO at the IED limit do not drive the need for additional mitigation, such as the determination of stack height, and therefore were not included in the PEI report. However, they have been assessed and presented within this ES.

8.3.28 As discussed in Section 8.2, subject to the outcome of the revised BRef and its interpretation, the use of SCR could be required to meet NO_x ELVs more stringent that those required under IED. However the Original Equipment Manufacturers indicate that such technology will not be required to meet the current IED legislative limit for NO_x and therefore the need for SCR to be installed and operated will be subject to the outcome of a BAT assessment for the Proposed Development and subject to the EA's position on the implementation of the revised BRef for high efficiency CCGTs. Emissions of ammonia (NH_3) occur through the use of SCR (NH_3 'slip'). Two scenarios have been assessed – emissions of nitrogen oxides at IED levels achieved through the use of primary means, and emissions of nitrogen oxides at published draft BAT-AEL levels together with emissions of ammonia associated with the use of SCR. A formal BAT assessment will be conducted once the final generation technology has been confirmed and plant efficiency and NO_x ELV requirements are known.

8.3.29 Emissions from the Proposed Development, assumed to be operational in 2022, have been assessed using the EA Risk assessment methodology (Defra and EA, 2016) in order to identify

where proposed emissions can be screened as having a negligible impact. Detailed dispersion modelling using the atmospheric dispersion model ADMS5.1 has been used to calculate the concentrations of pollutants at identified receptors. These concentrations have been compared with the air quality assessment level for each pollutant species, as summarised in Table 8.1-8.3.

8.3.30 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.

8.3.31 The assessment has been based on the operational design parameters for the Proposed Development, including a number of alternative plant technologies and configurations under consideration for the Proposed Development, as described in paragraph 8.3.50. The worst-case operational scenarios, with respect to the potential air quality impacts, have been determined and are reported in this chapter. The determination of optimum stack height has been driven by the predicted impacts from oxides of nitrogen, as described in Section 8.5.

8.3.32 The first year of operation (referred to as opening) of the Proposed Development is assumed to be 2022 for the purpose of this assessment, which is the earliest date that the Proposed Development could conceivably start to export power commercially to the national transmission system.

8.3.33 The assessment of worst-case long-term and short-term emissions resulting from operation of the Proposed Development has been undertaken by comparison of the maximum process contributions at identified sensitive receptors with the NAQS annual mean and hourly mean objectives, and Critical Levels for ecological receptors, taking into consideration the baseline air quality, in accordance with EA risk assessment methodology (Defra and EA, 2016).

8.3.34 An assessment of nutrient nitrogen enrichment has been undertaken by applying published deposition velocities to the predicted annual average NO_x concentrations at the identified Statutory Habitat sites, determined through dispersion modelling, to calculate nitrogen deposition rates. These deposition rates have then been compared to the Critical Loads for nitrogen published by UK Air Pollution Information System (APIS) (Centre for Ecology and Hydrology and APIS, 2016) for the most sensitive species in each individual Habitat site, taking into consideration the baseline air quality.

8.3.35 Increases in acidity on designated ecological receptors from depositional contributions of NO_x from the process contribution have also been considered. In this assessment, the nitrogen kilo equivalent Keq/ha/yr, which are the units in which acidity Critical Loads are measured, have been derived from nitrogen deposition modelling values using standard conversion factors. The acidity deposition rates and baseline deposition rates have been used within the Critical Load Function Tool (Centre for Ecology and Hydrology and APIS, 2016) to determine whether the contribution will result in exceedance of the defined acidity Critical Loads for the most sensitive feature. Process contributions of SO_2 to the acidity deposition rate have been assumed to be zero, as the SO_2 emissions from the process are negligible. Non-statutory habitat sites have not been assessed as the sensitive species present at these receptors and their associated Critical Loads for nutrient and acid deposition are not on public records.

Evaluation of Significance – Construction Dust

8.3.36 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 minimises the potential for complaints to be generated as a result of the Proposed Development construction works.

8.3.37 The IAQM guidance (IAQM, 2014) 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'.

Evaluation of Significance – Point Source Emissions

8.3.38 For a change of a given magnitude, the IAQM (IAQM, 2017) has published recommendations for describing the magnitude of long term impacts at individual receptors and describing the significance (Table 8.7) of such impacts. This terminology has been changed where appropriate in order to maintain consistency with the rest of this ES – where the IAQM uses 'substantial' this has been changed to 'major', and 'slight' has been changed to 'minor'.

Table 8.7: Air quality impact descriptor for long term changes in ambient pollutant concentrations of NO_2 and PM_{10}

Long term average concentration at receptor	Percentage change in annual mean concentration				
	Up to 0.5% Imperceptible	0.5-1% Very low	2-5% Low	6-10% Medium	>10% 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 EU limit value or EAL)

8.3.39 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 judgement of significance of effects adopted within this assessment is discussed below.

8.3.40 The evaluation of the significance of air quality effects from the operational point sources has been based on the criteria referenced in SDC guidance for air quality impacts (SDC, 2014), which are set out in the IAQM publication 'Land Use Planning & Development Control: Planning for Air Quality' (IAQM, 2017), and on the criteria outlined in the Environment Agency EPR Risk Assessment (Defra and Environment Agency, 2016).

8.3.41 The IAQM guidance (IAQM, 2017) indicates that the Environment Agency 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 Environment Agency guidance (discussed below) 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 process contribution (PC) is used to measure impact, not the overall concentration at a receptor. The peak short term PC from an elevated source is described as follows:

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

8.3.42 The Environment Agency EPR Risk Assessment (Defra and Environment Agency, 2016) screening criteria for comparison of PCs with NAQS objectives state that an emission may be considered insignificant (or negligible) where:

- short term PC <=10% of the NAQS; and
- long term PC <=1% of the NAQS.

8.3.43 The second stage of screening considers the PCs 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 NAQS minus twice the long-term background concentration; and
- long term PEC (PC + background concentration) <70% of the NAQS.

8.3.44 Where the PEC is not predicted to exceed the NAQS objective and the proposed emissions comply with the BAT associated emission levels (or equivalent requirements) the emissions are considered acceptable by the EA.

8.3.45 The impact of point source emissions on ecological receptors, through deposition of nutrient nitrogen or acidity, has been evaluated using the Environment Agency insignificance criterion of 1% of the long term objective, as above.

8.3.46 Where emissions are not screened as insignificant (negligible), the descriptive terms for the air quality effect outlined in Table 8.7 above have been applied.

<u>Evaluation of Significance – Proposed Development as a whole</u>

8.3.47 Following the assessment of each individual air quality effect, the significance of all of the reported effects is then considered for the Proposed Development in overall terms. 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 NAQS values set out in Table 8.1, since achievement of local authority goals for local air quality management is directly linked to the achievement of the NAQS values.

8.3.48 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'. Effects found to be 'minor' or 'negligible' are considered to be 'not significant'.

Sources of Information/ Data

Construction Phase Data

8.3.49 The traffic data used within this assessment has been sourced from Chapter 14: Traffic and Transportation and is set out in Table 8.8.

Table 8.8: Peak traffic volumes associated with construction of Proposed Development

Location	Units	Proposed Development total vehicles (AADT)	Proposed Development HGVs	Speed (mph)
A19 (north of M62 Junction 34)	Total 2-way	894	80	51.8
Wand Lane (west of Hensall Gate entrance)	Total 2-way	1010	0	56.3
A19 (north of Wand Lane)	Total 2-way	154	0	52.3

Opening Phase Data

8.3.50 At this concept design stage, the technology providers and hence final layout and combustion emission parameters have not been fixed and the Rochdale Envelope is being applied for certain parameters where flexibility needs to be retained; these parameters are outlined in Chapter 4: The Proposed Development and Chapter 6: Need, Alternatives and Design Evolution. The air quality effects associated with alternatives for consideration within the design scheme have been fully explored and the worst case results are presented within this assessment. The design evolution will continue as the project develops but any changes in design parameters will remain within the envelope evaluated in this assessment, in line with the Rochdale Envelope approach.

8.3.51 Opening point source emissions data has been determined from information supplied by four Original Equipment Manufacturers (OEMs) that would potentially supply the CCGT units for the Proposed Development.

8.3.52 Conservative assumptions have been made with regard to operational parameters, to determine the maximum potential effects of the operation of the Proposed Development on sensitive receptors; these assumptions include:

- worst case emissions from any of the four OEM-provided information;
- maximum potential operational availability for the CCGT units over an operational year;
- operation of peaking plant throughout the year at the same time as operation of the main units, even though the peaking plant will run for less than 1,500 hours per year;
- abnormal short term (<50 hours per year) operation of the plant represented as a worst-case by operation of the black start and peaking plant; and

- maximum emission rates, at IED ELVs for all combustion units except for the scenario when BAT-AELs and ammonia slip are assessed.

8.3.53 In practice, the operation at maximum load of all CCGT units simultaneously with the peaking plant is unlikely to occur for more than a few hours per year; therefore the results present the worst-case potential impact.

8.3.54 The actual hours of operation of the CCGTs or the peaking plant will be subject to the national demand for electricity and the economic viability of gas-fired generation. The likely operation of the peaking plant would be to meet short-term peak demand whilst CCGT(s) are brought on-line, with peaking plant units ramping down once CCGTs are nearing maximum load; therefore extended operation of the peaking plant and CCGTs at the maximum output capacity would be unlikely to occur. Furthermore the annual maintenance regime for the plant as a whole will reduce actual annual operation.

8.3.55 The above assumptions of 100% operability and emissions at IED ELVs will therefore overestimate the effect on local air quality.

8.3.56 There are a number of options for the makeup of the Proposed Development although the overall gross capacity will be no more than 2.5 GWe. The alternative design options that have considered for this assessment are summarised in Table 8.9 below; as outlined above, the technology suppliers are not yet fixed and four alternative OEM suppliers have been assessed, with the worst-case, in respect of potential impact, used in the assessment.

Table 8.9: Alternative design schemes for the combustion plant

Design scheme	Unit summary	CCGT configuration	Stack configuration
A	Up to three H-Class CCGT units (2.5 GW maximum output) or three F-class CCGT units (1.6 GW maximum output)	Three single-shaft units (see Figure 4.1a in ES Volume II)	Three co-located stacks
B	Up to three H-Class CCGT units (2.5 GW maximum output) or three F-class CCGT units (1.6 GW maximum output)	One multi-shaft (two gas turbines) units and one single-shaft (one gas turbine) unit (see Figure 4.1b in ES Volume II)	Three co-located stacks
A/ B	Above units with peaking plant (up to 299 MW output capacity), housed in a building, consisting of either: • one F-Class OCGT; or • up to two E-class OCGTs; or • up to ten reciprocating gas engines (maximum output of circa 100 MW)	-	Co-located stacks

Design scheme	Unit summary	CCGT configuration	Stack configuration
Abnormal operation	'Black start' facility consisting of either: • one OCGT (circa 30MW); or • up to three reciprocating gas engines (maximum output of circa 30 MW); plus peaking plant (worst-case)	-	Co-located stacks

8.3.57 During normal day-to-day operation of the plant, the CCGTs would be started from 'warm' using steam taken from one of two gas-fired auxiliary boilers (circa 23 MW each). The boiler would be in operation for approximately half an hour per day and combustion emissions would vent to atmosphere via a dedicated stack (circa 25m) with a minimum exit velocity of 15 m/s in line with good design practice. The impact of emissions from the auxiliary boilers has not been assessed, as given the limited operating hours and the use of natural gas as a fuel, emissions are not anticipated to present a significant impact on nearby receptors.

8.3.58 Abnormal operation of the plant includes the use of 'black start' gas turbines or engines to start the main CCGT plant units. While the maximum combined gross output of the peaking plant and black start facility is 299 MW, as a worst-case for the air impact assessment it is assumed that the peaking plant capacity of 299 MW would also be in operation during the black start plant (of circa 30 MW capacity) operation. This means that for the purposes of the air quality impact assessment the gross capacity limit for the combined units is in excess of 299 MW and therefore the assessed scenario represents an overestimation of the potential impacts. Once the selection of black start technology is made, the peaking plant output capacity would be correspondingly reduced to ensure the combined output is 299 MW or less. As the black start plant would be operational for a maximum of 50 hours per year, even if its capacity is higher than the circa 30 MW assessed, the impacts would therefore be expected to be comparable to or lower than those assessed.

8.3.59 The black start plant is initially started up on diesel fuel and then switched over to gas-firing and would be operational for less than 50 hours per year, therefore the maximum short term impacts have been assessed; however in order to capture the worst-case meteorological conditions that could coincide with black start operation, the abnormal emissions have been modelled assuming continuous operation. Long term impacts would be anticipated to be lower as a result of the limited operating hours.

8.3.60 The modelled point source release parameters have been based on the technology option that results in worst-case impacts, as described above; the modelled emission parameters are summarised in Table 8.10 below.

Table 8.10: Modelled combustion plant atmospheric release parameters

Parameter		Worst-case CCGT unit (each)	Worst-case peaking plant OCGT unit (each, F-class)	Peaking plant /Black start reciprocating engine unit (each)	Black start OCGT unit
Stack height (m above finished ground level)		90.0	45.0	45.0	45.0
Average efflux velocity (m/s)		23.2	35.5	26.9	23.0
Volumetric flow (Nm^3/hr) [1]		4,140,000	2,340,000	64,300	273,000
Volumetric flow at stack exit conditions (Am^3/s)		1,200	1,800	30.5	222
Average stack exit conditions:	Temp (°C)	75.0	579	355	535
	O_2 (% dry)	12.9	13.6	11.9	14.5
	Moisture (%)	8.9	8.3	9.3	7.4
Approx. flue diameter (m)		8.1	8.0	1.2	3.5
Assumed maximum operating hours / year		8760	8760	8760 (Peaking plant)	<50
Oxides of nitrogen (NO_x) ELV (IED, mg/Nm^3)		50.0	50.0	100.0	50.0
Oxides of nitrogen (NO_x) emission rate (g/s)		57.5	32.5	1.79	3.79
Carbon monoxide (CO) ELV (IED, mg/Nm^3)		100.0	100.0	100.0	100.0
Carbon monoxide (CO) emission rate (g/s)		115	65.0	1.79	7.57
Approximate stack locations (OS Grid reference)		457600, 423934 (Stack 2 as an example)	457520, 423950	457520, 423950	457510, 423940

1. Reference conditions: 273 K, 15 % O_2, dry

8.3.61 The dispersion modelling of point source emissions at the Opening scenario 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 from a representative meteorological station (Church Fenton) have been used; and
- inclusion of buildings, structures and local topography that could affect dispersion from the source into the modelling scenarios.

Key Parameters for Assessment

8.3.62 The air quality assessment has been undertaken with reference to the Planning Inspectorate's Advice Note Nine: The Rochdale Envelope (Planning Inspectorate, 2012). As discussed in paragraph 8.3.50, the Rochdale Envelope (i.e. the maximum parameters for the Proposed Development and in particular its main buildings and structures) approach has been applied to assess a worst case for key design parameters that are currently uncertain. The key measurements for the implementation for the Rochdale Envelope are detailed in Schedule 14 of the draft DCO (Application Document Ref. No. 2.1), which defines the Design Parameters. Where flexibility is to be retained in the application, any changes to design parameters will remain within the envelope assessed in this assessment.

8.3.63 The alternative design schemes included within this assessment under the Rochdale Envelope approach have been modelled and the design scheme resulting in the worst-case overall predicted concentrations has been used in the assessment of effects significance. The maximum predicted concentrations at the worst affected human health and ecological receptors associated with the alternative design schemes are provided in Table 8.23.

8.3.64 In order to enable a robust assessment of worst case air quality impacts, both the CCGT stack locations and the CCGT stack heights have been set within the air impact assessment and fixed in the draft DCO (Application Document Ref. No. 2.1, Schedule 14). In this way, even if the final plant layout and building sizes vary within the parameters of the Rochdale Envelope as it has been applied, the main release points will not have changed and therefore the predicted environmental impact at sensitive receptors will also not have changed.

Extent of Study Area

8.3.65 The study area for the operational development point source emissions extends up to 10 km from the Proposed Power Plant Site, with specific receptor locations defined for statutory ecological receptors up to 15 km from the Site, in order to assess the potential impacts on sensitive human health and ecological receptors, in line with Environment Agency Risk assessment methodology (Defra and Environment Agency, 2016). However, in practice the predicted impacts become negligible beyond a distance of around 3 km from the Proposed Power Plant Site.

8.3.66 The study area for construction dust and NRMM emissions has been applied, in line with IAQM guidance, extending:

- up to 350 m beyond the Site boundary and 50 m from the construction traffic route (up to 500 m from the Site entrances), for human health receptors; and
- up to 50 m from the boundary or construction traffic route (up to 500 m from the Site entrances) for ecological receptors.

8.4 Baseline Conditions

Existing Baseline

Sensitive Receptors

8.4.2 During the construction phase, based on IAQM guidance (IAQM, 2014), receptors potentially affected by dust soiling and short term concentrations of PM_{10} generated during construction activities are limited to those located within 350 m of the nearest construction activity, and/or within 50 m of a public road used by construction traffic that is within 500 m of the construction site entrances. Ecological receptors are limited to those located within 50 m of the nearest construction activity and/or within 50 m of a public road used by construction traffic that is within 500 m of the construction site entrances.

8.4.3 Receptors potentially affected by the exhaust emissions associated with construction phase vehicle movements are those located within 200 m of a public road used by construction traffic to access the Site. In this instance, it is assumed for the purposes of assessment that construction workers will use the A19 and Wand Lane, to access the Site via Hensall Gate entrance. As outlined in Section 8.3, the only road link for which traffic associated with the Proposed Development may exceed the DMRB screening criteria is Wand Lane to the site entrance and no receptors have been identified within 200 m of this road link, therefore Proposed Development traffic impacts on receptors have been screened out of further assessment.

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. Isopleth figures of pollutant dispersion have been examined to identify the receptors that will receive the highest point source contributions and the assessment of impact has been made at these receptors; the assessment also includes designated AQMAs within the Study Area, described below.

8.4.5 Ecological receptors potentially affected by operational emissions have been identified through desk study of Defra Magic mapping (Defra, 2016c) and consultation (see Chapter 10: Ecology and Nature Conservation). Statutory designated sites including Sites of Special Scientific Interest (SSSIs) up to and beyond 2 km and Special Areas for Conservation (SACs) up to 15 km from the Site have been considered, with those further from the Site identified through consultation with NYCC and the Environment Agency. No national or local nature reserves have been identified within 2 km of the Site; however several non-statutory Sites of Importance for Nature Conservation (SINC) have been identified through consultation and included in the assessment. Details of the sites and reasons for designations are provided in Chapter 10: Ecology and Nature Conservation.

8.4.6 Identified receptors are detailed in Table 8.11 below, for construction and opening phases, and are shown in Figure 8.1 (ES Volume II).

Table 8.11: Identified receptors with potential for air quality impacts from construction and opening of the Proposed Development

ID	Receptor name	Receptor type	Grid Reference		Distance (km)[1] and direction from proposed operational power plant		Distance (m)[3] from construction areas (within the red line boundary of the Proposed Development) (dust)
			x	y			
1	Chapel Haddlesey	School	457632	426514	2.5	N	>350
2	Chapel Haddlesey	Residential	457933	426196	2.2	N	50
3	Eggborough	Residential	456745	423690	0.9	SW	50
4	Kellington	School, Residential	455360	424974	2.4	W	>350
5	West Haddlesey	Residential	456983	426567	2.6	NW	>350
6	Gallows Hill	Residential	458485	423783	0.9	E	200
7	Hensall	Residential	458887	423453	1.4	E	>350
8	Temple Hirst	School, Residential	460744	424682	3.2	E	>350
9	Springfield Farm	Residential	457435	423054	1.0	S	>350
10	Hazelgrove Farm & caravan park	Residential	457620	423040	1.0	S	>350
11	Properties, Roall Lane	Residential	456923	424774	1.0	NW	300
12	Properties, Roall Water Works	Residential	456965	424370	0.7	NW	50
13	Roall Hall Farm	Residential	457019	425065	1.2	NW	>350
14	Roall Manor Farm	Residential	456619	424893	1.3	NW	>350
15	Eggborough Sports & Social Club	Residential	457360	424728	0.8	N	<25
16	East Haddlesey	Residential	459333	425786	2.5	NE	>350
17	PRoW, A19-Tranmore Lane-cricket pitch	Transient	457076	424447	0.7	NW	<25
18	PRoW, Gallows Hill-Eggborough Ings	Transient	458460	424185	1.2	NE	<25
19	Gallows Hill (2)	Residential	458581	423727	1.0	E	300
20	Myrtle Grange Farm	Residential	459327	423541	1.8	E	>350

ID	Receptor name	Receptor type	Grid Reference		Distance (km)[1] and direction from proposed operational power plant	Distance (m)[3] from construction areas (within the red line boundary of the Proposed Development) (dust)
			x	y		
21	Temple Farm	Residential	459640	425130	2.3 NE	>350
22	PRoW Hazel Old Lane	Transient	458207	423937	0.6 E	<25
23	AQMA, M62	AQMA	452980	422430	4.9 W	>350
24	AQMA, New Street, Selby	AQMA	461620	432340	9.3 NE	>350
25	Haddlesey Manor, E. Haddlesey	Residential	458888	425833	(see note 4)	200
26	Manor Cottages, E. Haddlesey	Residential	458552	425973		100
27	Lodge Farm, Fox Lane	Residential	458425	426889		<25
28	Burn Lodge Farm	Residential	458582	427358		<25
29	Top House Farm	Residential	458652	428307		100
30	Blossom Hill	Residential	458964	427660		200
31	Gateforth Grange	Residential	457588	427726		>350
E1	Burr Closes[2]	SSSI	459650	433900	9.6 N	>350
E2	Eskamhorn Meadows[2]	SSSI	466300	423766	8.3 E	>350
E3	Went Ings Meadows[2]	SSSI	464800	418300	9.1 SE	>350
E4	Forlorn Hope Meadow[2]	SSSI	454450	417190	8.0 SW	>350
E5	Brockadale[2]	SSSI	450530	417690	10 SW	>350
E6	Humber Estuary [2]	SAC	473400	426200	15 N	>350
E7	Skipwith Common [2]	SAC	464900	436600	15 NE	>350
E8	Thorne Moor [2]	SAC	472350	419350	15 SE	>350
E9	Selby canal and towpath[2]	SINC	457600	428300	4.4 N	>350
E10	Burn disused airfield[2]	SINC	460000	427600	4.4 NE	>350
E11	Eggborough disused pit[2]	SINC	458100	422800	1.2 S	>350
E12	River Derwent[2]	SAC	467800	428700	11.3 NE	>350

Notes:
1 Distance measured from receptor to Proposed Power Plant.
2 Receptor beyond screening distance but identified for potential impacts through consultation
3 Distance measured from receptor to red-line boundary for construction phase
4 Receptors 25-31 have been assessed for construction impacts from proximity to the Proposed Gas connection only as the operational impacts are identified as comparable to, or below those, predicted for other receptors within East Haddlesey and Chapel Haddlesey.

Existing Air Quality

8.4.7 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. As described, the key pollutants of concern resulting from construction and operation of the Proposed Development are oxides of nitrogen, nitrogen dioxide, CO, PM_{10} and $PM_{2.5}$, therefore the assessment of baseline conditions considers these pollutants only.

8.4.8 A small AQMA in Selby town (New Street/ The Crescent) was designated by SDC in February 2016 due to consistent elevated levels of nitrogen dioxide being recorded over a number of years, primarily as a result of traffic emissions. An AQAP is now being prepared by SDC. This AQMA is approximately 9 km to the north-east of the Proposed Power Plant Site.

8.4.9 There is also a larger AQMA along the M62 corridor through Wakefield District, designated by Wakefield Metropolitan District Council (WMDC) for elevated concentrations of nitrogen dioxide. The boundary of the AQMA is approximately 5 km to the west of the Proposed Power Plant Site. The nearest diffusion tube monitor operated by WMDC is approximately 9 km from the Proposed Power Plant Site (monitor reference 101) and is close to the M62 and Ferrybridge Service Station, therefore is not considered representative of the background concentration at potential receptors within the M62 AQMA that could also be affected by the Proposed Power Plant emissions.

8.4.10 SDC currently undertakes diffusion tube monitoring within Selby town to help characterise conditions in the AQMA by monitoring at roadside locations, the highest of which was 55.9 $\mu g/m^3$ in 2015 (monitor reference S7b), and obtains automatic monitoring data for data validation from automatic monitors in Hull, Barnsley and York (SDC, 2015), the closest of which is 25 km from the Proposed Power Plant Site. The available roadside monitoring data is therefore not considered representative of background air quality in the vicinity of the Site. SDC undertakes diffusion tube monitoring at two urban background locations in Selby for which the annual mean NO_2 concentrations in 2015 were 16.8 $\mu g/m^3$ (monitor reference 3N) and 16.7 $\mu g/m^3$ (monitor reference 9N) and which are therefore comparable with the Defra background mapping data for Selby , described below.

8.4.11 Background data has therefore been obtained from Defra published maps for the locations of likely maximum impact from point source emissions from the Proposed Development, and at identified sensitive receptor locations. The most recently available data is for 2013, which is conservatively assumed to be representative of the construction and opening baselines (2020 (peak construction) and 2022 (opening year), respectively). Background data assumed for the maximum impact location from the point source emissions is provided in Table 8.12 below and indicates nitrogen dioxide, CO, PM_{10} and $PM_{2.5}$ concentrations within the vicinity of the Proposed Development are consistently well below the NAQS annual mean objectives. Background data for NO_2 and PM_{10} at sensitive receptors for point source and traffic emission impacts is provided in Table 8.13.

Table 8.12: Defra background air quality data – existing and assumed future year projections

Pollutant	Annual mean concentration (µg/m^3)	
	2013	2022 (assumed)
Nitrogen dioxide (NO_2)	16.1	16.1
PM_{10}	16.8	16.8
$PM_{2.5}$	11.9	11.9
CO (from 2001)	289	289

Notes: Grid reference (457500, 424500); based on 2013 base-mapping except where indicated

Table 8.13: Background concentrations at receptors – based on Defra background data

ID	Receptor name	Background air quality (2013)	
		Nitrogen dioxide (µg/m^3)	PM_{10} (µg/m^3)
1	Chapel Haddlesey	13.9	16.9
2	Chapel Haddlesey	13.9	16.9
3	Eggborough	17.7	21.5
4	Kellington	15.5	19.4
5	West Haddlesey	13.7	16.9
6	Gallows Hill	15.6	16.9
7	Hensall	15.6	16.9
8	Temple Hirst	15.5	17.4
9	Springfield Farm	16.3	18.2
10	Hazelgrove Farm & caravan park	16.3	18.2
11	Properties, Roall Lane	15.6	19.3
12	Properties, Roall Water Works	15.6	19.3
13	Roall Hall Farm	14.6	18.0
14	Roall Manor Farm	15.6	19.3
15	EPL Sports & Social	16.1	16.8
16	East Haddlesey	14.2	16.9
17 (T)	PRoW, A19-Tranmore Lane-cricket pitch	16.1	16.8
18 (T)	PRoW, Gallows Hill-Eggborough Ings	14.8	16.8
19	Gallows Hill (2)	15.6	16.9
20	Recreation ground / Myrtle Grange Farm	15.6	17.0
21	Temple Farm	14.2	16.9
22	PRoW, Hazel Old Lane	16.1	16.8
23	AQMA, M62	21.3	21.4
24	AQMA, New Street, Selby	17.1	17.3

(T) indicates transient receptor

8.4.12 Eggborough Power Limited (EPL) (the Applicant) previously undertook monitoring of the ambient air as part of the Aire Valley Power Stations Joint Environment Programme (JEP) for the coal-fired power stations in the area. The most recently reported data to the EA (2014) is presented in Table 8.14 below for the closest downwind monitoring site to the existing

Eggborough coal-fired power station (5 km from the Proposed Power Plant Site), together with historic data from two previous reports.

Table 8.14: Existing coal-fired power station background monitoring (JEP, West Bank monitoring)

Pollutant	Annual mean concentration (µg/m^3)		
	2014	2012	2010
Nitrogen dioxide	12.1	16.3	15.9

Notes: Monitor located approximately 5 km east of the Proposed Power Plant Site

8.4.13 The JEP monitoring similarly indicates that background air quality in the vicinity of the Proposed Development is well below the NAQS annual mean objective for NO_2. The Defra mapping data for NO_2 for the West Bank location in which the JEP monitor is located indicates a background concentration in 2014 of 14.4µg/m^3 and therefore there is reasonable agreement between the two data sources.

8.4.14 As there is limited ambient air monitoring data in the immediate vicinity of the Site, EPL has conducted a four month diffusion tube survey for nitrogen dioxide at key receptor locations, identified through the air quality assessment, in order to supplement the baseline data. The results of the diffusion tube survey are presented in Table 8.15.

Table 8.15: Primary NO_2 Diffusion Tube Monitoring (November 2016 – February 2017)

ID	Monitoring Location	Site Type	Grid Reference		Mean concentration (µg/m^3)
			X	Y	NO_2
1	6 Homestead Close, Eggborough, DN14 0JY	Background	456406	423580	19.1
2	A19, YO8 8QG (adjacent to the Cooling Water Connection abstraction point)	Roadside	457900	426104	22.0
3	2 Dene Close, Hensall, DN14 0RG	Background	458745	423673	16.6
4	Hazel Old Lane, DN14 0RJ	Background	458207	423941	15.5
5	High Eggborough Lane, DN14 0UH	Roadside	456385	423139	20.8
6	Low Eggborough Road, DN14 0PS	Roadside	456481	423231	19.5
7	Tranmore Lane, DN14 0PR	Roadside	456692	423679	19.5

Notes: The above results are based on up to four months of sampling and therefore cannot be directly compared to annual averages, but provide an indication of the overall air quality.

8.4.15 The data indicates that the level of NO_2 at all monitoring locations is low, and well below the NAQS objective annual mean level of 40 µg/m^3. The sensitivity of predicted impacts to the selection of ambient concentration data is considered within the sensitivity analysis in Appendix 8A (ES Volume III).

8.4.16 The existing air quality concentrations, acid and nutrient nitrogen deposition rates at the designated habitat sites have been obtained from APIS. This data is presented in Appendix 8A within Tables 8A.10-8A.13 (ES Volume III). The data indicates that existing baseline NO_x

concentrations at the ecological receptors are well within the daily mean and annual mean Critical Levels; however the existing baseline nutrient nitrogen deposition and acid deposition levels for most of the identified designated ecological sites exceed the lower Critical Loads defined for the most sensitive species within these sites.

Future Baseline

Construction Dust

8.4.17 The baseline for construction dust has not been quantified as the assessment uses a qualitative risk based approach, however the potential for additional sources of dust and cumulative effects from other developments is considered within the evaluation of the magnitude of effects, as discussed in Section 8.6.

Point Source Emissions

8.4.18 The future baseline (without the Proposed Development) will be beneficially lowered as a result of the planned closure of the existing coal-fired power station, resulting in lower ambient concentrations of criteria pollutants, including NO_2, SO_2, PM_{10} and $PM_{2.5}$. The levels to which the ambient concentrations of pollutants in the vicinity of the Site will be reduced as a result of the cessation of existing coal-fired power station emissions are not easy to predict since the current contribution in the vicinity of the Site is unknown. However, based on the relative stack heights and stack locations of the existing coal-fired power station (198 m high stack) and the Proposed Development (90 m high stack), the peak ground level process contributions from the two generating stations would occur in different locations and therefore the assumed future baseline (from existing Defra mapping data) would not be expected to be overly influenced by the contributions from the existing coal-fired power station.

8.4.19 As a worst-case, therefore, the existing baseline including the existing coal-fired power station emission contributions is assumed to also represent the future baseline to which the Proposed Development point source emissions are added (in other words, no improvement in air quality through cessation of the operation of the coal-fired power station is assumed in the assessment); this therefore results in a conservative assessment and actual impacts are likely to be slightly lower.

8.4.20 Furthermore, the other identified or proposed significant combustion point sources within the local area (described in Chapter 20: Cumulative and Combined Effects) would not be expected to overly influence the local air quality at the point of maximum impact of the Proposed Development, as the identified sources are more than 5 km from the Proposed Power Plant Site and peak ground level contributions would be local to these sources; typically within 1-2 km of the source and in the direction of the prevailing wind. Therefore it is considered unlikely that peak impacts would coincide and such contributions are considered to be adequately represented by the existing background data. The new Saint Gobain manufacturing facility 250 m to the south of the Site (currently under construction – see Chapter 20: Cumulative and Combined Effects) is not expected to emit the same pollutants as the Proposed Development and therefore does not represent a risk to attainment of the NAQS for the study species.

8.4.21 In accordance with Environment Agency risk assessment methodology (Defra and Environment Agency, 2016), the annual mean background pollutant concentrations have been obtained

from Defra background mapping (2013) as described above, and the short-term background concentration is assumed to be twice the annual mean ambient concentration.

Future Receptors

8.4.22 Future additional receptors may be developed prior to construction of the Proposed Development as part of potentially planned housing developments south-west of A19/ A645 and between Selby Rd and the A19, as described in Chapter 20: Cumulative and Combined Effects, however these receptors are considered to be adequately represented by those receptors identified above.

8.5 Development Design and Impact Avoidance

Construction

Construction Environmental Management Plan

8.5.2 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 the proposed Construction Environmental Management Plan (CEMP). A framework CEMP has been prepared as part of this ES – see Appendix 3A (ES Volume III). The Considerate Constructors Scheme (CCS) will also be adopted to assist in reducing pollution and nuisance from the Proposed Development.

8.5.3 Based on an initial assessment of the area of sensitivity to dust impacts and the likely risk of impacts arising from each of the key construction activities (earthworks, construction and 'trackout' of material onto roads – see Appendix 8A, ES Volume III), as described in Section 8.6 below, appropriate specific measures to be implemented during construction (beyond general good site techniques) that have been identified are:

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

8.5.4 Best practice will also be employed for the siting and operation of NRMM to control associated emissions, including:

- minimise vehicle and plant idling;
- locate static plant away from sensitive boundaries or receptors, in particular by retaining the existing landscaping embankment around the Site; and

- minimise operating time outside of normal working hours/ daylight hours.

Opening

IED Emission Limit Value (ELV) Compliance

8.5.5 The Proposed Development will be designed such that process emissions to air comply with the ELV requirements specified in the IED. This will be regulated by the Environment Agency through the Environmental Permit required for the operation of the Proposed Power Plant.

8.5.6 The OEMs have all indicated that the current generation of CCGT technologies can meet IED ELVs without the use of secondary abatement techniques, such as Selective Catalytic Reduction (SCR) for the control of nitrogen oxide emissions. However, a revision to the LCP BRef Note is being drafted, which is due for finalisation and publication in September2017, as discussed in Section 8.2. This will specify emission levels that represent BAT for new generating stations including gas-fired generating stations such as the Proposed Development.

8.5.7 The current draft of this document indicates that the BAT achievable emission levels (BAT-AELs) for CCGTs may tighten such that the use of SCR may be required to achieve such levels. This is particularly challenging for the latest generation of CCGT units, which achieve higher electrical efficiencies through the use of higher temperatures; higher temperatures lead to higher nitrogen oxide formation.

8.5.8 In light of this, as outlined previously, the Environment Agency is determining whether to permit higher nitrogen oxide emissions from the most efficient CCGT units, which would still have to maintain compliance with the IED limits but may not be required to install SCR to meet the revised BRef levels; such high efficiency CCGT units are under consideration for use as part of this Proposed Development. Consequently, space has been left within the plant layouts for the installation of SCR, should that be required. However, emissions have been conservatively assessed at IED limits as these are the current legislative standard that must be applied and may be applied under the permit for the proposed generating station.

Stack Height

8.5.9 The stack heights for the CCGT units and peaking plant have been optimised with consideration given to minimisation of ground-level air quality impacts, and the visual impacts of taller stacks. This was the subject of a specific question within the Stage 2 public consultation events and public opinion favoured the use of slightly taller stacks to improve dispersion and this has been taken into account in the air impact assessment and selection of stack heights. Dispersion modelling has been undertaken to determine the optimum stack height range for the main plant stacks (75-90 m) and the peaking plant stacks (35-60 m) through comparison of the maximum impacts at human health and ecological receptors. Further information on the determination of the stack heights is provided in Appendix 8A (ES Volume III).

8.5.10 The selected stack height has been incorporated into the plant design and is based on a specified value of 90 m above the finished ground level (up to 99.9 mAOD) for the CCGT units, and 45 m (54.9 mAOD) for the peaking plant stacks.

8.5.11 All stacks for each technology type will be co-located as this is considered by the Environment Agency to improve dispersion over separately located stacks; it also reduces the visual impact of the stacks.

Visible Plumes

8.5.12 The potential for visible plumes from the CCGT stacks or peaking plant stacks is considered to be very low as a result of the water content and temperature of the flue gas.

8.5.13 Visible plumes from the potential use of hybrid cooling cells or wet cooling towers have been assessed, as described in Appendix 8B (ES Volume III), to determine the potential impacts from the alternative cooling technologies on sensitive receptors.

8.5.14 The potential for amenity impacts from visible plumes on local receptors (including loss of light and ice on roads from plume grounding) has been reviewed with consideration of the frequency, length and direction of visible plumes generated during daylight hours with reference to local sensitive receptors (as identified in Table 8.11).

8.5.15 The hybrid cooling system is predicted to result in water-condensed plumes for 25-40% of time with an average length of 3 m; the wet cooling system is predicted to result in water-condensed plumes for 80-85% of the time with an average length of 24 m. The risk of potential amenity impacts from both cooling technologies is described as low as the potential for visible plumes beyond the Site boundary (assumed for screening purposes to be >100 m in any direction) occurs for less than 5% of daylight hours per year.

8.5.16 The visible plume from use of hybrid cooling towers was predicted to exceed the Site boundary for 0.1% of daylight hours per year, with a maximum plume length extending up to 400 m to the south; the visible plume from use of wet cooling towers was predicted to exceed the Site boundary for 3.5% of daylight hours per year with a maximum plume length extending 640 m to the south, and therefore potentially reaching sensitive receptor property, although this is predicted for only two daylight hours per year. Further consideration of visible plume impacts on local landscape and visual receptors is considered within Chapter 16: Landscape and Visual Amenity.

8.5.17 The choice of cooling technology was the subject of a specific question within the Stage 2 public consultation events and public opinion favoured the use of hybrid cooling as it minimised visible plume formation. While the use of hybrid cooling towers is preferred based on current information, at this stage in the design, the use of wet cooling towers has not yet been ruled out. If wet cooling towers were to be used, based on the findings reported above, these would result in more significant visible plumes being generated than the use of hybrid cells, although wet cooling does lead to slightly higher electrical efficiency of the CCGT. The choice of cooling technology will be subject to a BAT justification to be submitted to and determined by the Environment Agency as part of the Environmental Permit application.

8.6 Likely Impacts and Effects

Construction

Assessment of Construction Dust

8.6.2 Identified sensitive receptors to dust soiling and PM_{10} effects from construction works are detailed in Table 8.11; of these, less than ten high sensitivity receptors are located within 100 m of the Site boundary or site exits; and less than 100 receptors are located within 350 m of the Site. The Proposed Borehole Connection running parallel to the A19 to the south is within 100 m of a number of sensitive receptors (Eggborough residential properties, R3), and the proposed gas pipeline route also runs within 100 m of a number of sensitive receptors, however these works are anticipated to be limited, with installation of the pipelines taking circa three months and only involving limited earth works to dig a trench and install or replace a gas or water pipe, and therefore receptor air quality sensitivity is judged to be low for these works.

8.6.3 No sensitive ecological receptors have been identified within the screening distance and therefore effects of demolition and construction dust on ecological receptors have been screened out.

8.6.4 The scale and nature of activities have been estimated to define the potential uncontrolled dust generation magnitude, according to the criteria outlined in Appendix 8A, Table 8A.1 (ES Volume III). Construction of the main Proposed Development Site is anticipated to commence in 2019 and to last approximately three years.

8.6.5 Whilst a detailed construction plan has yet to be developed for the Proposed Development, estimates of the likely scale of activities, with reference to the guidance magnitude definitions in Table 8A.5 (Appendix 8A, ES Volume III), have been made for the purposes of mitigation definition:

- the facilitating works are expected to remove existing ancillary buildings of <20,000 m^3 approximate volume, and of principally prefabricated design; some limited concrete removal is anticipated although on-site crushing and screening activities would not be proposed;
- the earthworks would cover an area in excess of 10 hectares, and move more than 100,000 tonnes of materials, including potentially dusty materials from the existing coal stockyard, using approximately 5-10 heavy earth moving vehicles at the peak;
- the total new building volume would be in excess of 50,000 m^3 and an on-site concrete batching is likely to be employed for periods during the construction phase; and
- HGV movements associated with excavation and earthworks would be more than 50 vehicles per day at peak.

8.6.6 The magnitude of effects for dust and NRMM emissions has been determined as ‘small’ for enabling demolition works; and large for earthworks, construction and trackout activities.

8.6.7 In consideration of the potential for cumulative impacts from demolition of the existing coal-fired power station at the same time as the Proposed Development construction activities, there is the potential for greater impacts at sensitive receptors. Therefore whilst the magnitude of any enabling demolition activities associated with facilitating the Proposed

Development is judged to be 'small', in order to account for potential increased impacts at the receptors from the cumulative effect of construction of the Proposed Development and demolition of the coal-fired power station, the magnitude of demolition activities has been increased to 'large'.

8.6.8 The area of sensitivity to the potential dust impacts (pre-mitigation) has been assessed based on the receptor sensitivity and distance criteria outlined in Tables 8A.2 - 8A.4 (Appendix 8A, ES Volume III) using professional judgement. The area of sensitivity has been judged to be 'medium' for dust soiling impacts from trackout at the site exits and 'low' sensitivity for dust soiling impacts and human health impacts from PM_{10} releases from all other activities, on account of the distance from the activity source to the receptors, and the existing low background concentration particulates (<24µg/m^3).

Table 8.16: Area of sensitivity to dust soiling and human health impacts

Activity and effect type	Receptor sensitivity	Potential impact	Area sensitivity
Demolition	High sensitivity (1-10 receptors, within 100 m)	Dust soiling	Low
		Human health PM_{10}	Low
Earthworks	High sensitivity (10-100 receptors within 100 m)	Dust soiling	Low
		Human health PM_{10}	Low
Construction	High sensitivity (1-10 receptors, within 100 m)	Dust soiling	Low
		Human health PM_{10}	Low
Trackout	High sensitivity (1-10 receptors, within 20 m of road, 500 m from site exits)	Dust soiling	Medium
		Human health PM_{10}	Low

8.6.9 The potential risks from emissions from unmitigated demolition and construction activities (i.e. not taking into account the impact avoidance measures set out in Section 8.5 above) have been defined with reference to the magnitude of the potential emission and the sensitivity of the impact area, in accordance with the classification defined in Appendix 8A, Table 8A.5 (ES Volume III); the results are shown in Table 8.17 below, for the Proposed Development (in isolation) and for potential cumulative activities with the existing coal-fired power station demolition, as described above.

Table 8.17: Risk of dust and particulates impacts (pre-mitigation)

Potential impact	Risk of impact from activity			
	Demolition	Earthworks	Construction	Trackout
Proposed Development in isolation				
Dust soiling	Negligible	Low risk	Low risk	Medium risk
Human health PM_{10}	Negligible	Low risk	Low risk	Low risk
Risk with cumulative impacts from demolition of existing coal-fired power station				
Dust soiling	Medium risk	Low risk	Low risk	Medium risk
Human health PM_{10}	Medium risk	Low risk	Low risk	Low risk

8.6.10 The level of mitigation required to reduce dust and particulates from the activities to avoid significant impacts on receptors has been determined based on the above risk assessment and indicative measures are outlined in Table 8.18 for the Proposed Development activities in isolation, and at the same time as demolition of the existing coal-fired power station. These were summarised in Section 8.5 above.

Table 8.18: Mitigation for dust and particulates during construction phase

Activity	Example mitigation based on risk level	Classification of residual risk of impact	Effect descriptor
Proposed Development in isolation			
Enabling Demolition	Negligible: apply good practice techniques	**Negligible**	**Not significant**
Earthworks	Low risk: apply good practice techniques	**Negligible**	**Not significant**
Construction	Low risk: avoid mechanical roughening of concrete surfaces; store sand and aggregates in bunded areas and finer materials in silos; minimise stockpiling of top soil and spoil on as and water pipeline routes during construction	**Negligible**	**Not significant**
Trackout	Medium risk: use water suppression and regular cleaning to minimise mud on road; cover vehicles leaving the site with spoil or waste materials; employ wheel wash systems at site exits	**Negligible**	**Not significant**
Proposed Development with cumulative impacts from demolition of existing coal-fired power station			
Demolition	Medium risk: use of screening at sensitive boundaries; use of water suppression measures at point of works; avoidance of blasting for structures where possible (use mechanical/manual techniques); no open fires	**Negligible**	**Not significant**
Earthworks	Low risk: apply good practice techniques;	**Negligible**	**Not significant**
Construction	Low risk: avoid mechanical roughening of concrete surfaces; store sand and aggregates in bunded areas and finer materials in silos; minimise stockpiling of top soil and spoil on as and water pipeline routes during construction	**Negligible**	**Not significant**
Trackout	Medium risk: use water suppression and regular cleaning to minimise mud on road; cover vehicles leaving the site with spoil or waste materials; employ wheel wash systems at site exits; restrict unmade road access	**Negligible**	**Not significant**

8.6.11 The aim is to apply mitigation measures as necessary, that minimise the potential for complaints to be generated as a result of the Proposed Development construction works. Therefore the application of industry best practice controls and mitigation, including consideration of the above identified example mitigation, is considered to reduce this potential such that effects at receptors will be **not significant**.

Assessment of Construction Traffic

As described in Sections 8.3 and 8.4 above, the peak construction traffic is below the DMRB screening criteria along all but one road link, for which there are no receptors within 200 m, and therefore significant changes in air quality at receptors are not expected. The change in AADT flow associated with construction traffic at the two identified AQMAs (M62; Selby town centre) is therefore also anticipated to be below the screening criteria and traffic composition at these sensitive locations is not anticipated to be significantly changed. The air quality effects from construction traffic are therefore **not significant**.

Assessment of Emissions Generated from Construction Site Plant (Non-Road Mobile Machinery)

8.6.12 At this stage of the design, the details for number and types of NRMM that would be employed in the construction on Site are not established, however the majority of the construction Site boundary is located more than 200 m from sensitive receptors, as described in the assessment of construction dust.

8.6.13 The areas of construction that are within 200 m of sensitive receptors include works associated with the Proposed Borehole Connection near to Eggborough residential properties (A19, R3), and works associated with the Proposed Cooling Water and/or Gas Connections near to Chapel Haddlesey properties, East Haddlesey properties and several farms to the north. None of these construction working areas are expected to employ NRMM for long periods of time; installation of each section of pipeline takes circa three to four months.

8.6.14 Therefore it is considered that the potential for significant effects from NO_2 and PM_{10} emissions from NRMM on sensitive receptors is likely to be low. As described in Section 8.5 above, best practice will be employed for siting and operation of NRMM. The application of best practice mitigation and the inherent low risk to sensitive receptors from NRMM as a result of their distance or duration of use means that the NRMM emissions are considered to be **not significant**.

8.6.15 The effects of construction emissions, from demolition and construction dust, construction road traffic and onsite plant, have been determined to be minor or negligible adverse and therefore the construction air quality effects are considered to be **not significant**.

Opening

Assessment of Opening Point Source Emissions

8.6.16 The impact of point source emissions at human health receptors has been determined from isopleth figures of pollutant dispersion and maximum model output at discrete receptor locations. The maximum hourly, daily and annual mean predicted concentrations have been compared with the NAQS objectives, as summarised in Tables 8.19-20 below; detailed concentrations are provide in Table 8A.9 in Appendix 8A (ES Volume III). Isopleth figures

showing the annual and hourly mean process contributions of NO_2 are provided in Figures 8.2 and 8.3 (ES Volume II).

8.6.17 These results represent the output from the worst-case modelled scenario described in Table 8.9 (design scheme B; one multi-shaft and one single-shaft H-Class CCGTs (up to 2.5 GW) and ten reciprocating gas engines (100 MW)); variation in the predicted results with alternative Rochdale Envelope scenarios is discussed in paragraph 8.6.43.

8.6.18 The assessment has been undertaken for the Proposed Development Opening year, likely to be around 2022. A separate future Operational (2037) scenario has not been undertaken for the air emissions assessment; this is because Defra predicts a gradual trend of improving air quality over the UK over many years, although the scale of any such improvement is currently under review. By assessing the effects of the Proposed Development at the Opening year therefore, a worst case background ambient air quality is assumed for the purposes of the operational impact assessment.

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

- use of the worst-case year of meteorological data modelled;
- maximum building sizes within the assessed Rochdale Envelope;
- worst case CCGT configuration within the assessed Rochdale Envelope, other configurations resulted in lower predicted impacts as shown in Appendix 8A (ES Volume III);
- annual operation of 100% for both CCGT main plant units and peaking plant units;
- operation of the plant at IED emission limits (for worst-case NO_x and CO); and
- conservative estimates of background concentrations at the sensitive receptors.

8.6.20 The following abbreviations are used in Tables 8.19-21:

- PC: this is the Process Contribution and represents the change caused by the Proposed Development;
- headroom: this is the short term PC as a percentage of the available headroom between the background concentration and the NAQS objective; and
- PEC: this is the Predicted Environmental Concentration and is PC plus background concentration. It is the concentration expected at a particular receptor once the effect of the Proposed Development is taken into account.

Table 8.19: Maximum long term nitrogen dioxide predicted concentrations at human health receptors

Receptor ID	Annual mean nitrogen dioxide PC PC/NAQS	Magnitude of change	Annual mean PEC/NAQS	Effect
1	0.6%	Very low	35%	**Negligible adverse**
2	0.8%	Very low	36%	**Negligible adverse**
3	0.4%	Imperceptible	45%	**Negligible adverse**
4	0.3%	Imperceptible	39%	**Negligible adverse**
5	0.4%	Imperceptible	35%	**Negligible adverse**

Receptor ID	Annual mean nitrogen dioxide PC PC/NAQS	Magnitude of change	Annual mean PEC/NAQS	Effect
6	4.9%	Low	44%	**Negligible adverse**
7	1.9%	Low	41%	**Negligible adverse**
8	1.6%	Low	40%	**Negligible adverse**
9	0.3%	Imperceptible	41%	**Negligible adverse**
10	0.3%	Imperceptible	41%	**Negligible adverse**
11	0.3%	Imperceptible	39%	**Negligible adverse**
12	0.3%	Imperceptible	39%	**Negligible adverse**
13	0.4%	Imperceptible	37%	**Negligible adverse**
14	0.2%	Imperceptible	39%	**Negligible adverse**
15	0.7%	Very low	41%	**Negligible adverse**
16	1.2%	Very low	37%	**Negligible adverse**
17(T)	0.3%	Imperceptible	41%	**Negligible adverse**
18(T)	6.4%	Medium	43%	**Minor adverse**
19	4.1%	Low	43%	**Negligible adverse**
20	2.4%	Low	41%	**Negligible adverse**
21	2.0%	Low	38%	**Negligible adverse**
22(T)	7.7%	Medium	48%	**Minor adverse**
23 (AQMA)	0.1%	Imperceptible	53%	**Negligible adverse**
24 (AQMA)	0.4%	Imperceptible	43%	**Negligible adverse**

(T) indicates transient receptor

Table 8.20: Maximum predicted short term concentrations at worst affected human health receptors

Receptor	Pollutant	PC ($\mu g/m^3$)	PC/NAQS	PC as % of headroom	Effect
22 (T)	Nitrogen dioxide (1-hour mean, 99.79th%ile)	62	31%	37%	**Moderate adverse**
6	Nitrogen dioxide (1-hour mean, 99.79th%ile)	39	19%	23%	**Minor adverse**
6	Carbon monoxide (8-hour, daily running mean)	185	2%	2%	**Negligible adverse**
22 (T)	Carbon monoxide (1-hour mean)	350	1%	1%	**Negligible adverse**

(T) indicates transient receptor

8.6.21 The maximum long term process contribution of nitrogen dioxide from any of the operational scenarios results in a medium magnitude of change in the annual mean concentration at several of the identified receptors, of which the transient receptor (22), representing users of the PRoW (Hazel Old Lane), represents the highest change in annual mean concentration, with medium magnitude, although given its transient nature (a Public Right of Way), long term impacts at this receptor are not considered relevant. Gallows Hill receptors (6,) represent the worst affected residential receptors, with a low magnitude of change.

8.6.22 The annual mean baseline concentration at these receptors is well below the NAQS objective; with the Proposed Development, therefore the effect of the predicted emissions at the worst-case, transient, receptors is described as **minor adverse (not significant)**. The magnitude of change in annual mean NO_2 at all other human health receptors is low or very low and the effect of the emissions is therefore described as **negligible adverse (not significant)** at these locations.

8.6.23 The magnitude of change in annual mean nitrogen dioxide concentration at the identified AQMAs (represented by receptors 23 and 24) from the Proposed Development is very low (M62 AQMA: 0.1% of the NAQS; Selby AQMA: 0.4% of the NAQS), therefore the effect from Proposed Development at the AQMAs is described as **negligible adverse (not significant)**.

8.6.24 The maximum short term predicted concentration of nitrogen dioxide at the worst affected receptor (22, PRoW Hazel Old Lane) represents 30% of the hourly mean NAQS objective and therefore is described as **moderate adverse (significant)** effect, however the Proposed Development short-term contribution combined with the baseline concentration is well below the NAQS and therefore the effect is defined as acceptable by the Environment Agency criteria; furthermore the impact occurs at a transient receptor location and therefore it is considered that the likelihood of peak impacts occurring when the Public Right of Way is in use is low. The maximum short-term predicted concentration of nitrogen dioxide at the worst affected residential receptor (6, Gallows Hill) represents 19% of the hourly mean NAQS objective and therefore is not negligible as defined by the Environment Agency criteria, however the Proposed Development short-term contribution combined with the baseline concentration is well below the NAQS and therefore the effect is described as **minor adverse (not significant)**.

8.6.25 As described in the IAQM guidance (IAQM, 2017), the impact descriptors are applied to individual receptors and if the impact at a receptor is described as moderate or major it does not necessarily follow that the overall impact has a significant effect. Given the worst-case assumptions made in the assessment and the overall predicted impacts at all residential receptors being **negligible adverse**, the effect of NO_2 emissions from the Proposed Development is considered **not significant**.

8.6.26 The maximum short term predicted concentration of carbon monoxide at the worst affected residential receptor (6, Gallows Hill) represents <10% of the 8-hourly mean NAQS objective and <10% of the 1-hour mean EAL, therefore the effect is described as **negligible adverse** and **not significant**.

8.6.27 The impact of process contributions of point source emissions at ecological receptors has been determined from isopleth figures of pollutant dispersion and maximum model output at discrete receptor locations. Annual mean NO_x process contributions (predicted from operation of the plant at IED ELVs) have been compared with the annual mean Critical Level at each of the identified ecological receptors, are shown in Table 8.21 below.

Table 8.21: Maximum NO_x process contributions at ecological receptors

Receptor ID	Annual mean PC/NAQS	Magnitude of change	Annual mean PEC/NAQS	Effect
E1	0.9%	Imperceptible	64%	**Negligible adverse**
E2	1.4%	Very low	74%	**Negligible adverse**

Receptor ID	Annual mean PC/NAQS	Magnitude of change	Annual mean PEC/NAQS	Effect
E3	0.5%	Imperceptible	68%	**Negligible adverse**
E4	0.3%	Imperceptible	75%	**Negligible adverse**
E5	0.2%	Imperceptible	76%	**Negligible adverse**
E6	0.8%	Imperceptible	63%	**Negligible adverse**
E7	0.6%	Imperceptible	52%	**Negligible adverse**
E8	0.8%	Imperceptible	61%	**Negligible adverse**
E9	1.0%	Imperceptible	67%	**Negligible adverse**
E10	1.2%	Very low	68%	**Negligible adverse**
E11	0.6%	Imperceptible	55%	**Negligible adverse**
E12	1.0%	Imperceptible	46%	**Negligible adverse**

8.6.28 The maximum process contribution of NO_x from any of the operational scenarios results in a very low magnitude of change in the annual mean concentration at the ecological receptor predicted to receive the highest PC (E2), and very low or imperceptible change at the other identified receptors; the ambient concentration at these receptors is well below the objective with the Proposed Development, therefore the effect of the Proposed Development operational emissions at these receptors is described as **negligible adverse (not significant)**.

8.6.29 In addition to the above assessment of ground level concentrations at the identified ecological receptors, an assessment of deposition impacts has also been undertaken as presented in Appendix 8A, Tables 8A.12-8A.13 (ES Volume III). The identified statutory ecological receptors are all designated for species that may be sensitive to nutrient nitrogen deposition and acid deposition; non-statutory sites (SINCs) have not been assessed for nitrogen deposition as Critical Loads for such sites are not available. The maximum process contribution of nutrient nitrogen deposition (from operation of the plant at IED ELVs) at any of the identified receptors is less than 1% of the lower Critical Load published for the most sensitive habitat at each receptor and therefore the magnitude of change may be considered imperceptible and the effect is described as **negligible adverse (not significant)**.

8.6.30 The process contribution of sulphur deposition at any of the ecological receptors is expected to be negligible as the emissions of SO_2 from natural gas combustion are negligible; therefore process contributions of only the nitrogen kilo equivalent deposition has been compared with the acidity Critical Loads. The maximum nitrogen deposition process contribution to acid deposition (from operation of the plant at IED ELVs) at any of the identified receptors is less than <1% of the Critical Load published for the most sensitive habitat at each receptor; therefore the magnitude of change may be considered imperceptible and the effect of nutrient nitrogen and acid deposition from the Proposed Development at these receptors is described as **negligible adverse (not significant)**.

8.6.31 The opening year point source emissions effects on identified receptors has been determined to have **negligible adverse** effect and therefore the operational effects are considered to be **not significant**.

Effects of Potential SCR Use

8.6.32 The effects of potential SCR use, to achieve lower NO_x emissions (30 mg/Nm^3) but with corresponding potential ammonia slip (likely to be at around 5 mg/Nm^3 NH_3), have been assessed and indicative results are presented below.

8.6.33 The use of SCR would reduce the maximum impacts of NO_2 and NO_x by 30-35% from the levels presented in Tables 8.18 and 8.19, which were based on emissions at IED ELVs.

8.6.34 Emissions of ammonia are predicted to result in hourly mean and annual mean PCs at all human health receptors that are less than 1% of the ammonia EALs defined for these averaging periods, and therefore the PCs are below the EA threshold criteria for negligible impacts. The effect of emissions of ammonia, associated with the potential use of SCR, on human health receptors would therefore be **not significant**.

8.6.35 The potential impact of the process contribution to ammonia concentration in the atmosphere on ecological receptors has been assessed against the Critical Level defined for each habitat type. The maximum impact was determined at E8 (Thorne Moor SAC) with an ammonia PC of 2% of the Critical Level of 1µg/m^3 (defined for lichens and bryophytes) and a PEC of 125% of the Critical Level. A PC of 2% is marginally above the threshold for insignificance; this is considered a low impact magnitude. However, as the current background level is so high (above the Critical Level for the degraded raised bog habitat), this would be termed a potentially **major adverse (significant)** effect. The maximum impact at E7 (Skipwith Common SAC) is very low impact magnitude but with an existing baseline above the Critical Level, the potential overall effect is considered **moderate adverse** (**significant**). For all other ecological receptors the PC of ammonia is 1% or less of the defined Critical Levels and therefore considered to be of **negligible adverse (not significant)** effect.

8.6.36 The potential impacts of nutrient nitrogen deposition and acid deposition at statutory ecological receptors from the combined PC of ammonia and NO_x from the potential use of SCR has also been assessed. The results of the assessment are tabulated in Appendix 8A (ES Volume III). The difference in nitrogen deposition rates of ammonia and nitrogen oxides results in an increase in nutrient nitrogen and acid deposition associated with the ammonia slip from use of SCR, despite the lower NO_x emissions, over those deposition rates from NO_x without the use of SCR.

8.6.37 The nutrient nitrogen impacts at E2 (Eskamhorn Meadows SSSI), E6 (Humber Estuary SAC) and E8 (Thorne Moor SAC) increase from 'imperceptible' to 'low' as a result of the emission of ammonia even with the lower NO_x, and therefore change the predicted potential effects from **imperceptible to minor adverse (not significant)** for E2; and to **major adverse (significant**) for E6 and E8 as the latter two sites are described with N-deposition above the lower (and upper) nutrient nitrogen Critical Load range for the most sensitive species.

8.6.38 Similarly, the acid deposition PCs at E6, E7 and E8 increase from <1% of the minimum Critical Load (MinCLMaxN), described as **negligible adverse (not significant)** effect, to 1-2% of the minimum Critical Load, which in combination with the existing high baseline levels gives predicted potential effects of **moderate adverse (significant)** for E7 and **major adverse (significant)** for E6 and E8. The potential effects at identified ecological receptors are therefore considered to be worsened with the potential use of SCR, even with the corresponding reduction in NO_x emission.

8.6.39 EPL are committed to the use of BAT for the control of emissions from the Proposed Development, however at this stage of design development the use of SCR cannot be determined as BAT for the CCGT units. Formal BAT justification will be conducted once the final generation technology has been confirmed and plant efficiency and NO_x ELV requirements are known.

Assessment of Abnormal Point Source Emissions

8.6.40 Abnormal operation of the plant has been assessed for the black start facility operating concurrently with the peaking plant as a worst-case; only short-term impacts have been assessed as the black start plant is assumed to be operation for a maximum of 50 hours per year. The assessment conservatively assumes that this operation coincides with worst-case meteorological conditions by modelling of continuous emissions.

8.6.41 The impact of abnormal operation from point source emissions at human health receptors has been determined from isopleth figures of pollutant dispersion and maximum model output at discrete receptor locations. The worst-case impacts from the abnormal operation of the peaking plant and black start plant in simultaneous operation are approximately 25% of the maximum impacts from peak operation of the main CCGT plant with peaking plant at the identified receptors. The PC at the worst-affected receptor is less than 10% of the NAQS short-term objectives and the effects are therefore described as **negligible adverse (not significant)**. Once the black start plant has powered the peaking plant or a CCGT unit it will be switched off, so there is no scenario whereby the CCGT, peaking plant and black start plant will all operate simultaneously at full load. Therefore the worst-case impacts and effects at receptors are represented within the above assessment.

8.6.42 Furthermore, even in the event that the selected black start technology is greater than 30 MW capacity (paragraph 8.3.58), with the corresponding reduction in the peaking plant output capacity the impacts from abnormal operation would be well below those predicted during normal operation. Maximum predicted short-term impacts from abnormal operation are shown in Table 8.22. An isopleth figure showing the maximum hourly mean process contribution of NO_2 associated with abnormal operation is provided in Figure 8.4 (ES Volume II).

Table 8.22: Maximum predicted short term concentrations from abnormal operation, at worst affected human health receptors

Receptor	Pollutant	PC (µg/m^3)	PC/NAQS	PC as % of headroom	Effect
22 (T)	Nitrogen dioxide (1-hour mean, 99.79th%ile)	16	<10%	<10%	**Negligible adverse**
15	Nitrogen dioxide (1-hour mean, 99.79th%ile)	13	<10%	<10%	**Negligible adverse**
15	Carbon monoxide (8-hour, daily running mean)	33	<10%	<10%	**Negligible adverse**
22 (T)	Carbon monoxide (1-hour mean)	59	<10%	<10%	**Negligible adverse**

(T) indicates transient receptor

Rochdale Envelope Parameters

8.6.43 The alternative design schemes included within this assessment under the Rochdale Envelope approach have been modelled and the design scheme (see Table 8.9) resulting in the worst-case overall predicted concentrations has been used in the above assessment of effects significance. The maximum predicted concentrations at the worst affected human health and ecological receptors associated with the alternative design schemes are shown in Table 8.23 below as the percentage of reported values used in the effects significance assessment. So a reported result in Table 8.23 of 100% means that result is the same as was reported in the main assessment above, and therefore represents the worst case; if a result is less than 100% then this means that the result is not as great an impact as the worst case presented. Application of the below sensitivity results to process contributions does not adversely alter the predicted effects significance assessment and therefore the reported receptor effects can be considered worst-case.

Table 8.23: Rochdale Envelope – maximum process contributions at worst affected receptors (as % of reported values)

Design scheme (see Table 8.8)	Human health receptors		Ecological receptors	
	Annual mean NO_2	Hourly mean NO_2	Annual mean NO_x	Daily mean NO_x
A (3 x H-Class, single shaft, OCGT peaking plant)	66%	92%	90%	100% (reported)
B (3 x H-Class, Multi- & single shaft, OCGT peaking plant)	77%	100% (reported)	89%	70%
B (3 x F-Class, multi-shaft, OCGT peaking plant)	65%	71%	78%	45%
B (3x H-Class)+ reciprocating engines peaking plant	100% (reported)	95%	100% (reported)	84%

Decommissioning

8.6.44 The relevant best practice mitigation measures will be in place during any decommissioning works, and the surrounding environment and receptors at the time of decommissioning will be identified through due process and documented in a Demolition Environmental Management Plan. No additional mitigation for decommissioning of the Proposed Development beyond such best practice is foreseen to be required 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.

Summary of Evaluation of Effects for the Proposed Development as a Whole

8.6.45 The effects of construction emissions, from enabling demolition works and construction dust, construction road traffic and onsite plant, have been determined to be **minor or negligible adverse** and therefore the construction air quality effects are considered to be **not significant**. The Opening scenario point source emissions effects on receptors as a whole has been determined to have **negligible adverse effect** and therefore the operational effects are considered to be **not significant**. Sensitivity analysis has identified that the results presented are not adversely altered with the alternative design schemes presented and that the

dispersion model variables present a realistic worst case. Therefore the air quality effects from the Proposed Development are considered to be **not significant**.

8.7 Mitigation and Enhancement Measures

8.7.1 As described earlier, the management of dust and particulates and application of adequate mitigation measures will be enforced through the CEMP, and through application of appropriate mitigation according to the risk of dust emissions from Site activities as identified in this assessment. A framework CEMP has been prepared as part of this ES to support the DCO application (Appendix 3A (ES Volume III)), and a DCO Requirement will secure the submission and approval (prior to construction), and then implementation of a final CEMP.

8.7.2 The environmental effects from construction of 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 embedded mitigation measured outlined in Section 8.5.

8.7.3 The air quality assessment of operational impacts has assumed that the ELVs will be met for the operational plant as required under the IED 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, therefore no specific additional mitigation has been identified as necessary for the operational phase of the Proposed Development other than the embedded mitigation measured outlined in Section 8.5. As identified in Section 8.5, the plant will be designed to be able to accommodate the future installation of SCR, should that be required.

8.8 Limitations or Difficulties

8.8.1 No technical limitations or difficulties that could have implications for the assessment were encountered. The assessment presented in this ES takes the data available from OEMs and assesses worst case impacts.

8.9 Residual Effects and Conclusions

Construction

8.9.1 The air quality assessment of construction impacts assumes that the measures outlined within the mitigation section (Section 8.5) 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 specific 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 8.6 of this chapter.

8.9.2 Whilst the potential air quality effects of construction traffic associated with the Proposed Development are negligible adverse (with or without the addition of traffic associated with the demolition of the existing coal-fired power station), it is recognised that a number of cumulative schemes could be using the same road network at the time of construction. EPL is not in a position to influence the timing or routing of construction traffic to off-site developments but they do have the potential to influence the timing and routing of demolition traffic associated with the existing coal-fired power station. It is therefore proposed that, once

the timing of the existing coal-fired power station demolition activities is known, EPL will prepare a Travel Plan for construction and demolition traffic accessing the site and will evaluate the need to coordinate traffic flows to the two activities, to avoid significant cumulative impacts.

Opening

8.9.3 The air quality assessment of impacts at opening has assumed that the ELVs will be met for the operational plant as required under the IED and in accordance with use of BAT under the environmental permitting regime. No specific additional mitigation has been identified as necessary for the opening phase of the Proposed Development. For this reason, the residual effects would be as reported within Section 8.6 of this chapter.

Decommissioning

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

8.10 References

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