10.0 AIR QUALITY

Introduction

10.1 This chapter of the ES assesses the likely significant effects of the Development on the environment in terms of air quality.

10.2 The chapter describes the assessment methodology; the baseline conditions at the Site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

10.3 In addition to a planning consent the Development will also require an Environmental Permit to operate. The Environmental Permit will be regulated by the Environment Agency. The Environmental Permit application process is a separate process to the planning process which focuses on the pollution control of the Development such as air and odour emissions controls).

Planning Policy Context

10.4 This section presents the national legislation, national planning policy, regional planning policy and local planning policy that are of relevance to the air quality assessment for the Development.

National Legislation

10.5 The principal air quality legislation within the United Kingdom is the Air Quality Standards Regulations 2010[i] which came into force in June 2010 and brings together the Government's requirements to transpose the separate EU Daughter Directives into national legislation through a single consolidated statutory instrument.

10.6 In addition, the Environment Act 1995[ii] requires the Government to produce a national Air Quality Strategy (AQS) containing standards, objectives, and measures for improving ambient air quality and to keep the policies identified below under review. It also requires that Local Authorities undertake a tiered appraisal of air quality within their borough to establish compliance or non-compliance with the targets established in the AQS. Where the objectives are likely to be exceeded, the Authority must designate an Air Quality Management Area (AQMA) and establish an Air Quality Action Plan (AQAP), which outlines measures to work towards the achievement of the objectives.

10.7 The AQS for England, Scotland, Wales and Northern Ireland[iii] provides the over-arching strategic framework for air quality management in the UK and contains national air quality standards and objectives established by the Government to protect human health. These objectives apply to outdoor locations where people are regularly present and do not apply to occupational, indoor, or in-vehicle exposure.

10.8 The air quality objectives applicable to Local Air Quality Management are set out in the Air Quality Regulations 2000[iv] and the Air Quality (Amendment) Regulations 2002[v]. The Air Quality Standards Regulations 2010[vi] include additional objectives for arsenic, cadmium, nickel and $PM_{2.5}$. However, the AQS does not contain objectives for these pollutants and local authorities have no statutory obligation to currently review and assess concentrations of these species locally.

10.9 Current assessment criteria applicable to the protection of human health and Local Air Quality Management based on the recent AQS and the 2010 Regulations are presented in Table 10.1. Concentrations are expressed in mass of pollutant (micrograms) per cubic metre of air ($\mu g/m^3$).

Table 10.1: Air Quality Strategy Objectives ($\mu g/m^3$)

Pollutant	Objective	Averaging period	Percentile	To be met by and maintained after
Nitrogen dioxide (NO_2)	200	1 hour	99.8^{th} (18 exceedances/year)	31 Dec 2005
	40	Annual	Mean	31 Dec 2005
Particulate matter (PM_{10})	40	Annual	Mean	31 Dec 2004
	50	24 hour	90.4^{th} (35 exceedances/year)	31 Dec 2004
Carbon monoxide (CO)	10,000	8-hour	100^{th}	31 Dec 2003
Benzene	5	Annual	Mean	31 Dec 2010
1,3 butadiene	2.25	Annual	Mean	31 Dec 2003
Lead	0.25	Annual	Mean	31 Dec 2008
Poly aromatic hydrocarbons (PAH) (ng/m^3)	0.25	Annual	Mean	31 Dec 2010
Sulphur dioxide (SO_2)	266	15 minute	99.9^{th} (35 exceedances/year)	31 Dec 2005
	350	1 hour	99.7^{th} (24 exceedances/year)	31 Dec 2004
	125	24 hour	99.2^{nd} (3 exceedances/year)	31 Dec 2004

10.10 In addition, a number of objectives have been developed for the protection of vegetation and ecosystems; these are shown in Table 10.2.

Table 10.2: Air Quality Strategy Objectives – Protection of Vegetation and Ecosystems

Pollutant	Objective	Averaging period	Percentile	To be met by
Oxides of Nitrogen (NO_x)	30 µg/m^3	Annual	Mean	31 Dec 00
Sulphur dioxide (SO_2)	20 µg/m^3	Annual	Mean	31 Dec 00
Ozone	18 mg/m^3	5 year average of summer 1 hour values		1 Jan 2010

10.11 The above legislation relates to concentrations of pollutants in ambient air with respect to human health or vegetation. There are no legislative standards or agreed guidelines for dust nuisance in the UK, for example due to dust deposition. Most issues of dust nuisance are covered through Statutory Nuisance legislation defined in the Environmental Protection Act, Part III, 1990, Section 79, Parts (d) and (e) which covers dust[vii]:

> *"d) Any dust, smell or effluvia arising on industrial, trade, or business premises and being prejudicial to health or a nuisance;*
>
> *e) Any accumulation or deposit which is prejudicial to health or a nuisance."*

10.12 In the absence of legislative standards there are however a number of non-statutory guidelines that are available when measuring the effect of dust deposition. For example for dust deposition, the Environment Agency has set a custom and practice limit of 200 mg/m^2/day[viii].

National Planning Policy

10.13 Air quality is considered in a range of national policy guidance notes and statements including general pollution control statements, local air quality policy guidance, transport guidance notes and also minerals planning notes. This sub-section identifies the key national policy guidance from these policy areas.

National Planning Policy Framework (March 2012)[ix]

10.14 The National Planning Policy Framework (NPPF) was published in March 2012[x], 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…"*

10.15 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."*

10.16 There are both national and local policies for the control of air pollution and for the management of local air quality within the North York Moors National Park Authority (NYMNPA) area. The effect of the Development on the achievement of such policies and plans are matters that may be a material consideration by planning authorities, when making decisions for individual planning applications. Paragraph 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."*

10.17 The different roles of a planning authority and a pollution control authority is addressed by the NPPF in paragraph 122:

> *"... local planning authorities should focus on whether the development itself is an acceptable use of the land, and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."*

10.18 The Planning Practice Guidance (PPG)[xi], provides a summary of the air quality issues set out in the National Planning Policy Framework and goes on to note that the assessment should include the following information (Paragraph: 007 Reference ID: 32-007-20140306):

> • *'a description of baseline conditions and how these could change;*
>
> • *relevant air quality concerns;*
>
> • *the assessment methods to be adopted and any requirements around verification of modelling air quality;*

- *sensitive locations;*
- *the basis for assessing impact and determining the significance of an impact;*
- *construction phase impact; and/or*
- *acceptable mitigation measures.'*

10.19 The guidance then advises that the application should proceed to decision with appropriate planning conditions or planning obligation, if the Development (including mitigation) would not lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or fail to comply with the requirements of the Habitats Regulations.

10.20 The PPG also provides guidance on the consideration of dust emissions for minerals extraction that are discussed in the methodology section of this chapter.

Policy Guidance Note LAQM.PG (09)[xii]

10.21 Policy Guidance Note LAQM.PG(09)[xiii] considers all aspects of local air quality management policy, including air quality reviews and assessments, air quality action planning, transport planning, and land use planning. It provides specific guidance on developing local air quality strategies; however the structure and format of a local air quality strategy is entirely up to the local authority.

Local Planning Policy

10.22 Local planning policy applicable to the Development includes policy prepared by North Yorkshire County Council (NYCC), NYMNPA and Ryedale District Council (RDC).

NYCC Minerals Plan Document[xiv]

10.23 NYCC produced a Minerals Local Plan which has an Environmental Protection chapter. There are no specific policies regarding air quality. However, there is a Policy 4/1 Determination of Planning Applications which concerning dust, the section concerning dust is outlined below:

> *"The objectives of the policy are to minimise the effects of visual intrusion, blasting, dust and noise on residential and rural amenity."*

NYMNPA Core Strategy and Development Policies Document[xv]

10.24 NYMNPA published its Core Strategy and Development Polices Document in November 2008[xvi]. This document includes a number of air quality references, and notes that good air quality is one of the special qualities of the National Park. As one of the special qualities of the National Park, air quality is protected in Development Policy 1 – Environmental Protection Item 1:

> *"To conserve and enhance the special qualities of the North York Moors National Park, development will only be permitted where: 1 It will not have an unacceptable adverse impact on surface and groundwater, soil, air quality and agricultural land."*

10.25 No Supplementary Planning Documents (SPD) or Supplementary Planning Guidance (SPG) for air quality has been published by the NYMNPA.

10.26 NYMPA Local Development Scheme has no specific mention of air quality and therefore will not be discussed any further[xvii].

Ryedale Local Plan Strategy, September 2013[xviii]

10.27 Local planning policy with respect to air quality is also presented for RDC whom have responsibility for local air quality management.

10.28 The purpose of the Ryedale Plan is to encourage new development and to manage future growth whilst ensuring that change across the District is based on the presumption in favour of sustainable development. The Plan includes a Vision and Objectives for the sort of place that Ryedale will be and sets out a Strategy and suite of strategic policies to achieve these and to promote and guide private and public sector investment, neighbourhood planning, community and voluntary sector work and support over the next fifteen years. The document considers air quality in policy SP 17 Managing Air Quality, Land and Water Resources. The policy states that:

> *"Air Quality will be protected and improved by:*
>
> *• Locating and managing development to reduce traffic congestion and air pollution and promote the use of alternative forms of travel to the private car.*
> *• Supporting measures to encourage non-car based means of travel or the use of low emission vehicles.*
> *• Reducing air quality emissions from buildings through renewable energy provision and sustainable building standards in line with policy SP18.*

> *• Requiring development proposals within or adjoining the Malton Air Quality Management Area to demonstrate how effects on air quality will be mitigated and further human exposure to poor air quality reduced. All development proposals within or near to the Air Quality Management Area which are likely to impact upon air quality; which are sensitive to poor air quality or which would conflict with any Air Quality Action Plan will be accompanied by an Air Quality Assessment.*
> *• Only permitting development if the individual or cumulative impact on air quality is acceptable and appropriate mitigation measures are secured."*

10.29 No SPD or SPG for air quality has been published by RDC.

10.30 The Malton Air Quality Management Area (AQMA) Order was designated by Ryedale District Council on 14 December 2009. An Action Plan has subsequently been prepared by RDC to improve air quality in this AQMA[xix]. This includes a range of measures including a major junction improvement, a scheme to reduce the flow of traffic through the AQMA and measures to facilitate modal shift from private vehicles.

Assessment Methodology

10.31 This section identifies the study pollutants associated with the different potential emission sources associated with the construction, operation, decommissioning and restoration of the Development. The section also identifies the sensitive receptors that could potentially be affected by the emission sources, describes the prevailing meteorological conditions and the significance criteria used to determine the significance of effects on these receptors. The section also describes the assessment methodology utilised for each potential emission source.

Study Pollutants

10.32 The following paragraphs identify the relevant study pollutants from the identified potential sources of pollutants associated with the Development including vehicle emissions from road vehicles, construction dust emissions (e.g. construction, decommissioning and restoration), and operational plant emissions (e.g. diesel generator).

10.33 Vehicle exhaust emissions (e.g. from petrol and diesel combustion) comprise a complex mixture of organic and inorganic substances. Of these emissions, assessment criteria for the protection of human health exist for the following pollutants:

- Fine particulate matter (PM_{10} and $PM_{2.5}$);

- Nitrogen dioxide (NO_2);
- Sulphur dioxide (SO_2);
- Carbon monoxide (CO);
- Benzene;
- 1,3-butadiene;
- Lead; and
- Poly Aromatic Hydrocarbons (PAHs).

10.34 These pollutants are currently regulated because of their known or suspected deleterious effects upon human health, and because historically, relatively high concentrations have been recorded within and downwind of urban centres.

10.35 Within this assessment of vehicular emissions, only $PM_{10,}$ $PM_{2.5}$ and NO_2 emissions have been considered. Lead is not included as it is no longer added to petrol fuels and therefore, lead emissions from vehicles are not considered significant nationally. SO_2 emissions from vehicles are also considered to be insignificant since the introduction of low sulphur diesel and the negligible sulphur content of petrol fuels. There are currently no AQMAs within the UK declared as a result of exceedances of CO, benzene, PAH or 1,3-butadiene, therefore, no quantitative assessment of these pollutants is considered necessary or has been provided as part of this assessment.

10.36 The key pollutants of concern with respect to construction activities are suspended dust (e.g. PM_{10}) and accumulated dust (soiling/deposition). This is due to the movement of on-site plant equipment, movement of materials on-site and stockpiling of materials on-site. In consultation with the Applicant no notable odour sources have been identified for the construction phase and therefore construction odours are not considered further.

10.37 The key pollutants for the Development have been determined from a review of the Environment Agency Combustion Activities Guidance Note[xx]. The review indicates that for natural gas related combustion, Oxides of Nitrogen (NOx), Carbon Monoxide (CO), Methane (CH_4) and Carbon Dioxide (CO_2) are the main pollutants (See Table 10.3). However, CH_4 and CO_2 are of concern with respect to greenhouse gases and climate change rather than for local air quality. Climate change is not considered to be a significant issue for the Development (which excludes combustion activities at Knapton Generating Site (KGS)) as limited combustion will be undertaken at the Ebberston Moor South (EMS) Well Site.

10.38 The operational assessment will therefore focus on NOx, PM_{10} and CO. Additionally, as the gas that will be processed at the Site is a natural gas, it may contain sulphur, Hydrogen

Sulphide (H_2S) and other odorous compounds (mercaptans), which will also be considered.

Table 10.3: Guide to Air Pollutants - Combustion

Fuel Type	Inputs	Potential air emissions
Solid	Coal	NO_x, CO, CO_2, particulate matter (including PM_{10}), fugitive dust, trace metals, polychlorinated biphenyls (PCBs) and Polycyclic Aromatic Hydrocarbons (PAHs), hydrogen halides, methane (CH_4), Non Methane Volatile Organic Compounds (NMVOCs), dioxins and nitrous oxide (N_2O).
	Biomass	NO_x, CO, CO_2, SO_x, Particulate matter (including PM_{10}), CH_4, NMVOCs and trace metals (from sewage sludge).
Liquid	Fuel Oil	NO_x, CO, CO_2, SO_x, particulate matter (including PM_{10}), PCBs and PAHs, hydrogen chloride, trace metals and dioxins.
Gaseous	Natural Gas	NO_x, CO, CO_2, CH_4
Secondary fuels	Solid, liquid or gaseous	NO_x, CO, CO_2, SO_x, particulate matter (including PM_{10}), PCBs and PAHs, hydrogen halides, trace metals, NMVOCs, hydrogen sulphide (H_2S), ammonia and dioxins.

10.39 The study pollutants described in the preceding paragraphs have been selected based on the potential of the pollutants to generate adverse odours, adversely affect human health or adversely affect vegetation and sensitive ecosystems. The known health effects of some of the key identified study species are briefly discussed below:

- Particulate matter – Health based assessment criteria focus on the fine 'PM_{10}' and '$PM_{2.5}$', size fractions. PM_{10} and $PM_{2.5}$ are defined as particulate matter with an aerodynamic diameter of less than 10 microns and 2.5 microns respectively. Emissions of particulates from construction activities and combustion processes are likely to contain a range of particulate sizes, including many larger than 10 microns in diameter. However for the purposes of a worst-case assessment and to enable comparison with national air quality objectives, these have been assumed to constitute PM_{10}. Although the health effects of fine particulate matter are currently the subject of much research, the possible association between exposure to increased levels and respiratory and cardiovascular illness, and mortality has previously been acknowledged. Recent reviews by the World Health Organisation (WHO) and the Committee on the Medical Effects of Air Pollutants (COMEAP) have suggested exposure to $PM_{2.5}$ gives a stronger association with adverse health than the larger particulate fractions.
- Nitrogen dioxide (NO_2) and oxides of nitrogen (NO_x) – Formed as a by-product of high temperature combustion by the oxidation of nitrogen in the air and the fuel. NO_x emissions primarily consist of nitric oxide (NO), which is oxidised in the atmosphere to produce NO_2, as well as small quantities of NO_2 produced directly during combustion. For combustion sources, NO_x emissions are typically in the NO:NO_2 ratio of 9:1. NO_2 is the component of NO_x that is principally associated with health

impacts, including effects on lung function and airway responsiveness, and potential increase in reactivity to natural allergens.

- CO - Formed when incomplete combustion of carbon-containing fuels occurs, due to insufficient oxygen being present. CO affects the transport of oxygen around the body by the blood. At very high levels, it can lead to a significant reduction in the supply of oxygen to the heart, particularly in people suffering from heart disease.
- H_2S - Present in natural gas, which when burnt oxidises to SO_2. However, in some circumstances not all H_2S present is oxidised to SO_2. The residual H_2S can cause breathing difficulties and be fatal at very high concentrations (e.g. within enclosed environments) and these type of health effects would not be anticipated in ambient air. H_2S is also odorous with a characteristic rotten eggs odour.
- Mercaptans (or thiols) - Are colourless odorous sulphur containing organic gases, with an odour often described as rotten cabbage. They are considered to be an irritant when inhaled.

Sensitive Receptors and Land Uses

10.40 A number of sensitive receptors have been identified within the vicinity of the Site these are detailed in Table 10.4 and shown on Figures 10.1 and 10.2.

10.41 The twenty eight receptors presented in Table 10.4 and Figures 10.1 and 10.2 are the closest to the Site in each compass direction within 4 km. Twenty two of the twenty eight receptors are locations of public exposure (i.e. residential locations) and five of the sites (R3, R21, R25, R26, R27, and R28) are Sites of Special Scientific Interest (SSSI).

10.42 There are twenty one receptors in total identified within 1 km of the Site (R1-2, R4-16, R18, and R20-24).

10.43 Receptors R25 to R28 are separated from the Site by dense areas of plantation forestry associated with the Dalby Forest. The other receptors located further south along the pipeline, are located within agricultural areas and less dense areas of forestry.

10.44 The Site is located in an area of undulating topography as described in Chapter 7 Landscape and Visual Amenity.

Table 10.4: Identified Sensitive Receptors

Receptor Number	Receptor Name	Grid Reference		Distance (km unless stated) and Direction
		X	Y	
R1	Ochre Farm	489021	477588	650m NE
R2	5 Knapton Railway Cottages	487349	476723	540m W
R3	East Heslerton Row SSSI	491435	475890	3.8 SE
R4	Difford Farm	487843	477812	490m E
R5	Knapton Lodge	487257	477586	100m W
R6	Wath House Farm	487465	478247	310m E
R7	Whitehall Farm	487546	479051	690m E
R8	Newstead Grange	486524	479351	340m W
R9	Crake Hall	487149	479632	250m E
R10	Carr House Farm	487842	480870	840m E
R11	Grange Farm	487157	481543	10m E(from site boundary) but 130 metres east of pipeline
R12	Low Farm	487794	482891	690m E
R13	Wilton Carr House	486573	482095	465m W
R14	Green Howe, Wilton	486386	482759	590m W
R15	Warren House	487465	484572	110m E
R16	Cliff Edge Farm	487256	482906	240m E
R17	High Park Farm	489599	484860	1.8 E
R18	Pheasant Hill	488969	485336	920m E
R19	Low Scamridge Farm	489673	485664	1.3 E
R20	Givendale Head Farm	489288	487599	500m N
R21	Troutsdale & Rosekirk Dale Fens SSSI	490035	487474	320m N
R22	Cockmoor Hall	491178	486479	960m SE
R23	Broad Head Farm	490220	488195	960m N
R24	Hern Head House	491130	487465	770m E
R25	Nabgate SSSI	486239	484552	1.3 W

Receptor Number	Receptor Name	Grid Reference		Distance (km unless stated) and Direction
		X	Y	
R26	Ellerswood & Sand Dale SSSI	485408	484419	2.0 W
R27	Ellerburn Bank SSSI	485392	485002	2.2 W
R28	Seive Dale Fen SSSI	485563	487499	3.0 NW

Meteorological Conditions

10.45 Based on detailed meteorological data from Church Fenton, located approximately 48 km to the south west, the prevailing wind direction at the Site varies between the west and south west (See Figure 10.3).

Significance Criteria

10.46 The assessment of potential effects and their significance has been based on the criteria outlined in the Environmental Protection UK (EPUK) "Development Control: Planning for Air Quality" publication[xxi].

10.47 There are three aspects that must be taken into account when assessing the significance of the effect, these are:

- The magnitude of the change caused by the Development;
- The absolute predicted environmental concentration in relation to the air quality objectives; and
- The number of people exposed.

10.48 Particular significance should be given to a change that takes the concentration from below to above the national AQS objective or vice versa because of the importance ascribed to the objectives in assessing local air quality (see Table 10.6).

10.49 Table 10.5 presents the EPUK criteria for the determination of the "magnitude of change", based on the percentage increase in pollutant concentrations due to the Development. Table 10.6 presents the significance of the effects, taking into account the magnitude of change over baseline conditions and the absolute concentration in relation to air quality objectives.

Table 10.5: Determination of Magnitude of Change

Magnitude of change	Annual Mean Concentration (NO_2 and PM_{10})	Days PM_{10} >50μg/m³
Large	Increase/decrease >10% (>4)	Increase/decrease >4 days
Medium	Increase/decrease 5-10% (2-4)	Increase/decrease 2-4 days
Small	Increase/decrease 1-5% (0.4-2)	Increase/decrease 1-2 days
Imperceptible	Increase/decrease <1% (<0.4)	Increase/decrease <1day

Table 10.6: Significance of Effects

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration			
	Imperceptible	Small	Medium	Large
Increase with Development				
Above Objective/Limit Value With Scheme (>40 μg/m³)	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Just Below Objective/Limit Value With Scheme (36-40 μg/m³)	Negligible	Minor Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (30-36 μg/m³)	Negligible	Negligible	Minor Adverse	Minor Adverse
Well Below Objective/Limit Value With Scheme (<30 μg/m³)	Negligible	Negligible	Negligible	Minor Adverse
Decrease with Development				
Above Objective/Limit Value Without Scheme (>40 μg/m³)	Negligible	Minor Beneficial	Moderate Beneficial	Major Beneficial
Just Below Objective/Limit Value Without Scheme (36-40 μg/m³)	Negligible	Minor Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value Without Scheme (30-36 μg/m³)	Negligible	Negligible	Minor Beneficial	Minor Beneficial
Well Below Objective/Limit Value Without Scheme (<30 μg/m³)	Negligible	Negligible	Negligible	Minor Beneficial

10.50 Tables 10.5 and 10.6 provide a mechanism for categorising the magnitude of change and significance of effect at individual receptors. The descriptions of effect and significance from individual receptors should be utilised together with the following considerations to derive an overall judgement of significance of effect:

- Number of properties affected by minor, moderate or major air quality effects and a judgement on the overall balance;

- Where new exposure is being introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant;
- Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before, or the size of an exceedence area is substantially increased;
- Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced in size;
- Uncertainty, including the extent to which worst case assumptions have been made in the assessment; and
- The extent to which an objective or limit value is exceeded, e.g. an annual mean NO_2 concentration of 40 $\mu g/m^3$ should attract less significance than an annual mean concentration of 50 $\mu g/m^3$.

10.51 The EPUK guidance also indicates that it would be useful to outline the experience of the author undertaking an air quality assessment to provide confidence in the assessment of significance due to the role of professional judgement in this task. In this instance the air quality assessment has been supervised by Dr David Deakin an Associate Air Quality Consultant and member of the Institute of Air Quality Management (IAQM).

Assessment of Dust Emissions Generated During Construction Works

10.52 The assessment of dust for the construction of the Development has been undertaken following the four stages outlined in the NPPF – PPG[xxii] for dust emissions as listed below:

- Stage 1: Stage 1: Establish existing baseline conditions;
- Stage 2: Identify site activities that could lead to dust emission without mitigation;
- Stage 3: Identify site parameters which may increase potential impacts from dust; and
- Stage 4: Recommend mitigation measures and site design modifications.

10.53 In Stage 1: the identification of baseline conditions includes the establishment of baseline air quality, the location of sensitive receptors and the conditions likely to affect the migration of dust (e.g. prevailing wind). The information gathered in Stage 1 and 2 is utilised to evaluate the potential risks to air quality in Stage 3. Whilst in Stage 4 suitable mitigation measures to avoid significant adverse are identified.

10.54 The PPG[xxiii] also provides a series of key questions to assist in the evaluation stage. The key

questions in the evaluation of air quality risks are as follows:

- Are there residential properties and other sensitive uses within 1 km? and if not development can proceed implementing good practice measures only and no further assessment is required;
- Are PM_{10} concentrations likely to exceed relevant air quality objectives? and if not development can proceed implementing good practice measures only and no further assessment is required; and
- If there are sensitive receptors within 1 km and there are likely exceedances of PM_{10} air quality objectives then an assessment of effects and of mitigation measures is required to establish if effects can be adequately controlled and/or monitored or if refusal should be considered. However, if there are no receptors within 1km and there are no concerns over exceedances of PM_{10} air quality objectives then good practice measures should be considered only.

10.55 In 2000 the Building Research Establishment (BRE)[xxiv] undertook six months of continuous PM_{10} sampling at three locations within 200m of a demolition and construction site of 0.65 ha. The site was a former chemical works and required demolition of existing buildings, piling along some of the site boundary, excavation of soil to a depth of 1m across the site (greater than 1m in some areas), and the subsequent erection of new structures. During working hours, in the 6-month monitoring period, PM_{10} concentrations within 1m of the study site boundary increased by up to 11 $\mu g/m^3$ during demolition, 3 $\mu g/m^3$ during site preparation and 5 $\mu g/m^3$ during piling and earth working (including a period of piling at the site boundary). PM_{10} concentrations about 150m from the construction site were indistinguishable from background levels. The study utilised 'best practice' dust mitigation measures and the site did not receive any complaints concerning dust effects, despite the presence of residential properties within 10m of the site perimeter.

10.56 The findings of this BRE study have been applied to the Development, taking into consideration the ambient background levels of particulate matter for the area to assist in Stage 3 of the NPPF-PPG assessment and in particular to consider the key question concerning potential exceedances of PM_{10} air quality objectives.

10.57 The decommissioning and restoration phase of works is also briefly discussed as the activities involved in decommissioning and restoration will be very similar to those required for the construction phase.

Assessment of Road Traffic

10.58 A review of the potential for air quality effects associated with increases in road traffic during the construction, operational and decommissioning and restoration phases of the Development has been undertaken. The review has been undertaken as vehicles travelling to and from the Development have the potential to affect air quality with respect to PM_{10} and NO_2.

10.59 The level of assessment for road traffic emissions has been established by comparison of anticipated construction and operational traffic flows (see Chapter 8 Traffic and Transportation) against the Design Manual for Roads and Bridges (DMRB) local air quality road traffic criteria[xxv]. The DMRB criteria enable significant traffic changes, with the potential to affect air quality, to be identified. Where significant traffic changes are identified, these are then modelled using either the DMRB air quality screening model or an advanced air quality dispersion model. The criteria for the identification of significant traffic changes outlined in the Environmental Protection UK (EPUK) document 'Development Control: Planning for Air Quality' have also been considered.

Assessment of Emissions from Operational Plant

10.60 The Development includes a small diesel generator of approximately 0.5 MW.

10.61 It is not considered necessary to undertake any additional assessment of the Knapton Generating Site (KGS) as the Development is for the provision of gas to the existing site only and therefore no significant change in combustion activities are envisaged at the KGS site. Additionally, no new infrastructure is anticipated to be required to treat or combust the gas delivered from the EMS Well Site.

Limitations and Assumptions

10.62 No significant difficulties or limitations in the establishment of baseline conditions etc or development details have been encountered in the preparation of the air quality chapter that have affected the overall evaluation of air quality effects.

Baseline Conditions

10.63 Baseline air quality conditions (i.e. annual long term pollutant concentrations) are presented in this section.

10.64 NYMNPA does not have responsibility for local air quality management. This is the responsibility of RDC.

10.65 The statutory review and assessment of local air quality within the area by RDC has identified one AQMA under the Local Air Quality Management (LAQM) regime at Malton (approximately 10 km south west of the Development), as described below[xxvi]:

> *"An area in the centre of Malton encompassing properties along the B1248 (Castlegate and Yorkersgate, between Sheepfoot Hill and Market Street), and the B1257 (Wheelgate and Old Maltongate, between Finkle Street and 20m east of the junction with East Mount). The area also includes part of Church Hill."*

10.66 The 2014 Air Quality Progress Report RDC[xxvii] did not identify any other areas which were likely to exceed air quality objectives.

10.67 In support of their air quality review and assessment work, RDC carry out passive monitoring for NO_2 using diffusion tubes; these are located at Malton, Norton, Pickering, Sherburn, Helmsley and Rillington. The closest of these sites to the Development is in Pickering, approximately 3 km to the west of the pipeline, and 11.5 km to the south west of the EMS Well Site.

10.68 In the absence of suitable monitored background data, background NO_2 and PM_{10} concentrations have been taken directly from the National Air Quality Archive Background maps for 2014 to provide levels for the baseline year[xxviii].

10.69 Concentrations of CO have been taken from the 2001 National Air Quality Archive Background Maps, which are the most recent background maps for CO[xxix].

Table 10.7: Predicted Background Pollutant Concentrations ($\mu g/m^3$)

Pollutant	Estimated Minimum Background concentration in Study Area (2014)	Estimated Maximum Background Concentration in Study Area (2014)	Objective	Averaging Period
CO	176	195	350	Annual mean
	352	390	10,000	Maximum 8 hr running mean
NO_2	5.1	5.9	40	Annual mean
	10.2	11.7	200	1 hour, 99.8th percentile
PM_{10}	12.8	16.6	40	Annual mean
	25.6	33.2	50	Daily mean, 90.4th percentile

Note: Short term concentrations based on EA H1 Annex F Guidance that in the absence of monitored concentrations short term averages are considered to be twice the annual

average[xxx].

10.70 For all pollutants assessed, background concentrations in 2014 are predicted to comply with the air quality standards.

Likely Significant Effects

10.71 This section describes the likely significant effects from construction dust (including decommissioning and restoration), road traffic (construction and operation) and operational sources.

Dust Emissions Generated During Construction and Decommissioning and Restoration Works

10.72 The guidance presented in the PPG[xxxi] indicates that there is a risk of adverse air quality effects from minerals works, such as excavation of pipeline and construction works. Chapter 5 indicates that there will be the following construction activities:

10.73 Site preparation will involve:

- Construction of a temporary construction compound including site cabins within the EMS Well Site which will contain offices and welfare facilities for management and construction workers;
- Ground modelling works including topsoil stripping and stockpiling for later use;
- Workshop facilities for maintaining the construction equipment;
- Erection of temporary fences along the boundaries of the pipeline working corridor. Gates and stiles will be incorporated into the fence wherever access by public rights of way and farm tracks are required; and
- Installation of temporary surface water management measures for construction.

10.74 The main construction phase will involve:

- Foundation excavation and construction;
- Installation of below and above ground services;
- The fibre optic cable and pipeline;
- Construction of structures including separator and storage tanks;
- A rig will be used at the EMS Well Site for 30 days to re-enter the existing wellhead. This rig will subsequently be used for a further 60 days to drill the new water production well. The rig will be powered by one small 350 kW generator.

10.75 The landscaping works will involve:

- Felling of trees and clearance of other vegetation;
- Stripping and stockpiling of existing topsoil;
- Placement of materials recovered from excavations for foundations, roadways and pipeline and services trenches;
- Placement of topsoil; and
- Tree and vegetation planting and seeding.

10.76 The first question considered in the -PPG is if there are any sensitive receptors within 1 km. There are twenty receptors within 1 km of the Development. Of these receptors only three are within 150m of the Development. R5 Knapton Lodge is located 100 metres west of the Site, R11 Grange Farm is located 10 metres to the east of the pipe storage and 135 metres east of the pipeline route and R15 Warren House is located 110 metres to the east of the Site. As the majority of air quality effects would be within the first 150m, it is anticipated that most receptors will experience no significant air quality effects. The closest receptor R11 Grange Farm is not likely to experience significant dust effects as the portion of the site closest to the receptor will be used for pipe storage and worker welfare facilities.

10.77 The second question is whether there is a risk of PM_{10} air quality objectives being exceeded. Background PM_{10} concentrations are anticipated to be very low, with annual average PM_{10} concentrations of 16.6 µg/m³, which are approximately a third of the relevant annual objective and 33.2 µg/m³ which is just over half of the 24-hour objective. Therefore, the risk of an exceedence is considered to be low, as confirmed by reference to the BRE case study findings described below.

10.78 Based on the BRE study, the mean concentrations at the Site boundary arising from earth works and site preparation works could increase by 5µg/m^3 to 38.2µg/m^3 during site working hours, from a short term concentration of 33.2 µg/m^3 (based on the maximum background concentration presented in Table 10.7). This concentration is still well within the AQS 24-hour objective of 50 µg/m^3.

10.79 On the basis of these findings, it is anticipated that construction dust will cause a negligible effect at the two receptors within 150m along the pipeline route. This is because during construction activities, PM_{10} concentrations are predicted to remain below the 24-hour AQS objective of 50µg/m³ (with no increase in the number of days of exceedence).

10.80 The small drilling rig generator is also not anticipated to have any significant air quality

effects, due to its small size and temporary period of operation.

10.81 Similar negligible air quality effects will also be anticipated with any decommissioning and restoration phase of works.

Assessment of Road Traffic

10.82 The DMRB guidance states that assessment of affected roads is only considered necessary where proposals would result in:

- An increase in daily traffic flows by 1,000 or more;
- Daily Heavy Goods Vehicles (HGVs) flows will change by 200 or more;
- Daily average speed will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more.

10.83 Furthermore, the Environmental Protection UK (EPUK) document 'Development Control: Planning for Air Quality' states that an air quality assessment is not normally required unless:

- Proposals that will generate or increase traffic congestion, where 'congestion' manifests itself as an increase in periods with stop start driving; or
- Proposals that will give rise to a significant change in either traffic volumes, typically a change in annual average daily traffic (AADT) or peak traffic flows of greater than ±5% or ±10%, depending on local circumstances (a change of ±5% will be appropriate for traffic flows within an AQMA), or in vehicle speed (typically of more than ±10 kph), or both, usually on a road with more than 10,000 AADT (5,000 if 'narrow and congested'); or
- Proposals that would significantly alter the traffic composition on local roads, for instance, increase the number of HDVs by say 200 movements or more per day, due to the development of a bus station or an HGV park (professional judgement will be required, taking account of the total vehicle flow as well as the change); or
- Proposals that include significant new car parking, which may be taken to be more than 100 spaces outside an AQMA or 50 spaces inside an AQMA. Account should also be taken of car park turnover, i.e. the difference between short-term and long-term parking, which will affect the traffic flows into and out of the car park. This should also include proposals for new coach or lorry parks. These criteria are designed to trigger the requirement for the assessment of traffic on the local roads. It may also be appropriate to assess the emissions from within the car park itself; or
- Large, long-term construction sites that would generate large HGV flows (>200 movements per day) over a period of a year or more.

10.84 The traffic anticipated to be associated with the Development construction, operation and decommissioning and restoration phases are described in Chapter 8 Transport.

10.85 The traffic increases during the construction phase are anticipated to be well below the level of change requiring further assessment against both DMRB and EPUK criteria as outlined in Table 8.9 Summary of Construction Vehicle Movements (see Chapter 8, Transport Section for more details). It is therefore considered that the traffic effects of the Development during construction are insignificant in terms of local air quality, no further assessment is needed and construction traffic is deemed to be an effect of negligible significance.

10.86 Lower traffic flows are anticipated to be associated with the decommissioning and restoration phase (see Chapter 8 for more details) and therefore these will also result in changes in air quality of negligible significance.

10.87 During the operational phase of the Development, even fewer additional traffic movements are anticipated than during the construction period, with minimal traffic. See Chapter 8, Likely Significant Effects: Operation Section for more details. Therefore, the operational change in traffic flows is considered to be insignificant against the DMRB and EPUK criteria and is therefore deemed to have a negligible significance.

Operational Emissions

10.88 There is one combustion source associated with the Development with a small diesel generator (approximately 0.5 MW) within the EMS Well Site.

10.89 The Environment Agency H1 guidance Note [xxxii] indicates that point sources that are less than 20 MW are 'small point sources' and that:

> *"For gas and distillate oil fired boilers with an aggregated thermal input less than 20MW and small point sources such a vents and short stacks a case may be made by the operator that the scale of the release does not warrant detailed modelling on the basis of limited environmental risk. This should be done preferably in discussion with the regulator."*

10.90 It is considered that the diesel fuelled electric generator is a small point source (less than 1/20th of the size considered small) which presents a very limited environmental risk, due to the small size and also the distance of public exposure and designated ecosystems from the well site (as listed above). Therefore, no quantitative assessment of these emissions has been undertaken. The emissions associated with the diesel generator (approximately 0.5 MW) within the EMS Well Site are considered insignificant for human health and vegetation.

10.91 Odour is also considered unlikely to be a significant issue as only small volumes of gas are to be combusted at the EMS Well Site which may include some potentially odourous compounds. This will be confirmed in a Draft Odour Management Plan (OMP) which will be prepared for consultation with the relevant stakeholders prior to Construction. An OMP will also be a requirement of any Environmental Permit for the Development (See Paragraph 10.96).

10.92 In addition to a planning consent the Development will also require an Environmental Permit to operate. The Environmental Permit will be regulated by the Environment Agency. The Environmental Permit application process is a separate process to the planning process which focuses on the pollution control of the Development (e.g. air and odour emissions controls) associated with small natural gas fuelled electric generator etc. It is yet to be confirmed whether the permit required for the Development will consist of a variation to the permit already in place at KGS, or a whether there will be a separate application for a permit specifically for the operational activities at the well site along with a variation for KGS if necessary.

Mitigation Measures

10.93 This section presents the mitigation measures appropriate to minimise the effect on air quality from construction, decommissioning and restoration or operational activities.

Construction, Decommissioning and Restoration

10.94 Although a negligible effect is predicted for dust effects, these will be mitigated through the preparation and implementation of a dust management plan, which will be agreed in consultation with NYMNPA. This will result in an overall negligible effect.

10.95 In accordance with best practice, construction dust will be controlled through the application of a series of measures incorporated into a Construction Environmental Management Plan (CEMP) including (where appropriate):

- Regular inspection and, where necessary, wet suppression of material/soil stockpiles (including wind shielding, storage away from site boundaries, and restricted height of stockpiles);
- Appropriate orientation of material stockpiles to minimise wind dispersion;
- Provision of wheel washing and wet suppression during loading of wagons/vehicles;
- Covering vehicles carrying dry spoil and other wastes;
- Shielding of dust-generating construction activities;
- Provision of suitable site hoarding;

- Restricting vehicle speeds on access roads and other unsurfaced areas of the Assessment Site;
- Inspection of unsurfaced haulage routes, and wet suppression as necessary, during prolonged dry periods; and
- Complaints recording and resolution process.

10.96 A Principal Contractor will be appointed by the Applicant to develop and implement the CEMP, which will present a comprehensive list of mitigation measures, for agreement with NYMNPA and RDC.

Operation

10.97 The Development has been designed to minimise emissions to air, and good management processes will be implemented at the EMS Well Site. The measures that are proposed at EMS Well Site in comparison to indicative Best Available Techniques (BAT) as outlined in the Environment Agency Gasification, Liquefaction and Refining Installations (EPR 1.02) Sector Guidance for natural gas refining[xxxiii] are presented in Table 10.8.

Table 10.8: Air Emission Mitigation Measures – Natural Gas Refining

Item	Indicative BAT – You should, where appropriate	Proposed Implementation
1.	*'Minimise frequency of pig/sphere use by operating sea-lines at high velocity where practicable, i.e. use "mist flow" conditions, minimise recovery of spheres by use of receivers holding several devices and use of vent receivers of high pressure gas to a low pressure part of the process for gas recovery by recompression, before opening for access to pig/spheres.'*	Not applicable.
2.	*'Use sectioned vent and isolation systems which minimise the volume of gas to be released or allow high pressure gas to be vented by an enclosed header system to a low pressure part of the process for recompression.'*	The gas facility will include isolation valves to enable the isolation of relatively small, discrete sections of plant to minimise quantities of gas requiring venting.
3.	*'For planned depressurisation (e.g. of the sea line or process plant), minimise the quantity of gas released by venting down to as low a pressure as possible through the terminal process before flaring the remaining gas.'*	As the gas inventory is the primary resource it is in the interest of the operator / owner to vent as little gas as possible. As discussed in item 2, the plant will include isolation valves to enable the isolation of relatively small, discrete sections of plant to minimise the quantity of gas to be released.
4.	*''Gas streams with significant sulphur content should not be used as fuel.'*	Not applicable.
5.	*'Consider alternatives to direct releases of CO_2 particularly for large flows.'*	Not applicable.

Item	Indicative BAT – You should, where appropriate	Proposed Implementation
6.	*'Dispose of mercury recovered from raw natural gas in an environmentally responsible way.'*	Not applicable. The gas is not expected to contain any mercury.

10.98 The comparisons of indicative BAT with the proposed air emissions mitigation measures indicates a high degree of compliance that will control emissions of pollutants to air, including odorous gases such as H_2S and Mercaptans.

10.99 The BAT associated with treatment and conditioning of natural gas is not discussed herein as the processes utilised to treat the gas are located at the KGS. These are outside the planning application for the Development.

Residual Effects

10.100 This section discusses the anticipated level of effect following implementation of the aforementioned mitigation measures.

10.101 Any effects associated with construction, decommissioning or restoration dust are predicted to be negligible following mitigation as the closest receptor (R11, Grange Farm) is approximately 15m from the areas of construction work and best practice dust mitigation measures will be utilised.

10.102 Traffic emissions associated with either the construction, operation or decommissioning and restoration phases of Development are negligible, as there are small numbers of vehicles associated with each of these phases.

10.103 Operational effects of the Development are considered to be negligible as only one small diesel generator (approximately 0.5 MW) is included in the Development.

10.104 The residual effects associated with each aspect that has been assessed is described in Table 10.9.

Table 10.9: Summary of Effects Following Mitigation

Phase	Nature of Effect	Temporal and Spatial Extent	Significance
Construction, decommissioning and restoration	Increase in fugitive dust emissions during construction	Temporary, Local	Negligible
	Construction traffic Emissions	Temporary, Local	Negligible
Operation	Operational traffic emissions	Temporary, Local	Negligible
	Operational plant emissions	Permanent, Local	Negligible

Cumulative Effects

10.105 Potential cumulative effects have been assessed in respect of other proposed or permitted schemes in the vicinity, acting together to generate elevated levels of effects from those reported above. This includes York Potash and Ebberston Early Development Scheme. York Potash is located several kilometres from the Development. Due to the distance between York Potash and the Development no significant air quality effects are anticipated for either the construction or operational phase. No significant cumulative effects are anticipated with the Ebberston Early Development Scheme as these works would also be subject to the same dust control measures as the Development.

Summary

10.106 The significance of effects for construction, decommissioning or restoration activities is considered to be negligible due to the distance of the activities from receptors, along with the dust management techniques that will be implemented through the CEMP. The effects associated with traffic are considered to be negligible, due to the small number of vehicles required to construct, operate, decommission and restore the Development. Operational air quality effects associated with small combustion sources at EMS Well Site, are also considered to be negligible, due to the small amounts of gas that will be combusted on-site and because of the BAT that will be utilised on-site to manage emissions.

10.107 Odour is also considered unlikely to be a significant issue as only small volumes of gas are to be combusted at the EMS Well Site which may include some potentially odourous compounds. This will be confirmed in a Draft Odour Management Plan (OMP) which will be prepared for consultation with the relevant stakeholders prior to Construction. An OMP will also be a requirement of any Environmental Permit for the Development (See Paragraph 10.60).

10.108 In summary the significance of effects on air quality is considered to be negligible. The Development is considered to comply with the relevant air quality policies and plans. All

construction, operational and decommissioning and restoration air quality effects following mitigation are considered to be negligible and therefore it is anticipated that air quality will not be a material planning consideration with respect to the Development.

10.109 In addition to a planning consent the Development will also require an Environmental Permit to operate either as a new permit (s) or as a variation to the existing KGS Permit. The Environmental Permit will be regulated by the Environment Agency. The Environmental Permit application or variation process is a separate process to the planning process which focuses on the pollution control of the Development (e.g. air and odour emissions controls). This process will provide further detailed information concerning pollution control including a detailed odour management plan (OMP) and Best Available techniques to control emissions to air.

Table 10.10: Table of Significance – Air Quality

Potential Effect	Nature of Effect (Permanent /Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/ Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/ Minor) (Beneficial/ Adverse/ Negligible)
				I	UK	E	R	C	D/ NP	L	
Construction											
Construction Plant Emissions (e.g. drilling phase generators)	Short term temporary	Negligible	Emissions produced from the generator for the rig are expected to be negligible and therefore not significant								Negligible
Increase in fugitive dust emissions during construction	Short term temporary	Negligible	Although, a negligible effect is predicted for dust effects these will be mitigated through the implementation of a dust action plan and CEMP.							*	Negligible
Construction traffic emissions	Short term temporary	Negligible	Changes in traffic are anticipated to be small and so no further mitigation is proposed.							*	Negligible
Operation											
Operational traffic emissions	Long term temporary	Negligible	Changes in traffic are anticipated to be small and so no further mitigation is proposed.							*	Negligible
Operational plant emissions	Long term temporary	Negligible	The Development has been designed to minimise emissions to air. Good management processes will also be implemented to minimise emissions to air.							*	Negligible
Decommissioning and Restoration											
Increase in fugitive dust emissions during decommissioning and restoration	Short term temporary	Negligible	Although, a negligible effect is predicted for dust effects these will be mitigated through the preparation and implementation of a CEMP.							*	Negligible
Decommissioning and restoration traffic emissions	Short term temporary	Negligible	Changes in traffic are anticipated to be small and so no further mitigation is proposed.							*	Negligible
Cumulative Effects											
Increase in fugitive dust emissions during	Short term temporary	Negligible	Although, a negligible effect is predicted for dust effects these will be mitigated							*	Negligible

construction			through the implementation of a dust action plan and CEMP.								
Construction traffic emissions	Short term temporary	Negligible	Changes in traffic are anticipated to be small and so no further mitigation is proposed.							*	Negligible
Operational traffic emissions	Short term temporary	Negligible	Changes in traffic are anticipated to be small and so no further mitigation is proposed.							*	Negligible
Operational plant emissions	Long term temporary	Negligible	The Development has been designed to minimise emissions to air. Good management processes will also be implemented to minimise emissions to air.							*	Negligible

*** Geographical Level of Importance**

I = International; UK = United Kingdom; E = England; R = Regional; C = County; NP = National Park; L = Local

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