9.0 AIR QUALITY

Introduction

9.1 This chapter of the ES assesses the potential effects of the Proposed Development in terms of air quality.

9.2 The chapter describes: the assessment methodology; the baseline conditions currently existing at the Assessment Site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset and significant adverse effects; and the likely residual effects after these measures have been employed. This chapter has been prepared by URS Infrastructure and Environment Limited (URS).

9.3 In addition to a planning consent the Proposed 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 Proposed Development (e.g. air and odour emissions controls).

Planning Policy Context

9.4 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 relating to the Proposed Development. Compliance of the Proposed Development with respect to air quality policy and legislation will be discussed in the Residual Effects and Summary Sections.

National Legislation

9.5 The principal air quality legislation within the United Kingdom is the Air Quality Standards Regulations 2010 (Ref. 9.1), 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.

9.6 In addition, the Environment Act 1995 (Ref. 9.2) 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 Action Plan for the region, which outlines measures to achieve the objectives.

9.7 The AQS for England, Scotland, Wales and Northern Ireland (Ref. 9.3) 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.

9.8 The air quality objectives applicable to Local Air Quality Management are set out in the Air Quality Regulations 2000 (Ref. 9.4) and the Air Quality (Amendment) Regulations 2002 (Ref. 9.5). The Air Quality Standards Regulations 2010 (Ref. 9.1) 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.

9.9 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 9.1**. Concentrations are expressed in mass pollutant (micrograms) per cubic metre of air ($\mu g/m^3$).

Table 9.1: 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

9.10 In addition, a number of objectives have been developed for the protection of vegetation and ecosystems, these are shown in **Table 9.2**.

Table 9.2: 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

9.11 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 (Ref. 9.6):

> ***"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."***

9.12 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 (Ref. 9.7).

National Planning Policy

9.13 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 different policy areas.

National Planning Policy Framework (March 2012) (Ref. 9.8)

9.14 The National Planning Policy Framework (NPPF) was published in March 2012 (Ref. 9.8), 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…"***

9.15 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."***

9.16 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 Proposed Development on the achievement of such policies and plans are matters that may be a material consideration by planning authorities, when making decisions for individual planning applications. Paragraph 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."***

9.17 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."***

9.18 The NPPF is accompanied by Technical Guidance to the National Planning Policy Framework (NPPF-TG) (Ref: 9.9). The NPPF provides some broader guidance on assessments of dust

impacts from mineral extraction sites that have been cited in the methodology of this assessment.

Policy Guidance Note LAQM.PG(09) (Ref. 9.10)

9.19 Policy Guidance Note LAQM.PG(09) (Ref. 9.10) 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

9.20 Local planning policy applicable to the Proposed Development comprises policy prepared by North York Moors National Park Authority (NYMNPA).

NYMNPA Core Strategy and Development Policies Document (Ref. 9.11)

9.21 NYMNPA published its Core Strategy and Development Polices Document in November 2008 (Ref. 9.11). 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."***

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

9.23 Local planning policy with respect to air quality is also presented for Ryedale District Council (RDC) whom have responsibility for local air quality management.

9.24 RDC has a range of 'saved' local plan policies (Ref. 9.12) including the Chapter 15 – Landscape, Wildlife and Environmental Quality policies ENV2, ENV3, ENV5, ENV7, ENV12, ENV13 and ENV18. None of these polices directly relate to air quality.

9.25 RDC have recently submitted the Ryedale Plan: Local Plan Strategy (Ref. 13) to the Secretary of State for formal examination. The document proposes key policies for managing growth and change across the District to 2027. Once adopted this Local Plan Strategy will form part of the Development Plan for RDC. This document considers air quality in policy: SP 17 Managing Air Quality, Land and Water Resources. This policy indicates 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.***

9.26 No Supplementary Planning Documents (SPD) or Supplementary Planning Guidance (SPG) for air quality has been published by RDC.

9.27 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 (Ref. 9.14). 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.

Discussion

9.28 The review of planning policy has identified a number of national and local air quality policies relating to new development. These note that the potential effects of air quality on public exposure from new development should be considered in planning decisions.

9.29 National planning policy also highlights the differing responsibilities of the planning and environmental permitting regime. The responsibility of the pollution control authority in the

environmental permitting regime is to effectively control air emissions. Where a development will be subject to regulation by a pollution control authority, planning authorities should assume that this regulation will operate effectively.

Assessment Methodology

9.30 This section identifies the study pollutants associated with the different potential emission sources associated with the construction, operation, decommissioning and restoration of the Proposed Development. The section also identifies the sensitive receptors that could potentially be affected by the emission sources, describes the prevailing meteorological conditions and describes 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

9.31 The following paragraphs identify the relevant study pollutants from the identified potential sources of pollutants including vehicle emissions from road vehicles, construction dust emissions (e.g. construction, decommissioning and restoration), and operational plant emissions (flare).

9.32 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).

9.33 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.

9.34 Within this assessment of vehicular emissions, only PM_{10} 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. The only AQMAs to have been designated within the UK as a result of exceedances of CO, benzene, PAH or 1,3-butadiene objectives was for benzene which was designated by Plymouth City Council, therefore, no quantitative assessment of these pollutants is considered necessary or has been provided as part of this assessment.

9.35 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 designers of the Proposed Development no notable odour sources have been identified for the construction phase and therefore construction odours are not considered further.

9.36 The key pollutants for the Proposed Development have been determined from a review of the Environment Agency Combustion Activities Guidance Note (Ref. 9.15). The review indicates that for natural gas related combustion, Oxides of Nitrogen (NO_x), Carbon Monoxide (CO), Methane (CH_4) and Carbon Dioxide (CO_2) are the main pollutants (See **Table 9.3**). 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 Proposed Development as limited combustion will be undertaken on-site, in contrast to the power stations that the sector guidance primarily relates.

9.37 The operational assessment will therefore focus on NO_x and CO. Additionally, as the gas that will be processed at the Assessment Site is a sour gas, meaning the gas contains significant concentrations of sulphur, Hydrogen Sulphide (H_2S) and other odourous compounds (mercaptans) will also be considered.

Table 9.3: 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).

Fuel Type	Inputs	Potential air emissions
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.

9.38 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. 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

9.39 A number of sensitive receptors have been identified within the vicinity of the Proposed Development and these are detailed in **Table 9.4** and shown on **Figure 9.1**.

9.40 The 14 receptors presented in **Table 9.4** and **Figure 9.1** are the closest to the Proposed Development in each compass direction within 4 km. Twelve of the 14 receptors are locations of public exposure (i.e. residential locations) and two of the sites (R2 and R11) are Sites of Special Scientific Interest (SSSI).

9.41 There are only three receptors in total identified within 1 km of the Proposed Development (R4: South Moor Farm, R7: Ebberston Common Farm and R14: Jingleby Thorn).

9.42 Receptors located to the north, north west and west are separated from the Assessment Site by dense areas of plantation forestry. The other receptors located to the north east, east and south are located within agricultural areas and less dense area of forestry.

9.43 The Proposed Development is located in an area of undulating topography.

Table 9.4: Identified Sensitive Receptors

Receptor Number	Receptor Name	Grid Reference		Distance (km unless stated) and Direction
		X	Y	
R1	Bridestones	488430	490385	1.7 (NNW)
R2	Bridestones SSSI	487695	490660	2.4 (NNW)
R3	High Farm	489440	492595	2.9 (NNW)
R4	South Moor Farm	490490	490312	695m (NNE)
R5	Bickley Gate Farm	491189	491484	2.3 (NNE)
R6	Troutsdale Lodge	492470	489336	2.7 (E)
R7	Ebberston Common Farm	490100	489415	250m (SE)
R8	Manor House	491846	488296	2.3 (SE)
R9	Broad Head Farm	490220	488195	1.5 (SSE)
R10	Hern Head House	491130	487465	2.2 (SSE)
R11	Troutsdale And Rosekirk Dale Fens SSSI	490035	487468	1.7 (S)
R12	High Scambridge Farm	489490	487945	1.9 (SSW)
R13	Stoneclose Campsite	486410	488825	3.7 (SSW)
R14	Jingleby Thorn	489369	489520	600m (SW)

Meteorological Conditions

9.44 Based on detailed meteorological data from Church Fenton, located approximately 48 km to the south west, the prevailing wind direction at the Proposed Development varies between the west and south west.

Significance Criteria

9.45 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 (Ref. 9.16).

9.46 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 Proposed Development;
- The absolute predicted environmental concentration in relation to the air quality objectives; and
- The number of people exposed.

9.47 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 9.6**).

9.48 **Table 9.5** presents the EPUK criteria for the determination of the "magnitude of change", based on the percentage increase in pollutant concentrations due to the Proposed Development. **Table 9.6** 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 9.5: Determination of Magnitude of Change

Magnitude of change	Annual Mean Concentration (NO_2 and PM_{10})	Days PM_{10} >50μg/m^3
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 9.6: Significance of Effects

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration			
	Imperceptible	Small	Medium	Large
Increase with Proposed 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 Proposed 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

9.49 **Tables 9.5** and **9.6** 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 µg/m^3 should attract less significance than an annual mean concentration of 50 µg/m^3.

9.50 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 a Principal Air Quality Consultant and member of the Institute of Air Quality Management (IAQM).

Assessment of Dust Emissions Generated During Construction Works

9.51 The assessment of dust for the construction of the Proposed Development has been undertaken following the four stages outlined in the NPPF-TG (Ref. 9.9) for dust emissions as listed below:

- **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.

9.52 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.

9.53 The NPPF-TG (Ref. 9.9) also provides two pieces of guidance to assist in the evaluation stage concerning receptor sensitivity and also a series of key questions.

9.54 The guidance provided concerning sensitivity (based on Ireland, 1992 (Ref. 9.17)) indicates that receptors are considered to have varying sensitivities to dust nuisance ranging between: high, medium and low.

- Receptors considered to be high sensitivity include: hospitals and clinics, retirement homes, hi-tech industries, painting and furnishing and food processing;
- Receptors of medium sensitivity include: schools, residential areas, food retailers, glasshouses and nurseries, horticultural land and offices; and

- Low sensitivity receptors include: farms, light and heavy industry and outdoor storage areas.

9.55 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.

9.56 In 2000 the Building Research Establishment (BRE) (Ref. 9.18) 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.

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

9.58 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

9.59 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 Proposed Development has been undertaken. The review has been undertaken as vehicles travelling to and from the Proposed Development have the potential to affect air quality with respect to PM_{10} and NO_2.

9.60 The level of assessment for road traffic emissions has been established by comparison of anticipated construction and operational traffic flows against the Design Manual for Roads and Bridges (DMRB) local air quality road traffic criteria (Ref. 9.19). 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 the Operational Plant

9.61 A flare will be included in the Proposed Development to the south east of the well site and this would be operated when required (e.g. emergencies) or as part of some maintenance operations. The potential air quality effects of this source have been discussed qualitatively.

9.62 There is also a small natural gas fuelled electric generator of 1MW and a small gas fired heater (200KW).

Baseline Conditions

9.63 Baseline air quality conditions are presented in this section.

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

9.65 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 18 km south west of the Proposed Development), as described below (Ref. 9.20):

> ***"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."***

9.66 The 2012 Updating and Screening Assessment (USA) for RDC (Ref. 9.21) did not identify any other areas which were likely to exceed air quality objectives.

9.67 Background NO_2 and PM_{10} concentrations have been taken directly from the National Air Quality Archive Background maps for 2013 to provide levels for the baseline year (Ref. 9.22).

9.68 Concentrations of CO have been taken from the 2001 National Air Quality Archive Background Maps, which are the most recent background maps for CO (Ref. 9.23).

9.69 No reduction for year to year improvements in concentration for either NO_2, PM_{10} or CO have been reported, due to the uncertainty in the rate of improvements in air quality over time.

9.70 **Table 9.7** presents all the relevant background ambient air quality data for the required averaging periods. In accordance with Environment Agency guidance (Ref. 9.24), in the absence of actual measured short term background concentrations, these have been assumed to be twice the annual average concentration.

Table 9.7: Predicted Mean Background Pollutant Concentrations ($\mu g/m^3$)

Pollutant	Estimated Background (2013)	Objective	Averaging Period
CO	176	350	Annual mean
	352	10,000	Maximum 8 hr running mean
NO_2	5.2	40	Annual mean
	10.4	200	1 hour, 99.8th percentile
PM_{10}	12.4	40	Annual mean
	24.8	50	Daily mean, 90.4th percentile

Note: Closest Grid Reference to Site: 490500, 489500

9.71 For all pollutants assessed, background concentrations in 2013 are predicted to comply with the air quality standards.

Likely Significant Effects

9.72 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

9.73 The guidance presented in the NPPF-TG (Ref. 9.9) indicates that there are two key questions in deterring the risk of adverse air quality effects from minerals works, such as excavation of pipeline and construction works. Chapter 6: Construction Programme indicates that there will be the following construction activities:

- Site preparation (including excavation and grading);
- Provision of infrastructure;
- Construction; and
- Landscaping.

9.74 The decommissioning and restoration phases will also include similar activities as listed above for either scenario as described in Chapter 6 including:

- Dismantling and removal of plant, equipment, pipes, cables, buildings, security fencing, and surface installations;
- Concrete installations will be broken up and removed;
- The tarmac wearing and base course will be broken up and removed from the Assessment Site;
- The remaining sub base will be broken up and excavated to the depth of the original excavated subsoil depth; and
- Pest free sub-soil and topsoil will be replaced separately to the original depth before excavation to achieve a loose, uniform fill.

9.75 The first question considered in the NPPF-TG is if there are any sensitive receptors within 1 km. There are only three receptors within 1 km: R4: South Moor Farm, R7: Ebberston Common Farm and R14: Jingleby Thorn. Therefore at the majority (11 of 14) of receptors identified no significant air quality effects would be anticipated.

9.76 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 12.4 µg/m³, which are approximately a quarter of the relevant annual objective and around half of the 24-hour objective. Therefore, the risk of an exceedance is considered to be low, as confirmed by reference to the BRE case study findings.

9.77 In the BRE study changes in concentrations of PM_{10} were indistinguishable from background PM_{10} concentrations beyond 150m. The closest of the three receptors within 1 km of the Proposed Development is 250m from construction works. Therefore, no discernible change in PM_{10} concentration is anticipated (i.e. an imperceptible change).

9.78 On the basis of these findings, it is anticipated that construction dust will cause a negligible effect to the receptors around the Proposed Development.

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

9.80 Although a negligible effect is predicted for dust effects, these will be further mitigation through the preparation and implementation of a dust management plan, which will be agreed in consultation with NYMNPA.

Assessment of Road Traffic

9.81 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.

9.82 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.

9.83 The traffic anticipated to be associated with the Proposed Development construction, operation and decommissioning and restoration phases are described in Chapter 11 Traffic and Transportation.

9.84 The traffic increases during the construction phase are below the level of change requiring further assessment against both DMRB and EPUK criteria. For example the construction workforce required for the Proposed Development will vary (see Chapter 11, Likely Significant Effects: Construction Section for more details). It is therefore considered that the traffic effects of the Proposed 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.

9.85 Lower traffic flows are anticipated to be associated with the decommissioning and restoration phase (see Chapter 11 for more details) and therefore these will also result in changes in air quality of negligible significance.

9.86 During the operational phase of the Proposed Development, even fewer additional traffic movements are anticipated than during the construction period, with only 1 or 2 operational staff visiting the Assessment Site and small numbers of deliveries and removals by HGV. See Chapter 11, 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

9.87 There are three combustion sources associated with the Proposed Development with a flare located south west of the well site, gas fired heater (200 KW) and a small natural gas fuelled electric generator (1 MW) within the Ebberston Moor 'A' Well Site.

9.88 The flare is anticipated to be utilised when required and as part of routine maintenance works (potentially once a month). The duration of flaring is anticipated to be less than 1 hour and the flare will eliminate odorous sulphur bearing compounds, such as H_2S in the gas flow.

9.89 The main emissions with respect to human health and vegetation anticipated during flare operation are NO_x, SO_2 and CO. The shortest averaging periods for the air quality objectives for NO_x and CO are 1-hour and 8-hours respectively. Consequently no exceedance of these objectives would be expected at the sensitive receptors identified around the Proposed Development, the closest (Ebberston Common Farm) being approximately 250m of the Assessment Site and the closest down-wind location being 695m (South Moor Farm). The closest designated ecosystem is also 1.7 km from the Assessment site.

9.90 Due to the very limited anticipated frequency and duration of any gas flaring, the efficiency of the flare in eliminating potentially odorous compounds and the distance of the flare from sensitive receptors (closest approximately 250m), no further assessment of the flare emissions has been undertaken. The emissions associated with the flare are considered insignificant for human health, vegetation and odour.

9.91 The Environment Agency H1 guidance Note (Ref. 9.24) 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."***

9.92 It is considered that the natural gas fuelled electric generator and a small gas fired heater are small point sources (approximately 1/20th of the size considered small) which present a very limited environmental risk, due to their small size and also the distance of public exposure and designated ecosystems from the Assessment site (as listed above). Therefore, no quantitative assessment of these emissions has been undertaken. The emissions associated with the small natural gas fuelled electric generator (1 MW) and small gas fired

heater (200KW) within the Ebberston Moor 'A' Well Site are considered insignificant for human health, vegetation and odour.

9.93 In addition to a planning consent the Proposed 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 Proposed Development (e.g. air and odour emissions controls) associated with the flare and the small natural gas fuelled electric generator.

Mitigation Measures

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

Construction and Decommissioning and Restoration

9.95 In accordance with best practice, construction dust will be controlled through the application of a series of measures incorporated into the 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; and
- Inspection of unsurfaced haulage routes, and wet suppression as necessary, during prolonged dry periods.

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

Operation

9.97 The Proposed Development has been designed to minimise emissions to air, and good management processes will be implemented. The measures that are proposed on 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 and flares (Ref. 9.25) are presented in **Tables 9.8** and **Table 9.9**.

Table 9.8: 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.	Pigging of the piping between the well heads and the process piping will not be needed.
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. The relevant isolated section can then be depressurised via the flare.
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 flare 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.	The sulphur will be removed from the gas in the upstream processes. The fuel gas system will be fed by clean export gas that meets the National Grid NTS specifications (which includes sulphur content).
5.	Consider alternatives to direct releases of CO_2 particularly for large flows.	Not applicable.
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.

Table 9.9: Air Emission Mitigation Measures – Flare

Item	Indicative BAT – You should, where appropriate	Proposed Implementation
1.	Use flaring as a safety system (start up, shutdowns and as required).	Flaring will be used if depressurisation is required and for eliminating fugitive emissions.
2.	Use a flare control system with a response sufficiently fast to avoid unnecessarily leaving steam injection	A suitable flare control system will be specified. Steam injection is not relevant to the flare proposed for this project.

Item	Indicative BAT – You should, where appropriate	Proposed Implementation
	running in order to anticipate flaring events.	
3.	Ensure smokeless and reliable operation.	The flare will be designed to operate without smoke and will be serviced and maintained to ensure reliable operation.
4.	Minimise flaring by a suitable combination of: • Management information systems and instrumentation; • Balancing the refinery fuel gas system; • Installing a gas recovery system; • Using high-integrity relief valves; and • Applying advanced process control.	Flaring will be minimised by the use of: • Integrated control system and instrumentation to avoid emergency scenarios and minimise flaring; • Equipment will be suitably designed and specified to avoid excessive maintenance requirements and minimise the need for (planned) depressurisation; and • Equipment, relief systems and procedures will be designed and specified to minimise flaring.
5.	Reduce relief gas to flare by management/good housekeeping practices.	Relief of gas to flare will be minimised through: • Design and specification of suitable equipment and systems; • Appropriate operating procedures; and • Good housekeeping.

9.98 The mitigation of odour releases on-site also includes the 'sweetening plant' which removes odorous gas from natural gas prior to any combustion on-site.

9.99 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.

Residual Effects

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

9.101 Any effects associated with construction, decommissioning or restoration dust are predicted to be negligible, as the closest receptor is approximately 250m from the areas of construction work and best practice dust mitigation measures will be utilised.

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

9.103 Operational effects of the Development are considered to be negligible as only one small natural gas fuelled electric generator (1 MW), a small gas fired heater (200KW) and one flare are included in the Proposed Development.

9.104 The residual effects associated with each aspect that has been assessed is described in **Table 9.10**.

Table 9.10: 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

9.105 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. One project has been scoped into the cumulative assessment; the Ryedale Gas Project (ref: NY/2010/0159/ENV). The Ryedale Gas Project comprises of the following five principal elements:

- Gas production from the Ebberston South Well Site;
- The construction of two underground gas pipelines from the Ebberston South Well Site to a new Gas Processing Facility;
- The construction of a new access road between the A170 and the proposed Gas Processing Facility;
- The construction of a Gas Processing Facility at Hurrell Lane, Thornton-le-Dale; and
- The construction of an Above Ground Installation (AGI) connection into the existing National Transmission System (NTS) pipeline to the south of the Gas Processing Facility on land off New Ings Lane.

9.106 The nearest part of the proposed project to the Proposed Development is in the vicinity of Oxmoor Dike, where the Ryedale Gas pipeline crosses the Dike and bisects the minor road (east to west) providing access to Givendale Head Farm. The nearest construction works associated with the project are therefore approximately 2.5 km to the south, and it is

assessed that there is no potential for any significant cumulative effects to arise when considered in combination with Proposed Development.

9.107 No significant cumulative effects would be anticipated with the operation of both the RGP and the Proposed Development, due to the distance between any sources of air emissions and the small size of these emissions. For example the distance between the Ryedale Gas Project and the Proposed Development is approximately 9.5 km.

Summary

9.108 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 Proposed Development. Operational emissions 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.

9.109 In summary as the air quality significance of effects is considered to be negligible. The Proposed Development is considered to comply with the relevant air quality policies and plans described in the planning policy context Section of this Chapter. 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 above proposals.

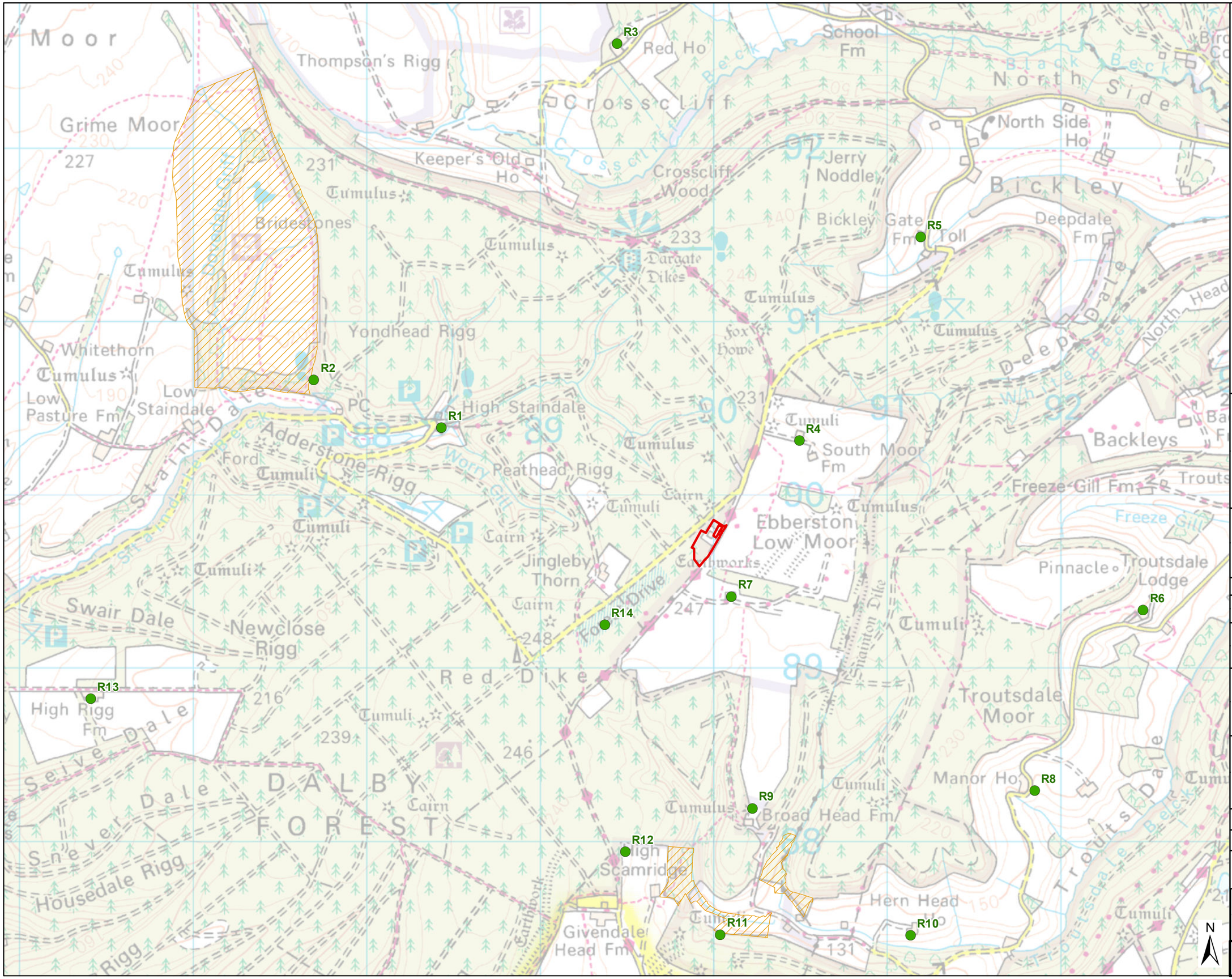
9.110 In addition to a planning consent the Proposed Development will also require an Environmental Permit to operate. The Environmental Permit will be regulated by the Environment Agency. The Environmental Permit application process is a separate process to the planning process which focuses on the pollution control of the Proposed 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 9.11: 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	NP	L	
Construction											
Increase in fugitive dust emissions during construction	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	Temporary	Negligible	Changes in traffic are anticipated to be small and so no further mitigation is proposed.							*	Negligible
Operation											
Operational traffic emissions	Temporary	Negligible	Changes in traffic are anticipated to be small and so no further mitigation is proposed.							*	Negligible
Operational plant emissions	Temporary	Negligible	The Proposed 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	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	Temporary	Negligible	Changes in traffic are anticipated to be small and so no further mitigation is proposed.							*	Negligible
Cumulative Effects											
No effects											None

*** Geographical Level of Importance**

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



NOTES

- Receptors
- Site Boundary
- SSSI

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Barton Wilmore

Project Title: Knapton Gas Processing Project

Drawing Title: Air Quality Study Area

Drawn	Checked	Approved	Date
EC	DDe	DDe	03/07/13

URS Internal Project No.	Scale @ A3
47063256	1:20,000

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Drawing Number	Rev
Figure 9.1	03