TABLES

9.0 AIR QUALITY AND GREENHOUSE GASES

9.1 Introduction

9.1.1 This chapter of the Environmental Statement (ES) describes the assessment of potential air quality impacts associated with the construction and operation of the Proposed Development.

9.1.2 Potential impacts could occur during the construction of the Proposed Development, associated with emissions of dust from construction activity and vehicle emissions from construction traffic.

9.1.3 Potential impacts could occur during the operation of the Proposed Development, associated with emissions of dust from operational activities undertaken at the Site, and from operational road traffic emissions.

9.1.4 Vehicle movements associated with the operation of the Proposed Development will also increase emissions of greenhouse gases (GHG).

9.1.5 This Chapter is supported by Appendix 9A and 9B (ES Volume II) and Figure 9.1 (ES Volume III). Carbon emissions and savings from the Proposed Development are also considered in the Sustainability and Carbon Review that accompanies the planning application.

9.2 Legislation and Planning Policy Context

Legislation

9.2.1 European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new air quality objectives for particulate matter with an aerodynamic diameter of less than 2.5 µm ($PM_{2.5}$). The consolidated Directives include:

- Directive 99/30/EC - the First Air Quality 'Daughter' Directive - sets ambient Air Quality Limit Values (AQLVs) for NO_2, oxides of nitrogen (NO_X), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10});
- Directive 2000/69/EC - the Second Air Quality 'Daughter' Directive - sets ambient AQLVs for benzene and carbon monoxide; and
- Directive 2002/3/EC - the Third Air Quality 'Daughter' Directive - seeks to establish long term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

9.2.2 Directive 2008/50/EC (Council of European Communities, 2008) is currently transposed into UK legislation by the Air Quality Standards Regulations 2010 (H.M. Government, 2010) which came into force on the 11th June 2010. The Air Quality Limit Values described within are legally binding parameters set by the EU for a range of pollutants that must not be exceeded in the UK, which have been set with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment as a whole.

9.2.3 Regarding climate change, the International Kyoto Protocol was agreed in 1997 in response to rising emissions of the principal gases contributing to global warming, which are considered to be long-lived greenhouse gases such as carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4). CO_2 arises from a range of sources including the combustion of fossil fuels. The Kyoto Protocol was subsequently ratified by the EU in 2005, under which the UK agreed to the burden sharing agreement within the EU to limit emission.

9.2.4 In the UK, the Climate Change Act of 2008 mandates national emissions reductions of pollutants associated with climate change (H.M. Government, 2008). In December, 2008 the United Kingdom's Committee on Climate Change (created by the Act) released a report recommending that national greenhouse gas emissions be reduced by at least 80% by 2050 and by 34% by 2022 (or 42% if an international agreement on climate change is reached)

The National Air Quality Strategy

9.2.5 The provisions of Part IV of the Environment Act 1995 establish a national framework for air quality management, which requires all local authorities in England, Scotland and Wales to conduct local air quality reviews. Section 82(1) of the Act requires these reviews to include an assessment of the current air quality in the area and the predicted air quality in future years. Should the reviews indicate that the objectives prescribed in the UK Air Quality Strategy (Defra, 2007) and the Air Quality (England) Regulations 2010 will not be met, the local authority is required to designate an Air Quality Management Area (AQMA). Action must then be taken at a local level to ensure that air quality in the area improves. This process is known as 'local air quality management' or LAQM.

9.2.6 Part IV of the Environment Act (1995) requires UK government to produce a National Air Quality Strategy which contains standards, objectives and measures for improving ambient air quality, based on the EU Air Quality Limit Values. The most recent Air Quality Strategy was produced by the Department for Environment, Food and Rural Affairs (Defra) and published in July 2007 (Defra, 2007). It sets out Air Quality Objective Values that are the maximum ambient pollutant concentrations that are not to be exceeded without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the Air Quality Limit Values, although the requirements for compliance vary slightly. The Air Quality Objective Values that are relevant to this assessment are summarised in Table 9.1.

Table 9.1 – Relevant Air Quality Objective Values

POLLUTANT	AVERAGING PERIOD	VALUE	ALLOWABLE EXCEEDANCES
Nitrogen dioxide (NO_2)	Annual mean	40 µg/m^3	None
	Hourly mean	200 µg/m^3	No more than 18 times in a calendar year
Particulate matter (PM_{10})	Annual mean	40 µg/m^3	None
	Daily mean	50 µg/m^3	No more than 35 times in a calendar year
Fine particulate matter ($PM_{2.5}$)	Annual mean	25 µg/m^3	None

9.2.7 In 2019, the UK government released its Clean Air Strategy 2019 (Defra, 2019), part of its 25 Year Environment Plan (H.M. Government, 2018). The Strategy places greater emphasis on improving air quality in the UK than has been seen before, and outlines how it aims to achieve this (including the development of new enabling legislation).

9.2.8 Air quality management focus in recent years has primarily related to one pollutant, nitrogen dioxide (NO_2), and its principal source in the UK, road traffic emissions. However, the 2019 Strategy broadens the focus to other areas, including domestic emissions from wood burning stoves and from agriculture. This shift in emphasis is part of a goal to reduce the levels of fine particulate matter ($PM_{2.5}$) in the air to below the World Health Organisation guideline level, which is lower than the current EU Air Quality Limit Value.

<u>National Policy Context</u>

9.2.9 The National Planning Policy Framework (NPPF) was updated in February 2019 and concisely sets out national policies and principles on land use planning (Ministry of Housing, Communities and Local Government, 2019). Paragraph 103 of the NPPF states that:

> *"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health."*

9.2.10 Air quality is considered as an important element of the natural environment. On conserving and enhancing the natural environment, Paragraph 170 states that:

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

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality …"

9.2.11 As noted above (at paragraph 9.2.3) air quality in the UK has been managed through the LAQM regime using national objectives. The effect of a proposed development on the achievement of such policies and plans are matters that may be a material consideration by planning authorities, when making decisions for individual planning applications. Paragraph 181 of the NPPF states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

9.2.12 The different roles of a planning authority and a pollution control authority are addressed by the NPPF in paragraph 183:

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

9.2.13 The Planning Practice Guidance (PPG) was updated in July 2018 (Ministry of Housing, Communities and Local Government, 2018), with specific reference to air quality. The PPG states that the planning system should consider the potential effect of new developments on air quality where relevant limits have been exceeded or are near the limit. Concerns also arise where a development is likely to adversely affect the implementation of air quality strategies and action plans and/ or, in particular, lead to a breach of EU legislation (including that applicable to wildlife). In addition dust can also be a planning concern, for example, because of the effect on local amenity.

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

"- Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.

- Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area;

- Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.

- Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.

- Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites."

9.2.15 On how detailed an air quality assessment needs to be, the PPG states:

"Assessments should be proportionate to the nature and scale of the development proposed and the level of concern about air quality... Mitigation options where necessary will be location specific, will depend on the proposed development and should be proportionate to the likely impact. It is important therefore that local planning authorities work with applicants to consider appropriate mitigation so as to ensure the new development is appropriate for its location and unacceptable risks are prevented."

<u>Local Planning Policy</u>

9.2.16 The Proposed Development is located within the administrative area of Selby District Council (SDC). SDC Core Strategy Local Plan (SDC, 2013), adopted on 22nd October 2013, details all polices that SDC considers a part of its Core Strategy. The salient objective and policy pertaining to air quality are:

- Objective No. 16 of the environmental objectives of the Core Strategy; *"Protecting against pollution, improving the quality of air, land and water resources, and avoiding over-exploitation of water resources, and preventing noise/light/soil pollution and protecting development from noise/light/soil pollution"*, and
- Policy SP18 Protecting and Enhancing the Environment, the supporting text of which states that: "*The high quality and local distinctiveness of the natural and man-made environment will be sustained by … Ensuring that new development protects soil, air and water quality from all types of pollution… [and] minimise[s] energy and water consumption, the use of non-renewable resources, and the amount of waste material"*.

9.2.17 SDC published a draft Air Quality Action Plan (AQAP) in June 2017 (SDC, 2017). The SDC AQAP covers eight broad topics under which actions are outlined as to how air quality can be improved in Selby. The topics are: alternatives to private vehicle use; freight and delivery management; policy guidance and development control; promoting low emission transport; promoting travel alternatives; public information; transport planning and infrastructure; traffic management. For the most recent information on the progress of the implementation of these actions, refer to the latest Annual Status Report published by SDC (SDC, 2018).

9.2.18 The Proposed Development is located within 500 m of the administrative area of Wakefield Metropolitan District Council (WMDC). The initial draft of the Wakefield Local Development Plan 2036 (WMDC, 2019) was undergoing a consultation at the time of writing this chapter. The document outlines sustainable development policies some of which concern air quality, such as:

- WSP23 Mitigating and Adapting to Climate Change and Efficient Use of Resources: In order to be sustainable, development must minimise the impact and mitigate the likely effect of climate change on existing and future occupants, the wider community and the environment and minimise the use of natural resources.

9.2.19 One of the measures stated to achieve this was: taking measures to reduce carbon emissions and adapt to climate change during the construction and operation of new developments through, for example, orientation, layout, design and material selection.

9.2.20 WMDC adopted an AQAP (WMDC, 2010) in 2010 in response to their establishing several AQMAs, the nearest of which is situated 1.5 km west-north-west of the Site boundary and 4.5 km west of Junction 34 of the M62. The WMDC AQAP identifies road transport as one of the largest contributing factors to poor air quality and consequently proposes measures that come under the six broad topics of: encouraging modal shift to public transport; managing the demand for travel; making the best use of existing capacity; improving the highway network; encouraging more walking and cycling; and promoting smarter choices in travel. The most recent information on the progress of the implementation of these actions is contained in the latest Annual Status Report (ASR) published by WDC (at the time of this ES chapter being written the most recent WMDC ASR was published in June 2018).

9.3 Assessment Method and Significance Criteria

<u>Study Area</u>

Construction Phase

9.3.1 The study area for the construction phase assessment is defined by the method set out in the relevant guidance (Holman *et al*., 2014), which includes all dust sensitive human receptors (such as residential properties, commercial properties and areas of amenity) within 350 m of the construction site boundary and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), and ecological receptors (with international, national and local designations) within 50 m of the construction site boundary, and/or within 50 m of the route(s) used by construction vehicles on the public highway.

Operational Phase

Dust Emissions

9.3.2 The study area for operational phase dust assessment is defined by the method set out in the relevant guidance (Holman et al., 2016), which includes all dust sensitive receptors (such as residential properties, commercial properties, areas of amenity and designated ecological sites) within 250 m of the Gale Common Ash Disposal Site boundary.

Road Traffic Emissions

9.3.3 The study area for the road traffic emissions assessment has been informed by the extent of the traffic data provided for the assessment, which includes all road links where the operation of the Proposed Development will generate more than 100 two-way HGV movements on average day. The full extent of the road traffic emissions study area is shown on Figure 9.1 (ES Volume III).

<u>Assessment Method</u>

Construction Phase

9.3.4 The impacts associated with the construction phase of the Proposed Development have been qualitatively assessed following the approach set out in the Institute of Air Quality Management guidance on the Assessment of Dust from Demolition and Construction' (Holman et al., 2014).

9.3.5 According to the IAQM (Holman et al., 2014), the main air quality impacts that may arise during construction activities are:

- dust deposition, resulting in the soiling of surfaces;
- visible dust plumes, which are evidence of dust emissions;
- elevated PM_{10} concentrations resultant of dust generating activities on site; and
- an increase in concentration of airborne particles and NO_2 due to exhaust emissions from diesel powered vehicles and equipment on site and vehicles accessing the site.

9.3.6 According to the IAQM and Environmental Protection UK (EPUK) Guidance (Moorcroft and Barrowcliffe et al., 2017), a quantitative assessment of vehicle emissions is only likely to be required where a proposed development generates more than 100 two-way HGV movements per average day. The construction works associated with the Proposed Development are anticipated to generate less than 100 two-way HGV movements per average day, with the maximum estimated at around 50 two-way HGVs per average day for one week during concrete pouring required for extension of the HGV loading pad within the Gale Common Ash Disposal Site. At other times during the construction phase, there is anticipated to be no more than around 10 two-way HGV movements per average day.

9.3.7 Accordingly, taking into consideration the scale of the construction works associated with the Proposed Development it is considered very unlikely that the IAQM and (EPUK) Guidance criteria would be exceeded. Therefore, a quantitative assessment is not considered to be required and the impacts due to vehicle emissions during the construction phase of the Proposed Development are considered to be 'not significant'.

9.3.8 Activities on construction sites are classified into four types to reflect their different potential impacts:

- demolition;
- earthworks;
- construction; and
- track-out

9.3.9 The following steps, as defined by the IAQM, were followed as part of the construction dust assessment carried out as part of the EIA for the Proposed Development:

- Step 1: Screen the need for a detailed assessment. Human and ecological receptors were identified and distance to the proposed development and construction routes were determined;
- Step 2: Assess the risk of dust impacts arising. The potential risk of dust impacts occurring for each activity was determined, based on the magnitude of the potential dust emissions and the sensitivity of the area;
- Step 3: Identify the need for site-specific mitigation. Based on the risk of impacts occurring, site specific mitigation measures were determined; and
- Step 4: Define impacts and their significance. The significance of the potential residual dust impacts (taking mitigation into account) for each activity was determined.

9.3.10 Further details on the approach to the construction dust assessment are provided in Appendix 9A (ES Volume II).

Operational Phase

Dust Emissions

9.3.11 Impacts associated with operational dust emissions have been assessed qualitatively, with reference to Institute of Air Quality Management (IAQM) guidance on the Assessment of Dust from Demolition and Construction (Holman et al., 2014) and the Assessment of Mineral Dust Impacts for Planning (Holman et al., 2016).

9.3.12 The main dust impacts associated with the operation of a proposed development are the same as those listed for construction dust (paragraph 9.3.2).

9.3.13 Activities on operational minerals sites that have the highest potential to generate fugitive emissions of dust are:

- site preparation/ restoration;
- mineral extraction;
- materials handling;
- on-site transportation;
- mineral processing;
- stockpiling/ exposed surfaces; and
- off-site transportation.

9.3.14 The following steps, as defined by the IAQM (2014 and 2016), were followed for the operational dust assessment undertaken as part of the EIA for Proposed Development:

- Step 1: Screen the need for a detailed assessment – human and ecological receptors identified and distance to the proposed development and construction routes were determined;
- Step 2: Describe the Site characteristics and baseline conditions, including current land uses, the sensitivity of receptors, existing dust and PM_{10} measurement and monitoring data, and the Site layout;
- Step 3: Estimate the dust impact risk from the activities undertaken on the Site, based on the activities being undertaken as part of the Proposed Development, the distance of receptors from those activities and local meteorological conditions;
- Step 4: Estimate the likely magnitude of residual effect, based on the relationship between the sensitivity of receptors (Step 2) and the dust impact risk (Step 3); and
- Step 5: Identify a suitable level of additional mitigation to control impacts so that any effect is not significant.

9.3.15 Further details on the approach to the operational dust assessment are provided in Appendix 9A (ES Volume II).

Road Traffic Emissions

9.3.16 A detailed assessment of operational road traffic emissions was undertaken, because the operation of the Proposed Development would increase HGV movements on local roads by more than 100 two-way HGV movements per average day, thereby exceeding the criteria to suggest that a detailed air quality assessment is required, as set out in IAQM and EPUK guidance (Moorcroft and Barrowcliffe et al. 2017).

9.3.17 The incomplete combustion of fuel in vehicle engines results in the presence of a variety of pollutants including hydrocarbons (HC), such as benzene, 1,3-butadiene, sulphur dioxide (SO_2) and carbon monoxide (CO) in the exhaust emissions. However, it is the emission of NO_X (mainly in the form of nitric oxide (NO), which is then converted to NO_2 in the atmosphere) and particulate matter (PM_{10} and $PM_{2.5}$) in exhaust emissions that are the main pollutants of concern in relation to road traffic emissions, due to their association with the potential for adverse effects on human health.

9.3.18 Although SO_2, CO, benzene and 1,3-butadiene are present in motor vehicle exhaust emissions, detailed consideration of the associated impacts on local air quality is not considered relevant in the context of the Proposed Development. Road traffic emissions of these gases have been reviewed by SDC and nowhere within the administrative area is at risk of exceeding the air quality objectives for these pollutants (SDC, 2018). Road traffic emissions of SO_2, CO and HC associated with the Proposed Development would not be capable of compromising the achievement of the relevant Air Quality Objectives for the protection of human health. Emissions of SO_2, CO and HC from road traffic emissions are therefore not considered further within the operational road traffic emissions assessment carried out as part of the EIA of the Proposed Development.

9.3.19 Exhaust emissions from road vehicles could affect the concentrations of the principal pollutants of concern, i.e. NO_2, PM_{10} and $PM_{2.5}$, at sensitive receptors in the vicinity of the Proposed Development. Therefore, it is these pollutants that are the focus of the assessment of the significance of road traffic related air quality impacts.

9.3.20 Modelling was undertaken for the Proposed Development using CERC's Atmospheric Dispersion Modelling System (ADMS) Roads software (4.1.1, CERC, 2017), to predict total pollutant concentrations at selected sensitive receptors for the following scenarios:

- Existing Baseline and model verification – representative of conditions in 2018, using 2018 meteorological data, 2018 traffic data, 2018 vehicle emissions rates and 2018 background pollutant concentrations;
- Future Baseline – representative of conditions in 2020, using 2018 meteorological data, 2020 traffic data (without the Proposed Development in operation), 2018 vehicle emissions rates and 2018 background pollutant concentrations;

- Future Operation (Designated HGV Route) – representative of conditions in 2020, using 2018 meteorological data, 2020 traffic data (with the Proposed Development in operation and assuming all Proposed Development HGV traffic accesses and leaves the Site via the designated HGV route as described in Chapter 4: The Proposed Development – Cobcroft Lane/ Whitefield Lane/ A19 to the M62 at Junction 34), 2018 vehicle emissions rates and 2018 background pollutant concentrations;
- Future Operation (Transport Sensitivity Test 1) – as per the Future Operational scenario above, but considering 80% of HGV traffic using the Designated HGV Route and 20% using an alternative route turning left out of the Site along Cobcroft Lane, Stubbs Lane and Leys Lane to the – as per Chapter 8: Traffic and Transport, Sensitivity Test 1; and
- Future Operation (Transport Sensitivity Test 2) – as per the Future Operational scenario above, but considering 80% of HGV traffic using the Designated HGV Route and 20% using an alternative route turning left out of the Site along Cobcroft Lane, Beal Lane and Sudforth Lane to the A645 at Knottingley – as per Chapter 8: Traffic and Transport, Sensitivity Test 2.

9.3.21 The difference in pollutant concentrations predicted at the selected air quality sensitive receptors between the Future Baseline and the three Future Operation scenarios (as described above at paragraph 9.3.17) equates to the magnitude of change. The effect at individual receptors is then determined by comparing the magnitude of change predicted there to the total pollutant concentrations predicted, with the Proposed Development in operation. A smaller magnitude of change will have a greater effect at a location that is predicted to experience total pollutant concentrations at or in exceedance of the Air Quality Objective Values (as set out in Table 9.1 above). Likewise, a large magnitude of change will have a lesser effect at a location that is predicted to experience total pollutant concentrations that are well below the Air Quality Objective Values.

9.3.22 Further details on the approach to the operational road traffic emissions assessment are provided in Appendix 9A (ES Volume II).

9.3.23 Appendix 9A (ES Volume II) describes the robust nature of the Future Baseline and Future Operation scenarios listed above, by assuming no improvement in vehicle emission rates, the evolution of the vehicle fleet and background pollutant concentrations, between the existing baseline (2018) and the year of operation (2020).

9.3.24 The assessment of road traffic emissions is also considered conservative, because it is assumed that the maximum output will be achieved in the year of opening (1 million tonnes per annum), which is unlikely to occur. It is also assumed that the proposed realignment of Whitefield Lane near the A19 will not be present. In reality, the maximum output will occur at a later year, when vehicle emission rates, the evolution of the vehicle fleet and background pollutant concentrations are improved, and the realignment of Whitefield Lane will move vehicle emissions further away from the air quality sensitive receptors on that road, reducing impacts.

9.3.25 GHG emissions associated with road traffic have been quantified following the approach set out in TAG Unit A3 Environmental Impact Appraisal (Department for Transport, 2015). Total GHG emissions as CO_2 equivalent have been quantified for the scenarios listed in paragraph 9.3.20.

<u>Significance Criteria</u>

Construction Phase and Operational Phase Dust Emissions

9.3.26 For amenity effects from coarser dust (>PM_{10}), the aim of the IAQM Guidance (Holman et al., 2014 and 2016) is to bring forward a scheme, including mitigation measures where necessary, that would control impacts so that they give rise to negligible or minor effects (at worst) at the closest sensitive receptors. Measures that reduce dust emissions could also reduce emissions of finer particles (PM_{10}). Determination of whether an effect is likely to be significant or not is based on professional judgement (based on experience of similar projects), taking account of whether effects are permanent or temporary, direct or indirect, constant or intermittent and whether any secondary effects are caused (in this instance, secondary effects refer to dust that is generated and deposited (primary impact) and then re-suspended and deposited again by further activity).

9.3.27 The classification of dust soiling and health effects on receptors exposed to impacts has been assessed using the relationship between the magnitudes of impact identified, in combination with receptor sensitivity and other related factors where appropriate (as described IAQM guidance (Holman et al., 2014 and 2016)), which results in a classification of effects as defined in Table 9.2.

Table 9.2 – Definition of Significance of Fugitive Dust and PM_{10} Effects

EFFECT	CHANGE IN DEPOSITION RATE AND SHORT TERM PM_{10} CONCENTRATIONS	SIGNIFICANT
Major	Impact is likely to be intolerable for any more than a very brief period of time and is very likely to cause complaints from local people. Increase in PM_{10} concentrations at a location where concentrations are already elevated and to the extent that the short term PM_{10} air quality objective is likely to be exceeded.	A significant effect that is likely to be a material consideration in its own right.
Moderate	Impact is likely to cause annoyance and might cause complaints, but can be tolerated if prior warning and explanation has been given. Increase in PM_{10} concentrations at a location where concentrations are already elevated and to the extent that the short term PM_{10} air quality objective is at risk of being exceeded.	A significant effect that may be a material consideration in combination with other significant effects, but is unlikely to be a material consideration in its own right.
Minor	Impact may be perceptible, but of a magnitude or frequency that is unlikely to cause annoyance to a reasonable person or to cause complaints. Limited increase in PM_{10} concentrations.	An effect that is not significant but that may be of local concern.
Negligible	Impact is unlikely to be noticed by and/or have an effect on sensitive receptors. Negligible increase in PM_{10} concentrations.	An effect that is not significant.

Operational Phase Road Traffic Emissions

9.3.28 With regard to road traffic emissions, the change in pollutant concentrations with respect to baseline conditions has been described at receptors that are representative of exposure to impacts on local air quality within the study area. The assessment of the impact of road traffic emissions does not define a graduating scale of human health receptor sensitivity. Instead, human health receptors are considered either sensitive or not, depending on the period of time for which they are exposed to emissions. The absolute magnitude of pollutant concentrations in the baseline and construction phase scenario, in relation to the Air Quality Objectives, is described and this is used to consider the risk of the Air Quality Objective Values being exceeded.

9.3.29 For a change in annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$, of a given magnitude, IAQM and EPUK have published recommendations for describing the effects of such impacts at individual receptors (Moorcroft and Barrowcliffe et al. 2017). These are set out in Table 9.3.

9.3.30 The IAQM and EPUK guidance (2017) includes seven explanatory notes to accompany the terminology for the effect descriptors. In particular it is noted that the descriptors are for individual receptors only and that overall significance is determined using professional judgement (using experience gained on similar projects). For example, a moderate effect on the worst effected receptors may not mean a moderate adverse effect overall, if the majority of selected receptors and those they represent experience a minor or negligible effect.

Additionally, it is noted that it is not best practice to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the objective value. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the objective value, rather than being exactly equal to it.

Table 9.3 – Definition of Significance of Local Air Quality Effects

ANNUAL MEAN NO_2/ PM_{10} CONC. (µG/M³) IN OPERATION	CHANGE IN ANNUAL MEAN CONCENTRATION (µG/M³) AS A PROPORTION OF THE AIR QUALITY OBJECTIVE VALUE					ANNUAL MEAN $PM_{2.5}$ CONC. (µG/M³) IN OPERATION
	>10% Large	5% - 10% Medium	2% - 5% Low	1% - 2% Very Low	<1% Impercept-ible	
≥43.8	Major	Major	Major	Moderate	Negligible	≥27.4
41.0–43.8	Major	Major	Moderate	Moderate	Negligible	25.6–27.4
37.8–41.0	Major	Moderate	Moderate	Minor	Negligible	23.6–25.6
30.2–37.8	Moderate	Moderate	Minor	Negligible	Negligible	18.9–23.6
≤30.2	Moderate	Minor	Negligible	Negligible	Negligible	≤18.9

9.3.31 A change in predicted annual mean concentrations of NO_2 or PM_{10} of less than 0.5% (0.2 µg/m³) is considered to be so small as to be negligible, as is a change in predicted annual mean concentrations of $PM_{2.5}$ of less than 0.5% (0.12 µg/m³). A change (impact) that is negligible, given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant.

9.3.32 It should also be noted that impacts associated with the operation of the Proposed Development are not permanent, in that they are anticipated to last for the duration of the operational works only. Furthermore, the impacts predicted and reported in this chapter are based on robust assumptions on vehicle emission rates, the rate of evolution of the UK vehicle fleet and background pollutant concentrations. Vehicle emission rates and background pollutant concentrations are anticipated to improve over the coming years, due to improvements in vehicle emissions technology and its evolution into the UK vehicle fleet, to the extent that the magnitude of impacts predicted in this assessment, based on conditions representative of 2020, are likely to lessen over the operational lifetime of the Proposed Development.

Greenhouse Gas Emissions

9.3.33 The GHG assessment has used the Government's WebTAG method (Department for Transport, 2015) to quantify emissions of greenhouse gases associated with the Proposed Development. The WebTAG method describes the process by which total emissions are quantified, but does not provide any guidance on the determination of the significance of any impact identified.

Overall Assessment of Significance

9.3.34 The significance of all of the potential effects is considered for the Proposed Development in overall terms. The potential for the Proposed Development to contribute to or interfere with the successful implementation of policies and strategies for the management of local air quality are considered, if relevant, but the principal focus is on any change to the likelihood of future achievement of the Air Quality Objective Values and/or other environmental standards, as set out in Section 2.6, for the following pollutants:

- annual NO_2 concentration of 40 µg/m³;
- annual mean particulate matter (PM_{10}) concentration of 40 µg/m³;
- annual mean fine particulate matter ($PM_{2.5}$) concentration of 25 µg/m³;
- 24-hour mean PM_{10} concentration of 50 µg/m³ not to be exceeded on more than 35 times per year; and
- 1-hour mean NO_2 concentration of 200 µg/m³ not to be exceeded on more than 18 times per year.

9.3.35 Predicted impacts and resultant likely effects are determined as significant or not, depending on the relationship between the impacts and the total pollutant concentrations experienced across the Study Area as a whole, rather than at individual properties. An overall effect across the Study Area that is moderate or major adverse would be considered to be significant for air quality.

Consultation

9.3.36 An Environmental Impact Assessment (EIA) Scoping Report was produced and made available to all stakeholders for comment. Following the submission of the EIA Scoping Report, additional consultation with statutory consultees to inform this chapter is summarised in Table 9.4.

Table 9.4 – Consultation Summary

CONSULTEE	DATE (METHOD OF CONSULTATION)	SUMMARY OF CONSULTEE COMMENTS	SUMMARY OF RESPONSE/ HOW COMMENTS HAVE BEEN ADDRESSED
Selby District Council	16th August 2018 (email)	I agree that emissions associated with vehicle movement should be assessed using ADMS-Roads but would question if the assessment should consider emissions from the extraction, processing and loading operations separately under different guidance	The assessment described in this chapter follows Institute of Air Quality Management guidance specific to construction dust and mineral dust impacts, as well the use of ADMS-Roads to model road traffic emissions impacts (see Section 9.3).
		I welcome the 3 month monitoring period but would question if particulate monitoring should also be included for this area	The Applicant already undertakes monitoring of dust deposition and dust direction at the Gale Common Ash Disposal Site (see Section 9.4). The assessment described in the chapter and the dust management plan that accompanies it recommends that additional dust deposition monitoring is undertaken during the works (see Appendix 9B (ES Volume II)).

9.4 Baseline Conditions

Existing Baseline

Local Air Quality Management

9.4.1 Under Part IV of the Environment Act (H.M. Government, 1995), SDC has a responsibility to review and monitor local air quality within their administrative area. AQMAs are declared when there is an exceedance or likely exceedance of an Air Quality Objective Value.

9.4.2 SDC have declared a single AQMA within their administrative area, in the town of Selby itself. The AQMA is approximately 12.5 km away from the Proposed Development and it will not be affected by Proposed Development emissions.

9.4.3 WMDC have declared multiple AQMAs, the nearest of which is the M62 AQMA, 2.5 km west of Junction 34 of the M62. Proposed Development traffic may pass through this AQMA.

Local Monitoring Data

9.4.4 SDC do not undertake any monitoring of local air quality in the vicinity of the Site. There has been no reason for SDC to declare an AQMA in the Site's locality and indicates that there is little risk of the Air Quality Objective Values being exceeded, where there is relevant exposure.

9.4.5 WMDC undertake monitoring of NO_2 at a single location (diffusion tube ID: 101) in the vicinity of the Site, adjacent to a stretch of M62 that Proposed Development-related vehicles may use and within the M62 AQMA. Annual mean concentrations at this location between 2013 and 2017 ranged between 27 $\mu g/m^3$ and 32 $\mu g/m^3$, well below the Air Quality Objective Value.

9.4.6 To ascertain baseline air quality conditions within the Study Area, and to provide data that could be used for model verification, a Proposed Development-specific NO_2 diffusion tube survey was undertaken as part of the EIA of the Proposed Development. Diffusion tubes were located adjacent to several roads in the Study Area and left exposed for a total period of around three months. The period mean dataset was annualised following the method set out in Defra guidance (TG16, Defra, 2018), to provide projected annual mean values representative of 2018. This process in described in more detail in Appendix 9A (ES Volume II). The annual mean NO_2 concentrations for NO_2 are provided in Table 9.5 and the location of the diffusion tubes is shown in Figure 9.1 (ES Volume III).

Table 9.5 – NO_2 Diffusion Tube Survey Concentrations (2018)

DIFFUSION TUBE ID	DESCRIPTION	LOCATION	ANNUAL MEAN CONCENTRATION ($\mu G/M^3$)
DT1	Roadside	450161, 421337	29.5
DT2	Background	452089, 421577	23.6
DT3	Background	452299, 421684	23.6
DT4	Roadside	453634, 422259	26.8
DT5	Roadside	455828, 421794	25.3
DT6	Roadside	455956, 421810	30.6
DT7	Roadside	455941, 421946	30.9
DT8	Roadside	455899, 422079	30.9
DT9	Roadside	456493, 423226	44.7
DT10	Roadside	453041, 424057	28.9
		Air Quality Objective Value	**40**

9.4.7 The annualised mean data for 2018, shown in Table 9.5, demonstrates that existing NO_2 concentrations are generally well below the Air Quality Objective Value, with the exception of diffusion tube DT9, which was located immediately adjacent to the A19, on the approach to Eggborough.

9.4.8 It should be noted that all of the 'roadside' diffusion tubes listed in Table 9.5 were located within 2 m of a road source and cannot therefore be considered fully representative of sensitive exposure. For example, the exceedance projected at diffusion tube DT9 does not necessarily mean that the air quality sensitive receptors nearest to it are also exceeding the Air Quality Objective Value. This is because the contribution of road traffic emissions to pollutant concentrations quickly falls off with increasing distance from the road and the receptors are located further back from the road than the monitoring location.

9.4.9 To better understand this, the NO_2 Fall-Off with Distance Calculator (Version 4.2) (LAQM TG16, Defra, 2018) was used. This tool projected measured concentration from the near roadside location where it was gathered, back to the location of the nearest sensitive receptors, taking into account the decrease in concentration likely to occur over this distance, from the road (A19) to the receptor. Whilst the measured concentration at DT9 was in excess of the Air Quality Objective Value for NO_2 at the roadside location, concentrations are projected to fall with increasing distance from the road, so that they are likely to be well below the Air Quality

Objective Value at the location of the nearest air quality sensitive receptor (the projected concentration at that distance (11 m back from the A19) was 33.2 μg/m^3).

9.4.10 The two background diffusion tubes (DT2 and DT3) were also located within 2 m of a road source, albeit a road with fewer vehicle movements, where the measured concentrations are dominated by the background contribution. Diffusion tubes DT2 and DT3 are therefore considered representative of background conditions in the study area.

9.4.11 No monitoring of PM_{10} or $PM_{2.5}$ has been undertaken in the vicinity of the Site. In the absence of monitored data, baseline data sourced from Defra background maps has been used to represent background PM_{10} and $PM_{2.5}$ concentrations. Defra background concentrations used in this assessment are summarised in Table 9.6. The table shows that background PM_{10} concentrations in the vicinity of the Proposed Development are well below the Air Quality Objective Values.

Table 9.6 – Average Defra PM_{10} and $PM_{2.5}$ Background Concentrations

1 KM BY 1 KM GRID SQUARES	ANNUAL MEAN CONCENTRATION (μG/M^3)	
	PM_{10}	$PM_{2.5}$
450500, 424500; 450500, 423500; 450500, 422500; 450500, 421500; 450500, 420500; 451500, 424500; 451500, 423500; 451500, 422500; 451500, 421500; 451500, 420500; 452500, 424500; 452500, 423500; 452500, 422500; 452500, 421500; 452500, 420500; 453500, 424500; 453500, 423500; 453500, 422500; 453500, 421500; 453500, 420500; 454500, 424500; 454500, 423500; 454500, 422500; 454500, 421500; 454500, 420500; 455500, 424500; 455500, 423500; 455500, 422500; 455500, 421500; 455500, 420500; 456500, 424500; 456500, 423500; 456500, 422500; 456500, 421500; 456500, 420500	14.8	9.4
Air Quality Objective Value	**40**	**25**

9.4.12 Regular dust deposition monitoring has been undertaken at the Site by the Applicant between 2016 and 2018 . This dust deposition data is summarised in Table 9.7. The location of the dust deposition gauge is shown on Figure 9.1 (ES Volume III). In addition to the dust deposition data summarised in Table 9.7, directional dust monitoring is also undertaken at eight locations across the Gale Common Ash Disposal Site, to determine the direction and composition of airborne dust at locations on or near to the boundary.

Table 9.7 – Dust Deposition Monitoring

SITE	YEAR	MONTH	DEPOSITION RATE (MG/M²/DAY)	
			MONTHLY MEAN	ANNUAL MEAN[1]
Gauge 3, located on the north-eastern boundary, north-east of Stage I Area	2016	April	53	40
		May	31	
		June	63	
		July	41	
		August	25	
		September	48	
		October	31	
	2017	January	5	23
		February	5	
		March	7	
		April	36	
		May	68	
		June	48	
		July	44	
		August	20	
		September	12	
		October	16	
		November	5	
		December	8	
	2018	January	12	75
		February	4	
		April	32	
		June	64	
		July	299	
		August	37	
Suggested value when complaints are likely			**200**	

[1] Estimated annual mean for 2016 and 2018, given that the periods sampled include the drier and potentially dustier months

9.4.13 Table 9.7 shows that deposition rates monitored on the north-eastern boundary of the Gale Common Ash Disposal Site in recent years range from 5 mg/m^2/day to 299 mg/m^2/day. The highest value, gathered in July 2018 appears to be an outlier, in that it does not correspond with any other data gathered at this location over the past few years, with the next highest deposition rate gathered being 68 mg/m^2/day. This outlier may have been due to a localised dust generating incident that only occurred during the sampling at that one time, or possibly as a result of contamination of the sample.

9.4.14 Over the course of each year of monitoring, the annual averages are 40 mg/m^2/day, 23 mg/m^2/day and 75 mg/m^2/day, in 2016, 2017 and 2018, although it is noted that data capture is limited in both 2016 and 2018, with data for normally wetter months unavailable (particularly for 2016). The absence of data for the wetter months is likely to mean that the values reported are potentially higher than they would be with the inclusion of that data, because during wetter months, dust deposition rates are generally lower due to natural suppression from rainfall.

9.4.15 There is no air quality standard for dust deposition. However, research has been undertaken on the correlation between dust deposition rates and the likelihood of complaints (Vallack & Shillito, 1998). That research suggested that a dust deposition rate of 200 mg/m^2/day would likely result in the onset of complaints. However, it is widely accepted that tolerance of dust deposition is subjective, in that receptors that are already used to a certain level of dust deposition are more likely to tolerate more, when compared to receptors that are not already used to that same level.

Predicted Existing Baseline Conditions

9.4.16 Existing baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$, and the number of exceedance of the PM_{10} Air Quality Objective Value, have been predicted at 12 air quality sensitive receptors in the air quality study area. The predicted concentrations are listed in Table 9.8. A description of the sensitive receptors is provided in Appendix 9A (ES Volume II) and the location shown in Figure 9.1 in ES Volume III.

Table 9.8 – Predicted Existing Baseline Air Quality Statistics (2018)

RECEPTOR ID	ANNUAL MEAN CONCENTRATION (µG/M^3)			PM_{10} >50 µG/M^3 (DAYS)
	NO_2	PM_{10}	$PM_{2,5}$	
R1	24.6	14.2	8.8	1
R2	27.2	15.8	9.9	1
R3	32.7	19.2	12.6	3
R4	31.7	18.9	12.4	3
R5	31.3	16.8	10.8	1
R6	29.7	14.8	9.7	1
R7	29.6	14.8	9.7	1
R8	27.0	14.2	9.4	1
R9	25.6	13.9	9.2	1
R10	28.5	14.6	9.6	1
R11	27.8	15.4	9.9	1
R12	24.7	14.7	9.2	1
Air Quality Objective Value	**40**	**40**	**25**	**35**

9.4.17 Predicted existing baseline pollutant concentrations suggest that there is no risk of an exceedance of any of the pollutants considered. Annual mean concentrations are predicted to be highest at locations closest to the A19, north of the M62 (R3 and R4), and close to the M62 (R5).

Greenhouse Gas Emissions

9.4.18 Total GHG emissions (as CO_2 equivalent) have been quantified from road traffic emissions within the Study Area. Existing baseline CO_2 emissions total at 41,190 tonnes in 2018.

Future Baseline

9.4.19 Future baseline conditions are considered in this assessment to be the same as existing baseline conditions, based on the assumption that there is unlikely to be significant, if any improvement in air quality conditions between 2018 and 2020. However, the assessment of road traffic emissions impacts does consider a future baseline scenario, to take into account the increase in vehicle movements on the local road network, due to general traffic growth and nearby committed developments (see Appendix 8A: Transport Assessment in ES Volume II).

Predicted Future Baseline Conditions

9.4.20 Future baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$, and the number of exceedances of the PM_{10} Air Quality Objective Value, have been predicted at 12 air quality sensitive receptors in the air quality study area. The predicted concentrations are listed in Table 9.9. A description of the sensitive receptors is provided in Appendix 9A (ES Volume II) and the locations shown in Figure 9.1 (ES Volume III).

Table 9.9 – Predicted Future Baseline Air Quality Statistics (2020)

RECEPTOR ID	ANNUAL MEAN CONC. (µG/M^3)			PM_{10} >50 µG/M^3 (DAYS)
	NO_2	PM_{10}	$PM_{2,5}$	
R1	24.6	14.2	8.8	1
R2	27.2	15.8	9.9	1
R3	32.8	19.3	12.6	3
R4	31.8	19.0	12.4	3
R5	31.4	16.9	10.8	1
R6	29.8	14.8	9.8	1
R7	29.7	14.8	9.7	1
R8	27.0	14.2	9.4	1
R9	25.6	13.9	9.2	1
R10	28.6	14.6	9.6	1
R11	27.8	15.4	9.9	1
R12	24.7	14.7	9.2	1
Air Quality Objective Value	**40**	**40**	**25**	**35**

9.4.21 Predicted future baseline pollutant concentrations suggest that there is no risk of an exceedance of any of the pollutants considered. Again, annual mean concentrations are predicted to be highest at locations closest to the A19, north of the M62 (R3 and R4), and close to the M62 (R5).

9.4.22 Annual mean concentrations in the future baseline scenario are slightly higher than those reported in the existing baseline scenario (Table 9.8). This is because of the growth in traffic flow on the local road network, due to committed developments in the vicinity of the Proposed Development, between 2018 and 2020, and the assumption that there will be no improvement in vehicle emission rates and background concentrations between 2018 and 2020.

Greenhouse Gas Emissions

9.4.23 Total GHG emissions (as CO_2 equivalent) have been quantified from road traffic emissions within the Study Area. Future baseline CO_2 emissions total at 41,916 tonnes in 2020 (assuming no improvement in vehicle CO_2 emissions between 2018 and 2020).

9.5 Development Design and Impact Avoidance

9.5.1 Whilst no measures have been specifically incorporated into the design of the Proposed Development with the intention to avoid air quality impacts, elements of the design incorporated for other reasons will have some benefit in reducing air quality impacts. These are summarised as follows:

- the realignment of Whitefield Lane, moving vehicle emissions away from the nearest air quality sensitive receptors on Whitefield Lane.
- the routing of Proposed Development-related traffic so that they join the Strategic Road Network at the earliest opportunity; and
- the inclusion of a Dust Management Plan with the planning application (see Appendix 9B in ES Volume II), setting out measures that will be (or will continue to be) implemented to control operation dust emissions to the extent that a significant effect does not occur as a consequence of the Proposed Development.

9.6 Likely Impacts and Effects

<u>Construction</u>

Step 1: Screen the Requirement for a Detailed Assessment

9.6.1 There are two highly sensitive construction dust receptors located within 350 m of the Gale Common Ash Disposal Site boundary. Both are residential properties, the nearest of which is located 25 m to the west of the Gale Common Ash Disposal Site boundary (C/Op1 on Figure 9.1). The other is located 150 m south of the southern boundary of the Gale Common Ash Disposal Site (C/Op2 on Figure 9.1). The rest of the Gale Common Ash Disposal Site boundary is surrounded by low sensitivity agricultural land.

9.6.2 There are a number of highly dust sensitive receptors located within 350 m of the Site boundary at the eastern end of Whitefield Lane. These are on Whitefield Lane itself (represented by R8 and R9 on Figure 9.1) and on Selby Road (represented by R10 on Figure 9.1). The nearest of which are within 10 m north of the Site boundary at the eastern end of Whitefield Lane.

Step 2: Assess the risk of Dust Impacts

Step 2A – Define the Potential Dust Emission Magnitude

9.6.3 The construction of the Proposed Development involves enabling works including construction of the following:

- works to improve Cobcroft Lane/ Whitefield Lane including localised widening and bend improvements;
- realignment of the eastern end of Whitefield Lane at the junction with the A19;
- new site access arrangements including widening of the site entrance construction of a new section of internal road and a gatehouse and installation of new barriers;
- installation of additional plant and equipment including weighbridges and wheel washes;
- internal site road widening comprising repairs and upgrading of the existing internal access road including localised widening;
- removal of an existing (redundant) conveyor to allow the loading pad to be expanded;
- expansion of the existing concrete loading pad, construction of an HGV route around the pad for access and loading and installation of lighting columns;
- expansion of existing office accommodation;
- facilities for public access to Stage I, initially comprising the construction of new pathways, fencing, gates and signage (accessed via the existing site entrance); and
- a new diesel storage tank.

9.6.4 The dust emission magnitudes for demolition, earthworks, construction and trackout are considered to be small at locations close to the Gale Common Ash Disposal Site. At locations close to the Site near the proposed Whitefield Lane realignment works, the dust emission magnitudes for construction of the Proposed Development are also considered to be small, but medium for earthworks and trackout, due to the scale of the works and the area of land they will cover, and the likely number of construction-related vehicle movements required.

Step 2B – Define the Sensitivity of the Study Area

9.6.5 The sensitivity of the Study Area is considered to be low for dust soiling and human health at locations close to the Gale Common Ash Disposal Site boundary and high for dust soiling and low for human health at locations close to the Site near the proposed Whitefield Lane realignment works based on the following justifications:

- just one (1) highly sensitive receptor located within 50 m of the Gale Common Ash Disposal Site boundary;
- between 10 and 100 highly sensitive dust receptors located within 20 m of the Site boundary at the eastern end of Whitefield Lane;
- no designated sites of importance for nature conservation within 50 m of the Site; and
- existing background PM_{10} concentrations of less than 24 $\mu g/m^3$.

Step 2C – Define the Risk of Impacts

9.6.6 Taking into account the potential dust emissions magnitude and the sensitivity of the Study Area, the risk of dust impacts are summarised as shown in Table 9.10.

Table 9.10 – Risk of Unmitigated Dust Impacts

SOURCE	DUST SOILING		HUMAN HEALTH	
	Gale Common Ash Disposal Site	Whitefield Lane Realignment Works	Gale Common Ash Disposal Site	Whitefield Lane Realignment Works
Demolition	N/A	N/A	N/A	N/A
Earthworks	Low	Medium	Low	Low
Construction	Low	Low	Low	Low
Trackout	Low	Medium	Low	Low
Overall Risk	**Low to Medium**		**Low**	

9.6.7 Step 3 and Step 4 of the construction dust assessment are considered later in this report, in Section 9.7 and Section 9.9 respectively.

<u>Operation</u>

Road Traffic Emissions

9.6.8 Operational concentrations of NO_2, PM_{10} and $PM_{2.5}$, and the number of exceedance of the PM_{10} Air Quality Objective, have been predicted at 12 air quality sensitive receptors in the air quality study area. The predicted concentrations are listed in Table 9.11 for the three operational scenarios considered (Designated HGV Route, Transport Sensitivity Test 1, Transport Sensitivity Test 2 as described in 9.3.20 above). The location of the air quality sensitive receptors is shown in Figure 9.1.

Table 9.11 – Predicted Future Operational Air Quality Statistics (2020)

RECEPTOR ID	ANNUAL MEAN CONCENTRATION (µG/M^3)			PM_{10} >50 µG/M^3 (DAYS)
	NO_2	PM_{10}	$PM_{2.5}$	
Future Operation (Designated HGV Route)				
R1	24.6	14.2	8.8	1
R2	27.3	15.8	9.9	1
R3	33.3	19.4	12.7	3
R4	32.2	19.1	12.5	3
R5	31.7	16.9	10.8	1
R6	30.8	15.0	9.9	1
R7	30.6	15.0	9.9	1
R8	27.9	14.4	9.5	1
R9	26.2	14.0	9.3	1
R10	28.9	14.7	9.7	1
R11	28.0	15.4	9.9	1
R12	24.7	14.7	9.2	1
Future Operation (Transport Sensitivity Test 1)				
R1	24.6	14.2	8.9	1
R2	27.3	15.8	9.9	1
R3	33.3	19.4	12.7	3
R4	32.2	19.1	12.5	3
R5	31.7	16.9	10.8	1
R6	30.6	15.0	9.8	1
R7	30.5	15.0	9.8	1
R8	27.7	14.3	9.5	1

RECEPTOR ID	ANNUAL MEAN CONCENTRATION ($\mu G/M^3$)			PM_{10} >50 $\mu G/M^3$ (DAYS)
	NO_2	PM_{10}	$PM_{2.5}$	
R9	26.1	14.0	9.3	1
R10	28.9	14.7	9.7	1
R11	28.0	15.4	9.9	1
R12	24.8	14.7	9.2	1
Future Operation (Transport Sensitivity Test 2)				
R1	24.6	14.2	8.8	1
R2	27.5	15.9	10.0	1
R3	33.3	19.4	12.7	3
R4	32.2	19.1	12.5	3
R5	31.7	16.9	10.8	1
R6	30.6	15.0	9.8	1
R7	30.5	15.0	9.8	1
R8	27.7	14.3	9.5	1
R9	26.1	14.0	9.3	1
R10	28.9	14.7	9.7	1
R11	28.0	15.4	9.9	1
R12	24.7	14.7	9.2	1
Air Quality Objective Value	**40**	**40**	**25**	**35**

9.6.9 With the Proposed Development in operation, annual mean concentrations of the pollutants considered remain well below the Air Quality Objectives in all three assessed operational scenarios. The highest concentrations predicted occur at receptor R3, adjacent to the A19 north of the M62, where annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ peak at 33.3 $\mu g/m^3$, 19.4 $\mu g/m^3$, and 12.7 $\mu g/m^3$ respectively.

9.6.10 The change in concentrations of NO_2, PM_{10} and $PM_{2.5}$, and the number of exceedance of the PM_{10} Air Quality Objective Values, because of the operation of the Proposed Development is given in Table 9.12 for three operational scenarios considered. The location of the air quality sensitive receptors is shown in Figure 9.1 (ES Volume III).

Table 9.12 – Change in Predicted Future Operational Air Quality Statistics (2020)

RECEPTOR ID	ANNUAL MEAN CONC. ($\mu G/M^3$)			PM_{10} >50 $\mu G/M^3$ (DAYS)
	NO_2	PM_{10}	$PM_{2.5}$	
Future Operation (Designated HGV Route) – Future Baseline Scenario				
R1	<0.1 (I)	<0.1 (I)	<0.1 (I)	<1
R2	<0.1 (I)	<0.1 (I)	<0.1 (I)	<1
R3	0.4 (VL)	0.1 (I)	0.1 (I)	<1
R4	0.4 (VL)	0.1 (I)	0.1 (I)	<1
R5	0.3 (VL)	<0.1 (I)	<0.1 (I)	<1
R6	1.0 (L)	0.2 (VL)	0.1 (I)	<1
R7	1.0 (L)	0.2 (VL)	0.1 (I)	<1
R8	0.9 (L)	0.1 (I)	0.1 (I)	<1
R9	0.5 (VL)	0.1 (I)	0.1 (I)	<1
R10	0.3 (VL)	0.1 (I)	<0.1 (I)	<1
R11	0.1 (I)	<0.1 (I)	<0.1 (I)	<1
R12	<0.1 (I)	<0.1 (I)	<0.1 (I)	<1
Future Operation (Transport Sensitivity Test 1) – Future Baseline Scenario				
R1	0.1 (I)	<0.1 (I)	<0.1 (I)	<1
R2	<0.1 (I)	<0.1 (I)	<0.1 (I)	<1
R3	0.4 (VL)	0.1 (I)	0.1 (I)	<1

RECEPTOR ID	ANNUAL MEAN CONC. (µG/M³)			PM_{10} >50 µG/M³ (DAYS)
	NO_2	PM_{10}	$PM_{2.5}$	
R4	0.4 (VL)	0.1 (I)	0.1 (I)	<1
R5	0.2 (VL)	<0.1 (I)	<0.1 (I)	<1
R6	0.7 (L)	0.1 (I)	0.1 (I)	<1
R7	0.8 (L)	0.1 (I)	0.1 (I)	<1
R8	0.7 (L)	0.1 (I)	0.1 (I)	<1
R9	0.4 (VL)	0.1 (I)	0.1 (I)	<1
R10	0.3 (VL)	0.1 (I)	<0.1 (I)	<1
R11	0.2 (VL)	<0.1 (I)	<0.1 (I)	<1
R12	<0.1 (I)	<0.1 (I)	<0.1 (I)	<1
Future Operation (Transport Sensitivity Test 2) – Future Baseline Scenario				
R1	<0.1 (I)	<0.1 (I)	<0.1 (I)	<1
R2	0.3 (VL)	<0.1 (I)	<0.1 (I)	<1
R3	0.4 (VL)	0.1 (I)	0.1 (I)	<1
R4	0.4 (VL)	0.1 (I)	0.1 (I)	<1
R5	0.2 (VL)	<0.1 (I)	<0.1 (I)	<1
R6	0.7 (L)	0.1 (I)	0.1 (I)	<1
R7	0.8 (L)	0.1 (I)	0.1 (I)	<1
R8	0.7 (L)	0.1 (I)	0.1 (I)	<1
R9	0.4 (VL)	0.1 (I)	0.1 (I)	<1
R10	0.3 (VL)	0.1 (I)	<0.1 (I)	<1
R11	0.2 (VL)	<0.1 (I)	<0.1 (I)	<1
R12	<0.1 (I)	<0.1 (I)	<0.1 (I)	<1
Air Quality Objective Value	**40**	**40**	**25**	**35**
IAQM magnitude of change descriptors given in parenthesis: (I) = Imperceptible (VL) = Very Low (L) = Low				

9.6.11 Predicted impacts to annual mean concentrations of PM_{10} and $PM_{2.5}$ are imperceptible across the study area for all three operational scenarios (Designated HGV Route, Transport Sensitivity Test 1, Transport Sensitivity Test 2 as described in 9.3.17 above). In line with IAQM guidance (IAQM, 2017) (see Table 9.3), predicted impacts to annual mean concentrations of NO_2 range from imperceptible to low. The imperceptible to low impacts reported at the majority of receptors (R1 to R5 and R8 to R12) occur at locations where total concentrations are such (<37.8 µg/m³) that the change predicted (<2% of the Air quality Objective Value) represents a **negligible effect**, in all three scenarios. The low impact reported at receptors R6 and R7, adjacent to the A19 to the north of Whitefield Lane, occur at locations where total concentrations of NO_2 are such (<37.8 µg/m³) that this change (between 2% and 5% of the Air Quality Objective Values) represents a **minor adverse effect (not significant)**, in all three scenarios.

Greenhouse Gas Emissions

9.6.12 Total GHG emissions (as CO_2 equivalent) have been quantified from road traffic emissions within the Study Area. Future operational CO_2 emissions and the change from future baseline are summarised in Table 9.13.

Table 9.13 – Annual Emissions of CO_2

SCENARIO	TOTAL CO_2 EMISSIONS (TONNES/YEAR)	CHANGE (FUTURE OPERATIONAL – FUTURE BASELINE)
Existing Baseline	41,190	n/a
Future Baseline	41,916	
Future Operation (Designated HGV Route)	42,361	+445 (1.1%)

SCENARIO	TOTAL CO_2 EMISSIONS (TONNES/YEAR)	CHANGE (FUTURE OPERATIONAL – FUTURE BASELINE)
Future Operation (Transport Sensitivity Test 1)	42,318	+402 (1.0%)
Future Operation (Transport Sensitivity Test 2)	42,280	+364 (0.9%)

9.6.13 The Proposed Development is likely to cause an increase in CO_2 emissions, due to the increase in vehicle movements during its operation. The three HGV routes that are assessed in Table 9.14 above are not comparable as they do not end at the same location (the Designated HGV Route ends at the M62 Junction 34, the Transport Sensitivity Test 1 route ends at the A645 and the Transport Sensitivity Test 2 route ends at the A1. Assuming for the purpose of assessment that 100% of Proposed Development traffic will access and leave the Gale Common Ash Disposal Site via Cobcroft Lane and Whitefield Lane to the east, and assuming no improvement in vehicle emission rates between 2018 and 2020, this increase accounts for 1.1% of total CO_2 emissions in the Study Area.

Dust Emissions

Step 1: Screen the Requirement for a Detailed Assessment

9.6.14 A review of aerial photography has identified a limited number of dust sensitive receptors located within 250 m of the Gale Common Ash Disposal Site. The receptors identified are residential and include a residential property approximately 25 m away from the Gale Common Ash Disposal Site's eastern boundary a residential property approximately 150 m away from the Gale Common Ash Disposal Site's southern boundary.

Step 2: Describe the Site Characteristics and Baseline Conditions

9.6.15 The Gale Common Ash Disposal Site covers an area of approximately 307 ha, although the actual area to be worked as part of the Proposed Development covers much less (approximately one-third of this area). At present, the Gale Common Ash Disposal Site consists of four deposits of ash (known as Stage I, Stage II and Stage III ash disposal areas and Lagoons C and D), the former processing plant area and areas of woodland and agricultural land. A full description of the Site is provided in Chapter 3: Description of the Site. The ash deposits themselves form the only notable terrain feature, with the surrounding area being predominantly flat.

9.6.16 As described in Chapter 4: The Proposed Development, extraction of secondary aggregate materials from certain areas within the Gale Common Ash Disposal Site (Stage II and Stage III ash disposal areas and Lagoons C and D only) will be increased as part of the Proposed Development. The predominant extraction material will be pulverised fuel ash (PFA). However, some areas of the Site contain colliery shale, which will also be extracted and reused in the restoration of the Site.

9.6.17 The Proposed Development is expected to extract up to 1 million tonnes per annum, over a period of approximately 25 years. The operational facility would be focussed on a simple process of extraction, screening and loading using mobile plant, as outlined in Chapter 4: The Proposed Development.

9.6.18 Operational dust sensitive receptors located with 250 m of the Gale Common Ash Disposal Site boundary are described in Table 9.14. The locations of the operational dust receptors are shown on Figure 9.1 (ES Volume III).

Table 9.14 – Dust Sensitive Receptors

RECEPTOR ID	DESCRIPTION	DISTANCE AND DIRECTION FROM		SENSITIVITY
		SITE BOUNDARY	NEAREST WORK AREA	
C/Op1	Residential property	25 m west	50 m west	High
C/Op2	Residential property	150 m south	250 south-south-east	High

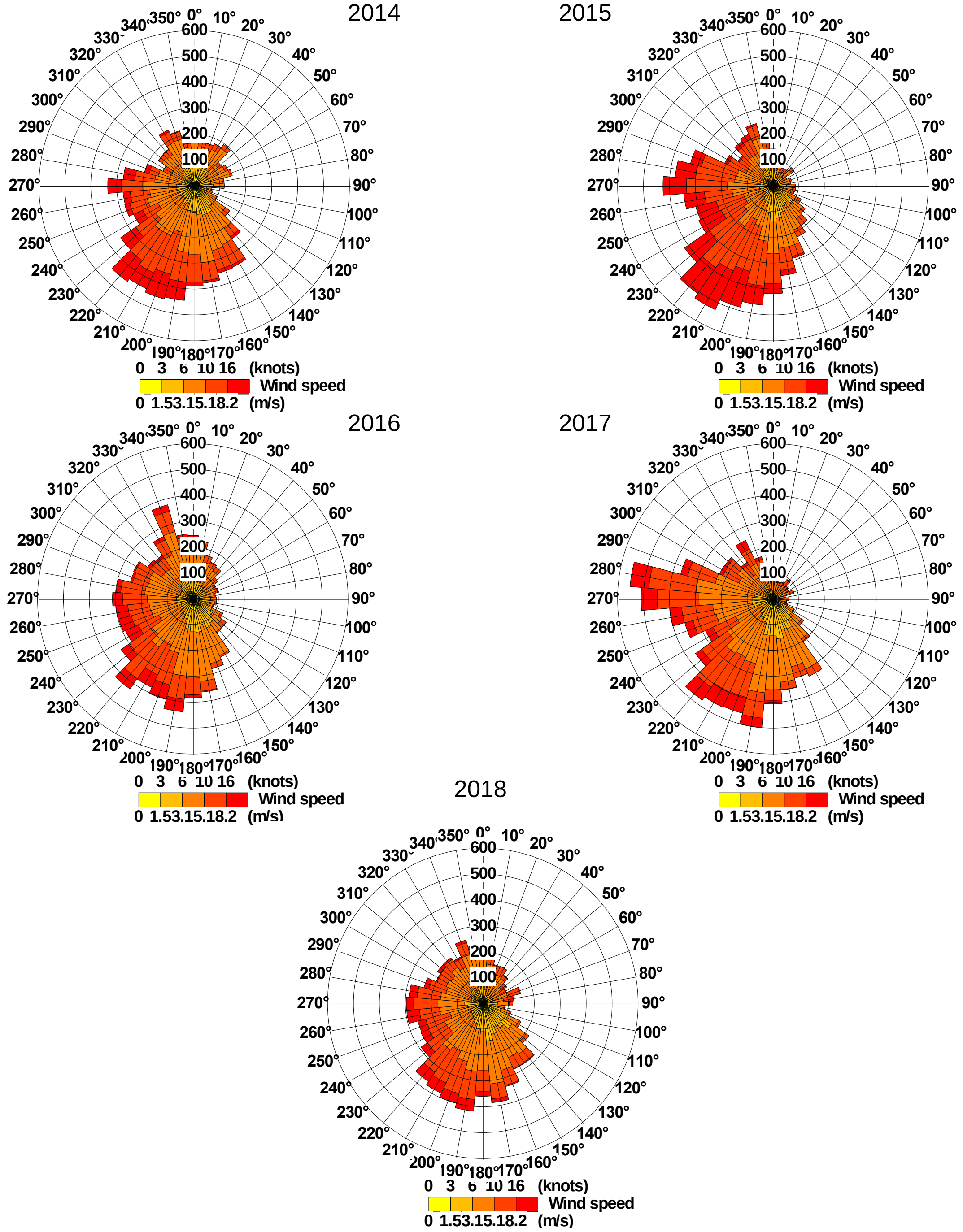
9.6.19 Receptor C/Op1 is only likely to be affected by operational dust emissions during works undertaken at Lagoons C and D. Receptor C/Op 2 is only likely to be affected by dust emissions during works on the Stage II ash disposal area.

9.6.20 Baseline conditions at the Site and surrounding areas are discussed in Section 9.4, including a summary of recent dust deposition monitoring and background PM_{10} concentration data. The review of baseline data suggests that baseline conditions are of a good standard.

9.6.21 Local meteorological data has been sourced from Doncaster Sheffield Airport. Located approximately 24 km to the south-south-east of the Site, this is the closest meteorological station for which an appropriate dataset is available. For the purpose of this assessment, conditions at Doncaster Sheffield Airport are considered representative of conditions experienced at the Site. Analysis of meteorological data gathered at the airport provides an indication of the local conditions under which the generation and dispersal of dust could potentially occur. The Airport is topographically similar to the area around the Site. A wind rose for Doncaster Sheffield Airport covering a period of five years is provided in Plate 9.1 below. The wind rose shows the frequency of wind direction and wind speed over the course of a calendar year.

9.6.22 Predominantly, winds tend to blow from southerly and westerly vectors, although they do blow from other directions at times. Therefore, receptors in any direction of the Site could potentially be downwind of operational activities at some time.

Plate 9.1 – Annual Wind Rose Plots – Doncaster Sheffield Airport



Step 3: Estimate the Dust Impact Risk

9.6.23 To determine the dust impact risk, the residual source emissions magnitude and pathway effectiveness were compared. The residual source emissions magnitude is determined by qualitative assumptions based on the nature and scale of works proposed to be undertaken at the Site and the likelihood that such works could generate dust emissions, taking into account inherent dust control measures, as set out in the Dust Management Plan (Appendix 9B). The pathway effectiveness is determined by the proximity of the dust sensitive receptors to the Gale Common Ash Disposal Site and analysis of local meteorological conditions.

9.6.24 The following factors were taken into account to determine the residual source emission classification associated with the Proposed Development:

- potential activities that may generate dust include:
  - the removal of topsoil;
  - the extraction of material;
  - loading the extracted material into mobile screening units;
  - loading the excavated and/ or screened material on dump trucks for transfer to the loading pad;
  - the stockpiling of material at the loading pad;
  - the loading of HGVs to transport the material off-site;
  - the movement of vehicles on site roads;
  - the movement of vehicles on public roads;
- the size of the proposed working area within the Gale Common Ash Disposal Site;
- the extraction rate of up to 1 million tonnes per annum;
- the extraction period of around 25 years;
- the on site operational plant:
  - 36 tonne 360 excavators;
  - dump trucks (for loading excavated and/or screened material);
  - loading shovels;
  - mobile screeners;
  - crusher/ shredders;
  - hopper;
  - radial telescopic conveyor;
  - dozers;
- the unsurfaced Site roads;
- the number of vehicle movements on the public road network; and
- the presence of dust suppression units and the implementation of all measures described in the Dust Management Plan (Appendix 9B).

9.6.25 Overall, the residual source emissions for the entire Site over the course of the life of the Proposed Development are considered medium, as summarised in Table 9.15.

Table 9.15 – Residual Source Emissions

ACTIVITY	RESIDUAL SOURCE EMISSIONS
Site Preparation and Restoration	Small
Material Extraction	Medium
Material Handling	Medium
On-Site Transport	Medium
Stockpiles and Exposed Surfaces	Medium
Off-site Transportation	Medium
Overall	**Medium**

9.6.26 To inform the determination of the pathway effectiveness, Table 9.13 has shown that the nearest dust sensitive receptors to the Gale Common Ash Disposal Site are located 50 m (Op1) and 250 m (Op2) from the nearest works areas. In line with IAQM guidance, receptor Op1 is therefore considered to be ‘close’ and Op2 is therefore considered to be ‘distant’ from the nearest source of dust emissions.

9.6.27 Pathway effectiveness is also informed by the analysis of local meteorological conditions. The dispersion of dust from a site towards a receptor is dependent on wind direction, wind speed and precipitation rate. According to the IAQM Guidance (2016) moderate to high wind speeds (>5 m/s) on dry days (<0.2 mm of precipitation) has the greatest potential of carrying airborne dust towards receptors and thus resulting in an effect.

9.6.28 As set out in paragraph 9.6.21, a detailed analysis of the wind speed, direction and precipitation data was undertaken for meteorological data recorded at Doncaster Sheffield Airport between 2014 and 2018. Table 9.16, indicates the percentage of days where the precipitation rate was <0.2 mm and when the wind speed was >5 m/s for wind direction vectors blowing from the Proposed Development towards the nearest dust sensitive receptors. The results are presented as a percentage of total days.

9.6.29 In line with the IAQM Guidance (2016), potentially dust generating meteorological conditions affecting receptor Op1 are considered infrequent (occurring <5% of the time). Potentially dust generating meteorological conditions affecting receptor Op2 are considered moderately frequent (occurring 5% to 12% of the time).

Table 9.16 – Frequency of Dry Winds

YEAR	RECEPTOR OP1 (45^0 - 135^0)	RECEPTOR OP2 (315^0 - 45^0)
2014	193/8760 hours (2%)	299/8760 hours (3%)
2015	74/8760 hours (1%)	321/8760 hours (4%)
2016	129/8784 hours (1%)	590/8784 hours (7%)
2017	147/8760 hours (2%)	483/8760 hours (6%)
2018	295/8760 hours (3%)	570/8760 hours (7%)
Average	838/43824 (2%)	2263/43824 (5%)
IAQM Classification	**Infrequent**	**Moderately Frequent**

9.6.30 In line with IAQM Guidance (2016) the pathway effectiveness of a receptor classified as being ‘close’ and experiencing ‘infrequent’ dry winds (Op1) is described as ‘ineffective’. The pathway effectiveness of a receptor classified as being ‘distant’ and experiencing ‘moderately frequent’ dry winds (Op2) is also described as ‘ineffective’.

9.6.31 Based on the residual source emissions classification of ‘medium’ and the pathway effectiveness classification of ‘ineffective’ for both operational dust receptors assessed, the dust impact risk is expected to be ‘**negligible**’ (**not significant**).

Step 4: Estimate the Likely Magnitude of Effect

9.6.32 The magnitude of effect is determined by comparing the sensitivity of the receptors to the potential dust impact risk.

9.6.33 In this instance, the sensitivity of the nearest receptors (OP1 and OP2) is classified as being ‘high’. However, the potential dust impact risk at both receptors is classified as being ‘negligible’. A negligible risk at a highly sensitive location is deemed to have a **negligible effect** (**not significant**).

9.6.34 Step 5 of the operational dust assessment is discussed in Section 9.7.

Restoration

9.6.35 Potential dust generating activities undertaken during restoration of the Proposed Development will be similar to those undertaken during the construction and operational. It is therefore considered likely that the effects reported for the construction dust and operation dust assessments can be considered representative of effects likely during restoration of the Proposed Development (as described in Chapter 4).

9.7 Mitigation and Enhancement

Construction Phase Dust Emissions

Step 3: Identify the need for site-specific mitigation

9.7.1 In line with IAQM Guidance (2016), the mitigation measures listed below will be capable of controlling impacts to the extent that a significant effect does not occur from the low risk construction works at the Gale Common Ash Disposal Site and the medium risk construction works associated with the realignment of Whitefield Lane (see Table 9.10). Many of the measures listed are already implemented at the Gale Common Ash Disposal Site for the existing operations:

- display the name and contact details of person(s) accountable for air quality and dust issues on the Site boundary;
- record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/ or air emissions, either on- or off Site, and the action taken to resolve the situation in the log book;
- carry out regular Site inspections, record results, and make an inspection log available to the local authority when asked;
- increase the frequency of Site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions;
- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- screens or barriers (such as the earth bund proposed) around dusty activities or the site boundary that are at least as high as any stockpiles on-Site;
- avoid site runoff of water or mud as far as possible;
- ensure all vehicles switch off engines when stationary - no idling vehicles;
- impose and signpost a maximum-speed-limit (suggested 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas), although for longer long haul routes speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate;
- avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment, where practicable;
- only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- ensure an adequate water supply on the Site for effective dust/ particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- use enclosed chutes and conveyors and covered skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- Prohibit bonfires and burning of waste materials.

<u>Operational Phase Road Traffic Emissions</u>

9.7.2 No additional mitigation measures, beyond those already incorporated into the design of the Proposed Development are suggested to mitigate impacts associated with operational road traffic emissions.

<u>Operational Phase Dust Emissions</u>

Step 5: Identify a suitable level of additional mitigation

9.7.3 Mitigation measures and enhancement measures are set out in the Dust Management Plan for the operation of the Proposed Development, which is included as Appendix 9B (ES Volume II). These measures have already been accounted for in the assessment described in Section 9.6.

9.7.4 No additional operational dust mitigation measures are considered necessary.

9.8 Limitations or Difficulties

9.8.1 The assessment of air quality impacts during the construction and operation of the Proposed Development has been undertaken in line with current IAQM Guidance.

9.8.2 However, the dispersion modelling of road traffic emissions impacts has the following uncertainties associated with it:

- Baseline survey method – the dispersion model for predicting the impact of road traffic emissions impacts was verified by measurement data gathered by project-specific survey, using NO_2 diffusion tubes. The use of diffusion tubes has an inherent error due to factors that can influence the NO_2 measurements during the preparation of the tube, the storage of the tube prior to use, the storage of the tube after use, and the analysis of the tube at the laboratory. The period mean obtained by the diffusion tubes was then adjusted to represent an annual mean using data gathered by nearby continuous air quality monitoring stations. To reduce the uncertainty associated with this potential error, the tube data was annualised and adjusted for bias following appropriate guidance (Defra, 2018);
- The traffic data – the air quality assessment is based on traffic data collected for the Transport Assessment over a period of days (see Chapter 8: Traffic and Transport). This data was then converted into daily average flows for each assessment scenario. It therefore includes the error and limitations associated with that data collection and the conversion of the period data into 24 hour annual average flows; and
- Dispersion model – the dispersion model used to quantify air quality impacts has inherent uncertainties, due to the traffic data used (as listed above), the meteorological data used and other factors that can influence the dispersion of emissions in the real world, but cannot necessarily be recreated in the dispersion model. The meteorological data used in this assessment was measured at Doncaster Sheffield Airport, which was the closest source of hourly sequential meteorological data available. However, whilst it is considered to be the most representative source of meteorological conditions to that of the Study Area, it can never be 100% representative of conditions across the whole of the Study Area. To account for dispersion model bias (and uncertainty in the traffic data), model verification has been undertaken following the approach described in Defra Guidance (Defra, 2018). The air quality assessment has been undertaken in line with standard best practice and appropriate guidance and is considered to be robust.

9.8.3 As the locations of PFA customers are not known at this stage, the total GHG emissions associated with materials export cannot be quantified. However the emissions associated with transport should be considered in the context of the significant carbon emissions savings that the Proposed Development could deliver, by reducing the embodied carbon of construction materials. This is set out in the Sustainability and Carbon Review that accompanies the planning application.

9.9 Residual Effects and Conclusions

Construction Phase Dust Emissions

Step 4: Define impacts and their significance

9.9.1 For the final step in the construction dust assessment, significance of the potential residual dust impacts, i.e. after mitigation, was determined. According to the IAQM Guidance (2014), the residual impacts assume that all the mitigation measures (listed in Step 3) to avoid or reduce impacts are adhered to. The measures listed are capable of controlling impacts to the extent that the effect is **negligible** or **minor adverse** at worst, which is considered '**not significant'.**

Operation Phase Road Traffic Emissions

9.9.2 The operational road traffic assessment reported in Section 9.6 is inherently cumulative, in that the traffic data used to inform the quantification of future baseline and future operation pollutant concentrations already includes the contribution from major committed development in the vicinity of the Proposed Development.

9.9.3 The assessment demonstrated that there would not be an exceedance of the air quality objectives in either future baseline or the future operational scenarios. The operation of the Proposed Development would cause an imperceptible to low magnitude of impact. At the majority of receptor locations, this change would have a **negligible effect**. At receptors located adjacent to the A19 north of Whitefield Lane, the change would have a **minor adverse effect**. **Negligible** to **minor adverse effects** are considered to be '**not significant'**.

Greenhouse Gas Emissions

9.9.4 The GHG emissions assessment established CO_2 emissions associated with HGV transport. The increase in CO_2 emissions from future baseline concentrations associated with the Designated HGV Route scenario accounts for an additional 1.1% of total CO_2 emissions in the study area. This should be considered in the context of the significant carbon emissions savings that the Proposed Development could deliver, by reducing the embodied carbon of construction materials, as set out in the Sustainability and Carbon Review that accompanies the planning application.

9.9.5 It should be noted that the estimate of total CO_2 emissions is based on the assumption that the maximum extraction rate will be undertaken in the year of opening (2020). In reality, maximum extraction will occur after this point, when vehicle emissions technology is likely to have improved to the extent that total CO_2 emissions are less than the values reported in Table 9.13.

Operation Dust Emissions

9.9.6 The steps of assessment described in Section 9.6 and 9.7 already account for the dust mitigation measures described within the Dust Management Plan (Appendix 9B (ES Volume II). No additional operational dust mitigation measures were considered necessary beyond those listed in Appendix 9B: Dust Management Plan in ES Volume II.

9.9.7 The residual effects are therefore as reported in Section 9.6. The scale of works, level of mitigation and likelihood of dusty winds experienced at the operational dust sensitive receptors will have a **negligible effect** which is considered to be '**not significant'**.

9.10 References

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