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8.0 AIR QUALITY

8.1 Introduction

8.1.1 This chapter assesses the effects of the Proposed Development on local air quality. In particular, it considers the potential impacts of construction dust and vehicle emissions on human and ecological receptors as a result of the Proposed Development.

8.1.2 The chapter describes the methods used to assess the baseline conditions currently existing at the Site and surroundings, the potential severity of direct and indirect air quality impacts of the Proposed Development, and the mitigation measures required to prevent, reduce or offset the impacts and the significance of residual effects.

8.1.3 The principal aspects considered during this assessment are:

- Construction dust: potential impacts of dust arising during earthworks and construction activities and from vehicle track-out during the construction phase; and
- Vehicle exhaust emissions: potential impacts of vehicle exhaust emissions arising from traffic generated by the Proposed Development on local air quality during the construction and operational phases.

8.2 Methodology

Technical Context

8.2.1 The airborne pollutants of principal concern in connection with demolition and construction activities and which are considered in the following assessment are disamenity dust and particulate matter less than less than 10µm (PM₁₀). The pollutants of principal concern in connection with road traffic are nitrogen oxides (NO_x), nitrogen dioxide (NO₂) and particulate matter less than 10µm (PM₁₀).

8.2.2 The term 'dust' typically refers to all airborne particulate matter and can be categorised on the basis of the size of particles¹. Dust can give rise to both soiling effects through dust deposition (*'disamenity dust'*) and human health effects through suspended particulates. Dust accumulation may also affect sensitive

¹ Institute of Air Quality Management (IAQM), (February 2014), *Guidance on the Assessment of Dust from Demolition and Construction*

habitats through impacts on vegetation and aquatic ecosystems. Dust soiling will arise from the deposition of particulate matter (PM) in all size fractions, but will be associated mostly with particulate matter greater than 30µm.

- 8.2.3 Particles below 10µm (referred to as PM₁₀) correspond to the inhalable fraction of particulate matter and have been related to various adverse health effects². PM_{2.5} (those particles of less than 2µm and which form a proportion of PM₁₀) has been shown to give a stronger association with the observed ill-effects.
- 8.2.4 The majority of construction dust is larger than 10 µm and hence the key potential impacts are associated with soiling effects.
- 8.2.5 Road transport is the main source in the UK of oxides of nitrogen (NO_x; comprises nitrogen dioxide (NO₂) and nitric oxide (NO)). NO itself is not considered harmful to human health. However, on release to the atmosphere it usually oxidises rapidly to NO₂ which is associated with adverse effects on human health, causing inflammation of the lungs at high concentrations. Long term exposure to NO₂ can affect lung function and cause respiratory symptoms.
- 8.2.6 Road transport is also major contributor to ambient PM both as direct emissions through vehicle exhausts and as indirect emissions through tyre and brake wear, re-suspension of particulate matter on the road and road wear (mechanical abrasion and corrosion). Road transport may also be responsible for secondary PM formed via gas-to-particle conversion.

Legislation and Guidance

European Legislation

- 8.2.7 Action to manage and improve air quality within the UK is currently driven largely by European (EU) legislation. The majority of European air quality legislation is consolidated under Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which came into force on 11th June 2008 consolidating an earlier Directive and three daughter directives. The legislation sets legally binding European-wide air quality limit and interim target values (Ambient Air Directive (AAD) Limit and Target Values) for concentrations in outdoor air of major air pollutants for the protection of human health and ecosystems and prescribes how air quality should be assessed and managed by Member States.

² Air Quality Expert Group (AQEG), *Fine Particulate Matter (PM_{2.5}) in the United Kingdom, December 2012*

UK Legislation

- 8.2.8 **The Air Quality (Standards) Regulations 2010** implement EU Directives 2008/50/EC and 2004/107/EC, a fourth daughter directive, transposing the AAD values into UK legislation. In the UK responsibility for meeting the AAD Limit and Target Values is devolved to the national administrations; the Department for Environment, Food and Rural Affairs (Defra) co-ordinates assessment and air quality plans for the UK as a whole.
- 8.2.9 Under the Environment Act 1995 the UK Government and the devolved administrations are required to produce a national **Air Quality Strategy (AQS)**. This was last reviewed and published in 2007³. The UK AQS sets out air quality objectives (AQOs) and policy options to improve air quality within the UK. The strategy sets AQOs for specific pollutants deemed to pose a risk for human health or other receptors, a number of which are derived from the EU limit and target values, although requirements for compliance vary. The UK AQS includes more exacting AQOs for some pollutants than those required by EU legislation.
- 8.2.10 Part IV of the Environment Act 1995 imposes a duty on local authorities in the UK to review existing and projected air quality in their area. Any location likely to exceed the UK AQOs must be declared an Air Quality Management Area (AQMA) and an Action Plan prepared and implemented, with the aim of achieving the objectives. This process is referred to as **Local Air Quality Management (LAQM)**. The LAQM process is supported by national statutory policy⁴ and technical guidance⁵ provided by Defra.
- 8.2.11 The standards and objectives relevant to the LAQM framework are prescribed through the Air Quality (England) Regulations (2000) and Air Quality (England)(Amendments) Regulations 2002.
- 8.2.12 The applicable EU limit and target values and UK AQOs relevant to the Site and Proposed Development with regards to protection of human health and vegetation and ecosystems, referred to in this report as Air Quality Assessment Levels (AQALs), are summarised in Table 8.1. below.

³ DEFRA, (2007), *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007*

⁴ Defra, *Local Air Quality Management, Policy Guidance (PG16), April 2016*

⁵ Defra, *Local Air Quality Management, Technical Guidance (TG16), April 2016*

Table 8.1: Relevant Air Quality Assessment Levels (AQALs)

Pollutant	AQAL	Averaging Period	Source
NO ₂	40 µg/m ³	annual mean	AAD Limit Value / AQO
	200 µg/m ³	hourly mean, not to be exceeded more than 18 times per annum	AAD Limit Value / AQO
NO _x (v)	30 µg/m ³	annual mean	AAD Limit Value / AQO
PM ₁₀	40 µg/m ³	annual mean	AAD Limit Value / AQO
	50 µg/m ³	24 hour mean, not to be exceeded more than 35 times per annum	AAD Limit Value / AQO
PM _{2.5}	25 µg/m ³	annual mean	AAD Limit Value / AQO ¹
	% reduction relative to average exposure indicator (AEI), dependant on initial concentration; to at least 18 µg/m ³	annual mean	AAD Target Value / AQO ¹

8.2.13 Statutory objectives, limit and / or target values for NO₂, PM₁₀ and PM_{2.5} are provided in the Air Quality Standards Regulations 2010 and Air Quality Strategy 2007, the 2010 Regulations imposing stricter standards on PM_{2.5} than the Strategy. However, there are no regulatory standards for PM_{2.5} within the LAQM system, and PM_{2.5} is currently regulated at a national, rather than local, level. Local Authorities do not presently have an obligation to review and monitor PM_{2.5} but are expected to work towards reducing PM_{2.5} emissions and concentrations in their area as far as practicable.

8.2.14 For the purposes of the AQALs ambient air refers to the outdoor air and excludes workplaces where members of the public do not have regular access. Advice is given in Defra guidance⁵ as to where the UK AQOs should apply as summarised below; slightly different compliance requirements are provided for EU limit and target values:

Table 8.2: Summary of where the AQOs should apply

Averaging period	Locations where the objective should apply
annual mean	All locations where members of the public might be regularly exposed; including facades of residential properties, schools, hospitals, care homes etc
24-hour mean and 8-hr mean	All locations where the annual mean objectives apply together with hotels and gardens of residential properties
1-hr mean	All locations where the annual mean, 24-hour and 8-hour means apply; also kerbside sites, parts of car parks, bus stations and railway stations which are not fully enclosed and any outdoor locations where members of the public might reasonably be expected to spend 1 hour or longer.
15-min mean	All locations where members of the public may be reasonably

Averaging period	Locations where the objective should apply
	exposed for a period of 15 minutes

Note: the AQOs do not apply at building facades or other places of work where members of the public do not have regular access

Dust Standards and Control

- 8.2.15 Disamenity dust as such is not regulated as a pollutant under the above requirements. Controls of soiling and nuisance impacts are typically achieved through conditions within planning permissions and / or environmental permits requiring the implementation of a dust management plan to prevent amenity impacts. For industrial and trade premises that do not require an Environmental Permit to operate dust is also controlled under Part III of the Environmental Protection Act 1990 (EPA 1990) with regards to statutory nuisance. Nuisance is defined as *'any **dust**, steam, smell or other effluvial arising on industrial or trade or business premises and being prejudicial to health or a nuisance'*.
- 8.2.16 There are no European or UK statutory standards or recommended levels that define the point when deposited dust causes annoyance or disamenity. Public concerns relating to dust accumulation and soiling may be related to a range of factors including the nature of a site and locality and baseline levels.

National Planning Policy and Guidance

- 8.2.17 The **National Planning Policy Framework 2012⁶** (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. The Framework provides some general guidance to local authorities on taking air pollution into account in planning policies and decisions. Paragraph 109 of the Framework states:

'The planning system should contribute to and enhance the natural and local environment by... preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution, or land instability.'

- 8.2.18 Annex 2 of the NPPF defines pollution as *'[...] anything that affects that quality of the 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*

⁶ Department for Communities and Local Government, (March 2012), *National Planning Policy Framework*

range of emissions, including smoke, fumes, gases, dust, steam, odour, noise and light’.

8.2.19 In addition, paragraph 124 of the Framework states:

‘Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.’

8.2.20 Further guidance is provided in the supporting Planning Practice Guidance on Air Quality⁷ which provides guiding principles on how planning can take account of the impact of new development on air quality. Of note the PPG states:

‘Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values [...]. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that the relevant limits have been exceeded or are near the limit’; and;

‘Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon 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).’

8.2.21 The guidance states that the level of air quality assessment should be proportionate to the nature and scale of development proposed and level of concern about air quality and that each assessment is location specific.

Local Planning Policy and Guidance

8.2.22 The current Harrogate District Local Plan (2001) does not contain any specific policies with regards to air quality. HBC is currently working towards a new local plan which is scheduled for adoption in Autumn 2018 and will guide future

⁷ Department of Communities and Local Government, *Planning Practice Guidance, Air Quality*, 6th March 2014

development within the Borough. Section 9 of the draft plan⁸, on Natural Environment, does include a policy, NE1, on air quality and which requires *'Development in, or likely to affect, the Knaresborough and Ripon Air Quality Management Areas (AQMAs), or any other AQMA designated over the course of the plan period, should ensure consistency with the Air Quality Action Plan and the current North Yorkshire Local Transport Plan'*.

- 8.2.23 The HBC Air Quality Action Plan (AQAP)⁹ outlines a range of potential measures to help reduce nitrogen dioxide levels within the declared AQMAs. This indicates a Supplementary Planning Document (SPD) was due to be produced on air quality; however this does not appear to have been developed to date and there are no current specific policies in relation to new development.

Additional Guidance

- 8.2.24 The IAQM **Planning for Air Quality**¹⁰ document provides specific non-statutory guidance on air quality and the planning system for new development. The guidance clarifies when an air quality assessment is required, what it should contain and how impacts and effects should be described and assessed. The guidance sets out a recommended approach to assess the significance of the air quality effects and sets out suggested approaches to reducing emissions and impacts.
- 8.2.25 The IAQM **Guidance on the Assessment of Dust from Demolition and Construction**¹¹ document provides specific non-statutory guidance on the assessment of the impacts of dust and fine particulate matter (PM₁₀) from demolition and construction activities. The guidance also provides recommended mitigation measures taking into account the risk posed by a development.
- 8.2.26 Highways England (HE) provides separate guidance within the Design Manual for Roads and Bridges (DMRB)¹², supported by a series of advice notes, for assessing potential air quality impacts from major new road schemes. This guidance is

⁸ Harrogate Borough Council (HBC), *Harrogate District Draft Local Plan 2016, Natural Environment, May 2016*

⁹ Harrogate Borough Council (HBC), *Air Quality Action Plan 2013 for Harrogate Borough Council, AQAP/2013, May 2013*

¹⁰ *Institute of Air Quality Management (IAQM), (2017), Land-use Planning & Development Control: Planning for Air Quality. v1.2.*

¹¹ *Institute of Air Quality Management (IAQM), (February 2014), Guidance on the Assessment of Dust from Demolition and Construction. v1.1.*

¹² *Highways England (HE), Design Manual for Roads and Bridges (DMRB), Volume II Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1, HA 207/07, Air Quality, May 2007*

applicable to schemes being undertaken by, or on behalf of, HE, and sets out criteria for determining when an air quality assessment should be undertaken and the methodology for an assessment of impacts and significance of effects.

Assessment Methodology

8.2.27 The scope of the assessment was based on consideration of the Proposed Development and likely effects on the local environment.

Surveys and Information Sources

8.2.28 In undertaking the air quality assessment the following has been undertaken:

- Site visit to view the site and surrounding environs;
- Review of baseline air quality, potential local air emission sources and Defra / HBC air quality reports and data;
- Review of local wind speed and direction statistics;
- Identification of potentially sensitive human and ecological receptors;
- Review of Proposed Development information including phasing and expected construction and operational traffic movements (data provided by AECOM);
- Qualitative construction dust assessment;
- Screening assessment of construction and operational phase vehicle movements; and
- Overall assessment of potential impacts on human and ecological receptors and significance of effects; and
- Provision of recommendations for additional mitigation measures and assessment of residual effects.

8.2.29 The baseline data has been gathered through a desk top study and the site visit. Adequate background information is available to inform the assessment and additional survey and monitoring work has not been undertaken. In undertaking the assessment reference has been made to the following sources of information:

Table 8.3 Information Sources

Date and Reference	Author and Source	Purpose and Content
<i>Background and Topographical Information</i>		
Promap	Ordnance Survey	General mapping information including topographic data, ground features, rights of ways, communications etc
Aerial satellite imagery	Aerial photography (various)	Site setting

Date and Reference	Author and Source	Purpose and Content
maps.environment-agency.gov.uk/wiyby	Environment Agency	General information on industrial pollution sources
magic.gov.uk	Multi-agency	Web-based interactive map containing information on nature conservation areas
<i>Air Quality Information</i>		
2016 Air Quality Annual Status Report (ASR), May 2016 ¹³	HBC	Update of local authority air quality monitoring and assessment
2017 Detailed Assessment of Air Quality for Harrogate Borough Council, January 2017 ¹⁴	Air Quality Consultants (AQC)	Detailed Assessment of air quality within two locations within HBC area
uk-air.defra.gov.uk/aqma	Defra	Details and maps of AQMAs throughout UK
laqm.defra.gov.uk	Defra	Local Authority air quality management support; background pollutant maps

Receptors

8.2.30 Receptors considered in this assessment comprise human receptors, that is locations where a person or property may experience adverse impacts of airborne dust or exposure to ambient pollution (i.e. residential, leisure, amenity and sensitive commercial use) and ecological receptors where this refers to any sensitive habitat that may be affected by dust soiling or increased ambient pollution (e.g. locations with an international, national or local designation and sensitive habitat features). The sensitivity of the receptors to potential impacts from aerial emissions, whether changes in pollutant concentrations or dust soiling, will be determined as detailed in the relevant guidance as described below.

Construction Dust Assessment

8.2.31 The assessment of the air quality impacts due to the generation and dispersion of dust and PM₁₀ during the construction phase has been undertaken in accordance with the current guidance issued by the IAQM¹¹. The guidance describes a qualitative assessment methodology to assess the risks of dust and PM₁₀ impacts from demolition, earthworks and construction activities and from trackout, and provides guidance for assessing the significance of the effects.

¹³ Hodgson, Suzanne (2017). *Detailed Assessment of Air Quality for Harrogate Borough Council*. Air Quality Consultants, Bristol. Available at: www.harrogate.gov.uk/downloads/file/2374/2017_detailed_assessment_of_air_quality

¹⁴ Revill, Emily (2016). *2016 Annual Air Quality Status Report (ASR)*. Harrogate Borough Council. Available at: www.harrogate.gov.uk/downloads/file/1622/2016_air_quality_annual_status_report

8.2.32 In accordance with the IAQM guidance the dust assessment considers receptors within 350m of the boundary of the Site and within 50m of the routes likely to be used by construction vehicles on the public highway up to 500m from the Site. For ease the construction dust Study Area therefore extends to 500m of the site boundary as shown in Figure 8.1.

8.2.33 The risk of dust arising in sufficient quantities from a site to cause annoyance and / or health or ecological effects is dependent on:

- The scale and nature of the works (magnitude of potential dust emissions); and
- The proximity of receptors, both human and ecological (potential for impacts).

8.2.34 A site is allocated a Potential Dust Emissions Magnitude of large / medium / small for demolition, earthworks, construction and track out taking into account factors such as the size of the site, type of soils, building volume and vehicle movements.

8.2.35 The impact of generated dust will depend on the sensitivity of an area. The sensitivity of the area is determined for dust soiling, human health and ecological impacts respectively taking into account of several factors, as follows:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM₁₀, the local background concentrations; and
- Site specific factors, such as whether there are natural shelters or screening e.g. trees to reduce the risk of wind-blown dust.

8.2.36 The overall risk for each aspect considers the sensitivity of the area and the dust emission magnitude for each phase of the development, as summarised in Table 8.4 below.

Table 8.4 Risk of Dust Impacts

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

8.2.37 Other factors such as local topography and prevailing wind direction are also considered.

Vehicle Emissions Assessment

8.2.38 The assessment of vehicle emissions during the construction and operational phases has been undertaken in accordance with the IAQM guidance⁸ which is deemed appropriate for the Proposed Development.

8.2.39 The level of assessment required was determined through an initial screening review taking into account the predicted changes in traffic flows along the roads and junctions within the transport assessment study area and locations of sensitive receptors.

8.2.40 The following indicative criteria were used to determine potentially affected roads as provided in the IAQM guidance:

- LDV flow change by 500 AADT or more outside an AQMA, or 100 AADT or more within or adjacent to an AQMA;
- HDV flows change by 100 AADT or more outside an AQMA, or 25 AADT or more within or adjacent to an AQMA;
- Road alignment changing by 5m or more;
- Introduction or removal of a junction.

8.2.41 These criteria are more stringent than those provided by HE in the DMRB guidance¹² with regards to changes in traffic flows and are therefore deemed appropriate for the screening assessment.

8.2.42 Where these criteria are met and there are relevant receptors present further assessment is required. This may take the form of a Simple or Detailed Assessment. Relevant receptors include residential dwellings, schools and hospitals, areas of leisure use and ecologically sensitive sites.

8.2.43 The IAQM guidance does not specify at what distance a receptor should be to an affected road to indicate the need for further assessment. However, pollution concentrations are known to fall rapidly away from the roadside and are expected to return to background levels within 100m of a road source¹⁵. For the purposes of this assessment reference is made to the HE DMRB guidance¹², which requires assessment of receptors within 200m of affected roads. Where there are no receptors within 200m of affected roads no further assessment is required and potential impacts can be considered negligible.

8.2.44 Where further detailed assessment is required the IAQM guidance provides a methodology for assessing the severity of impacts at individual receptors, based on the predicted change in concentration of a pollutant due to a development at a receptor and the resulting total concentration (as a long-term average) as summarised in Table 8.5.

Table 8.5: Impact descriptors for individual receptors

Long term average concentration at a receptor in assessment year	% Change in concentration relative to AQAL			
	1	2-5	6-10	>10
75% or less of AQAL	negligible	negligible	slight	moderate
76-94% of AQAL	negligible	slight	moderate	moderate
95-102% of AQAL	slight	moderate	moderate	substantial
103-109% of AQAL	moderate	moderate	substantial	substantial
110% or more of AQAL	moderate	substantial	substantial	substantial

Note: Refer to Table 6.3 of IAQM¹⁰ guidance for detail and explanatory notes

8.2.45 The road network considered in this case encompasses the MSA itself, A1(M), A168, including the proposed re-aligned section, and the B6265 as shown in Figure 8.2. The screening assessment determined that further detailed assessment with respect to impacts of either construction or operational vehicle movements was not necessary, as detailed below in Section 8.4.

8.2.46 The operation of on-site plant and machinery (non-road mobile machinery (NRMM)) during the construction phase will also give rise to vehicle exhaust and combustion plant emissions. However, these are typically considered unlikely to give rise to significant impacts on local air quality, and given the nature of the locality and temporary timeframe for construction (expected to take 12 months) further consideration has been scoped out of this assessment.

¹⁵ Air Quality Consultants (AQC), *NO₂ Concentrations and Distance from Roads, J504, 18th July 2008*

Assessment of Significance / Assessment Criteria

8.2.47 IAQM guidelines do not provide a traditional matrix assessment of significant effects with regards to air quality. The judgement on the overall significance of the air quality effects of the proposals is informed by the predicted impacts at individual receptors as detailed in Table 8.5 and takes into account a number of factors, such as, but not limited to:

- The existing and future air quality in the absence of the Proposed Development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

8.2.48 IAQM recommends that assessment of the overall significance of any dust effects arising during the construction phase is carried out following identification of the appropriate mitigation measures. The level of risk identified for each activity in accordance with Table 8.4 is used to determine the level of mitigation that should be applied. Guidance is that for most sites with appropriate mitigation, the resulting impacts are not expected to be significant.

Limitations

8.2.49 Baseline air quality data has been obtained through a review of existing information and additional monitoring has not been undertaken. Little data is available for the locality and reference has therefore been made to background information provided by Defra based on UK-wide modelling and monitoring. Predicted future air quality data is also based on Defra data. There is acknowledged uncertainty in future predictions of air quality due to various factors including differences in actual and expected vehicle on-road emissions and the UK vehicle fleet. However, the data available is considered appropriate for this Site and assessment.

8.3 Baseline

8.3.1 The Site is located in a rural setting with the nearest concentrated habitation being at Kirby Hill about 750m to the southeast.

8.3.2 Scattered isolated residential properties are located in the general area around the Site although none are in the immediate vicinity; the nearest residential properties being Providence Lodge 340m to the south-southeast beyond the B6265 and open

fields, Dale View 245m to the west off the B6265 and High Moor Bungalow 300m to the southwest beyond the B6265 and open fields.

8.3.3 No schools, hospitals or other highly sensitive receptors are located within 500m of the Site or 200m of the considered road network.

8.3.4 There is no existing built development on the Site.

8.3.5 No international, national or local designated ecological sites have been identified within 2km of the Site.

Air Quality Review

8.3.6 As part of the LAQM process, HBC has declared 2 Air Quality Management Areas (AQMAs) within the Borough¹⁶ as listed below in Table 8.6. Of these, the closest is within Ripon town centre, about 6.5km to the northwest of the Site.

Table 8.6 AQMAs declared by HBC

AQMA Name	Location	Comment
Ripon AQMA (No 1)	1-6 & 29-36 Low Skellgate, 8A Heaths Court, all properties High Skellgate, and 1-4 & 28-34 Westgate	6.5km northwest of the Site
Knaresborough AQMA (No 1)	The Royal Oak, 1-23 Bond End, and 104-138 High Street	12km south-southwest

8.3.7 In addition, following a Detailed Assessment¹⁷ of two further areas within the Borough, HBC is considering declaration of an AQMA at York Place in Knaresborough.

Background Air Quality

8.3.8 Predicted background air quality data was obtained from the Defra LAQM website for the 1km x 1km grid square in which the Site and the key associated transport routes are located. The data is based on 2013 ambient monitoring and meteorological data and is provided by Defra for each year from 2013 to 2030.

¹⁶ Reville, Emily (2016). *2016 Annual Air Quality Status Report (ASR)*. Harrogate Borough Council. Available at: www.harrogate.gov.uk/downloads/file/1622/2016_air_quality_annual_status_report

¹⁷ Hodgson, Suzanne (2017). *Detailed Assessment of Air Quality for Harrogate Borough Council*. Air Quality Consultants, Bristol. Available at: www.harrogate.gov.uk/downloads/file/2374/2017_detailed_assessment_of_air_quality

8.3.9 Predicted background concentrations for the existing year (2017) are summarised below. Data had also been summarised for two future years (2020 and 2027) to provide information on future predicted background air quality.

Table 8.7 Predicted Background Air Quality Data – Nitrogen Oxides

Grid Square	Location	NO ₂			NO _x		
		2017	2020	2027	2017	2020	2027
438500, 469500	Site, A1(M)	12.00	9.58	7.84	16.39	12.80	10.36
437500, 469500	Dale View	8.36	6.97	5.89	11.16	9.18	7.67
437500, 468500	High Moor Lodge	8.23	6.90	5.84	10.98	9.08	7.62
438500, 468500	Providence Lodge, A1(M) south	12.19	9.75	8.00	16.67	13.05	10.59

Table 8.8 Predicted Background Air Quality Data – Particulate Matter

Grid Square	Location	PM ₁₀			PM _{2.5}		
		2017	2020	2027	2017	2020	2027
438500, 469500	Site, A1(M)	17.58	17.23	17.07	11.19	10.88	10.72
437500, 469500	Dale View	15.18	14.89	14.71	9.93	9.67	9.52
437500, 468500	High Moor Lodge	17.30	14.70	14.53	9.83	9.56	9.42
438500, 468500	Providence Lodge, A1(M) south	14.99	16.95	16.79	11.12	10.80	10.64

8.3.10 The average background NO₂ and PM₁₀ concentrations for the grid square in which the Site is located are predicted to be substantially below the relevant AQOs at 30% and 44% of the objectives in 2017, falling to 19.6% and 42% by 2027.

8.3.11 It should be noted that the data are effectively an average concentration across each 1 km square. The pollutant concentrations will therefore be higher close to any significant source, such as main roads, junctions and concentrated habitation. Concentrations will therefore be higher than those provided above in close proximity to the A1(M) and A168.

Monitored Air Quality

8.3.12 HBC operates a network of diffusion tubes for monitoring NO₂ concentrations across the Borough. None of these are located within the vicinity of the Site, or along the key transport routes in the immediate vicinity of the Site.

8.3.13 There are no automatic monitoring sites within the Borough.

Industrial Emissions

- 8.3.14 No Environment Agency Part 1A processes, or other industrial activities, such as mineral extraction, have been identified within the vicinity of the site that may influence background concentrations of NO₂ or PM₁₀.

Wind Speed and Direction

- 8.3.15 The most important meteorological parameters governing the atmospheric dispersion of pollutants are:

- Wind direction: determines the broad direction of the transport of the emission;
- Wind speed: affects the ground levels emissions by determining the initial dilution of the pollutants emitted; and
- Atmospheric stability: a measure of the turbulence and hence dispersion of pollutants.

- 8.3.16 Windroses depict average wind speeds and directions for an assessed period of time. An annual windrose for Linton on Ouse, located 12.55km to the southeast of the Site, for 2004–2013 (see Appendix 8.1) shows the prevailing wind direction in the area of the Site to be from the west / southwest.

8.4 Assessment of Effects

Construction Phase

- 8.4.1 Construction works will include general earthworks, construction of slip roads from the MSA to / from the A1(M), construction of a new overbridge across the A1(M), realignment of the A168 and construction of the wider MSA facilities.
- 8.4.2 It is anticipated that construction-related HGV movements will be via the A1(M), accessing the Site via junctions J49 and J48 and the A168 and B6265; HGV movements via Marton le Moor, Kirby Hill and Boroughbridge will not be permitted and this will be set out in the Construction Management Plan.
- 8.4.3 Construction traffic is to initially access the Site via the southwest corner off the B6265. It is expected that the northbound slip roads will be constructed first and following completion construction traffic could access the Site from the motorway (subject to Highways England approval). It is anticipated that direct access from the motorway during this period will be restricted to outside peak hours. Construction

traffic for works on the eastern side of the motorway may access this area from the A168 / B6265 junction.

8.4.4 Construction is estimated to take around 9 to 12 months. Working hours are likely to be 07:00–19:00 hours on weekdays and 09:00–13:00 hours on Saturdays, with no construction work undertaken on Sundays or Bank Holidays. The only exceptions to this are likely to be associated with specific highways works that may need to be timed to occur overnight / weekends e.g. the proposed overbridge, works to the slip roads.

8.4.5 The main aspects of concern in association with air quality impacts during the construction phase of the Proposed Development are potential impacts of dust emissions arising during earthworks and construction activities and vehicle track-out, and vehicle exhaust emissions arising from construction traffic.

Construction Phase – Construction Dust Assessment

General Observations

8.4.6 Airborne dust occurs when fine particles are disturbed and loosened by physical activity such as breaking, excavating, loading and transport, or by an airstream passing over such materials. It is generally accepted that winds of more than 10 knots across loose fine materials can cause windblown dust emissions.

8.4.7 Light winds will transport fine particles already suspended in the atmosphere due to disturbance. In calm conditions, any raised dust tends to settle out in the vicinity of the source. In windier conditions the dust may be carried for a greater distance before settling out. The distance the dust will be carried depends on the wind speed, the particle size of the dust, the topography of the site and its surroundings.

8.4.8 Fugitive dust emissions arising from site activities may result in

- The soiling of surfaces;
- Visible dust plumes; and
- Locally elevated PM₁₀ concentrations.

Principal Sources of Dust

8.4.9 The principal potential sources of airborne dust arising from the Proposed Development are:

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- Earthworks / site preparation;
 - Loading and tipping;
 - Site haulage;
 - Road haulage;
 - Materials handling, including soils and building materials;
 - Windblow across stripped areas, disturbed surfaces and stockpiles of construction materials; and
 - Concrete batching.

8.4.10 Site preparation will involve stripping of surface soils and earthworks to create level development areas.

8.4.11 Loading and tipping of potentially dusty materials such as road base and other aggregates may create visible dust emissions, although such emissions will be short-lived.

8.4.12 Site haulage is typically the principal potential dust source on construction sites due to the physical disturbance of particles by vehicle movements over bare soil or loose surfaces. The potential impact is increased over longer distances when speeds tend to be greater and more effort is required to maintain a smooth damp running surface. The haul distances at the Site may range up to a maximum of about 500m. Over such distances, and in the absence of appropriate mitigation, large quantities of dust may be raised.

8.4.13 Dust may also be raised by road haulage due to spillage or windblow from unsheeted loads and due to the adherence of mud and sand to the wheels and underbodies of vehicles leaving the site. This may subsequently be deposited as track-out on roads in the vicinity of the Site, and on drying, be raised as dust by the passage of vehicles. In the event of road vehicles travelling across unsurfaced and muddy ground, track out may occur.

8.4.14 The handling of soils, construction materials, and aggregates can be a potentially significant dust source, particularly under dry conditions.

8.4.15 It is generally accepted that winds blowing at more than 10 knots across loose fine materials can lead to airborne dust emissions. The Linton-on-Ouse windrose indicates winds of 10 knots or greater blow for about one quarter of the time

annually, decreasing slightly in summer months. Windblown dust from areas of bare soil and materials stockpiles could therefore arise for prolonged periods.

8.4.16 Plant emissions are generally not a significant source of dust except where large numbers of plant are present close to boundaries and then only if not according with current emissions standards or emit black smoke.

8.4.17 In summary, the principal potential sources of dust are likely to be windblow across disturbed surfaces, track out, and materials handling.

Risk of Dust Effects Arising

8.4.18 The risk of fugitive dust emissions from the Site resulting in the loss of amenity and / or health or ecological effects is related to:

- The nature of the activities being undertaken;
- The duration of these activities;
- The size of the Site;
- The meteorological conditions (wind speed and direction, and rainfall);
- The proximity of receptors to the Site;
- The adequacy of mitigation measures applied to reduce or elimination dust emissions; and
- The sensitivity of receptors to dust.

8.4.19 The potential dust emission magnitudes for the Proposed Development are as set out in Table 8.9 below.

Table 8.9 Dust Emission Magnitude

Activity	Class	Comment
Demolition	n/a	No demolition works required
Earthworks	Large	Site area of >10,000m ² , potentially dusty soil type
Construction	Large	Build volume of >100,000m ³ , on site concrete batching
Trackout	Large	Unpaved haulage road lengths within the site potentially >100m

8.4.20 The sensitivity of the area to dust soiling, human health and ecological impacts is as follows.

Table 8.10 Sensitivity of Area

Activity	Sensitivity ¹	Comment
Dust Soiling Effects on People & Property		
Earthworks	Low	4 residential properties within 350m of Site
Construction	Low	4 residential properties within 350m of Site
Trackout	Low	0 residential properties within 20m of edge roads to be used for construction HGVs up to 500m from Site access on to B6265 or A1(M)
Human Health Impacts (note: Background PM₁₀ <24 µg/m³)²		
Earthworks	Low	4 residential properties within 350m of Site
Construction	Low	4 residential properties within 350m of Site
Trackout	Low	0 residential properties within 20m of edge roads to be used for construction HGVs up to 500m from Site access on to B6265 or A1(M)
Ecological Impacts		
Earthworks	n/a	No statutory or locally designated ecological sites within 350m of boundary.
Construction		
Trackout		No statutory or locally designated ecological sites within 50m of the edge of roads to be used for construction HGVs up to 500m of the site access points off B6265 or A1(M).

1: With reference to Table 2 to 4 of IAQM guidance¹

2: IAQM guidance provides different sensitivity banding depending on the area background PM₁₀ concentrations. Defra data provides a predicted background PM₁₀ concentration of 17.58 µg/m³ for the grid square in which the site is located for 2017. On this basis, and given the nature of the locality, set back distances of receptors from the A1(M) and absence of other significant sources of PM₁₀, reference to the background concentration band of <24 µg/m³ at receptors is considered appropriate.

8.4.21 In determining the overall sensitivity of the area other factors should be taken into account such as other local dust generating sources and the prevailing wind direction. The following points are also therefore noted with regards to the Site:

- No significant sources of dust have been identified in the locality which may impact the overall sensitivity of the area;
- The prevailing wind direction is from the south/west, away from the majority of receptors although towards the A1(M) from the western part of the development;
- No screening in the form of hedgerows or trees is currently provided between the western part of the development and the A1(M) or the residential properties to the west on the B6265; some limited screening is provided between the western part of the site and the B6265.

8.4.22 Taking these factors into account the overall sensitivity is defined as set out in Table 8.11 below.

Table 8.11 Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	n/a	Low	Low	Low
Human Health	n/a	Low	Low	Low
Ecological	n/a – no receptors identified			

Assessment of Fugitive Dust and PM₁₀ Impacts

8.4.23 Taking into account the dust emission magnitude and the sensitivity of the area, the risk of impacts, in the absence of mitigation, during the construction works are as set out in Table 8.12 below.

Table 8.12 Risk Categories – Dust Soiling and PM₁₀ Impacts

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	n/a	low	low	low
Human Health	n/a	low	low	low
Ecological	n/a – no receptors identified			

8.4.24 In summary, the assessment indicates that, in the absence of mitigation, there is a **low** risk of dust soiling and human health impacts arising from fugitive dust during the earthworks and construction phases of the overall development due to the distance of the receptors from the Site boundaries. The proximity of the A1(M) is however also noted, and although not defined as a sensitive receptor as such, suitable mitigation will be required to minimise fugitive dust emissions across the highway during the construction phase, and particularly during a prolonged dry period.

8.4.25 There is a **low** risk of dust soiling and human health impacts due to track-out along the roads to be used by HGVs during the construction period.

8.4.26 Taking into account the low risk of dust soiling and human health impacts, and the expected 12-month period of construction, the overall significance of effects associated with construction dust is **not significant**.

Construction Phase - Vehicle Emissions Assessment

- 8.4.27 The Site and nearby associated road network are distant from any AQMAs or areas of known or potential air quality concern. It is therefore appropriate to refer to the IAQM screening criteria of +500 AADT for LDV flows and +100 AADT for HDV flows as indicating the need for further assessment.
- 8.4.28 Construction is expected to take up to 12 months. It should be noted that the AQALs of relevance to the assessment are all based on a 12-month period, either as an annual mean concentration or a concentration not to be exceeded a certain number of times an annum. Hence in screening potential impacts of vehicle emissions reference is made to predicted average vehicle movements across a 12-month period as the annual average daily traffic (AADT).
- 8.4.29 Peak predicted vehicle movements during construction are estimated at 500 total HGV movements a day, resulting in an average of 42 HGV movements per hour over a 12-hour working day. This maximum number of vehicle movements is expected to be experienced for two months only for a 5.5-day period each week, equating to a daily average of 393 movements over this peak period. Daily HGV movements will be lower outside the peak period.
- 8.4.30 As noted above construction-related HGVs would not be permitted to route through the settlements of Kirby Hill, Marton-le-Moor or Boroughbridge but would access the two construction compounds at the Site via junctions J48 and J49 of the A1(M), A618 and B6265 until access is possible direct to / from the A1(M) via the new slip roads (subject to HE approval).
- 8.4.31 It is possible that the average working daily HGV movements across the 12-month construction period would be above the +100 AADT screening criteria provided by IAQM for indicating when an air quality assessment may be required. The highest daily movements would be experienced at the A168 / B6265 junction close to the Site access / egress points, with reduced movements on the stretches of A168 to the north and south of the site due to traffic distribution. Assuming direct access to / from the A1(M) is utilised once the slip roads are constructed then the average daily movements at the A168 / B6265 junction across the 12 months are likely to be less than 100. The annual average daily movements on any individual stretch of road away from the A168 / B6265 junction would be further reduced.

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- 8.4.32 One property, Providence Lodge, is located within 200m of the A168 / B6265 junction being 197m to the southeast. The property is 118m from the A168 at its closest point and 155m from the A1(M); background pollutant concentrations at this location would therefore be expected to be broadly consistent with the predicted Defra background concentrations for the locality which are substantially below the relevant AQALs. Given the short-term nature of the construction phase, proposal to utilise direct access to / from the A1(M) for construction HGV vehicles once the slip roads are constructed (subject to HE approval), the low expected background pollutant concentrations and distance from the road network, the potential for significant adverse impacts due to air quality are not predicted at this location.
- 8.4.33 As noted above construction-related movements on the wider road network away from this junction would be reduced. Taking into account the above comments regarding potential HGV numbers, distribution and routing and the temporary nature of the construction phase the overall effects of construction road traffic vehicle emissions are considered **not significant**.

Operational Phase – Vehicle Emissions

- 8.4.34 The main aspects of concern in association with air quality impacts during the operational phase of the Proposed Development are vehicle exhaust emissions arising from operational traffic movements of customers, staff, and servicing and fuel deliveries and idling refrigeration vehicles.
- 8.4.35 All customer related traffic movements to and from the Proposed Development are to be via the A1(M) and slip roads. The traffic movements on the northbound slip roads to and from the MSA are expected as 3,476 AADT, totalling daily northbound traffic movements of 6,952 AADT. Traffic movements on the southbound slip roads to and from the MSA are expected as 3,516 AADT, resulting in total southbound vehicle movements of 7,032 AADT. Total customer movements during the operational phase are therefore expected to be 13,894 AADT.
- 8.4.36 These vehicle movements are substantially higher than the IAQM indicative criteria for proceeding to an air quality assessment. However, the slip roads and the parking area of the MSA are more than 200m distant from any human health or ecological receptors; potential impacts are therefore **negligible** and further assessment is not considered necessary.

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- 8.4.37 Similarly, any parking areas to be utilised by idling refrigeration vehicles are more than 200m distant from any receptors and potential impacts are *negligible*.
- 8.4.38 The Proposed Development will not result in additional customer related vehicle movements on the A1(M) and therefore there are no associated potential impacts on any receptors in proximity to the A1(M) distant to the Site.
- 8.4.39 Staff related traffic movements to and from the MSA are predicted at 215 AADT (based on 215 staff in total; 2 staff per car). Up to 30% of these movements are predicted to use the rear access from the B6265 resulting in a maximum of 65 movements in this location; all others will be via the A1(M).
- 8.4.40 Operational traffic movements of servicing vehicles (HDVs) are predicted at a total of 80 movements a day. Up to 30% of these movements are predicted to use the rear access from the B6265 resulting in a maximum of 24 movements.
- 8.4.41 Both predicted operational LDV and HDV vehicle movements at the access off the B6165 are therefore substantially less than the IAQM screening criteria, and would be even if 100% of the flows accessed the MSA via the B6265 access. Movements would also be distributed to the east and west to an extent, further reducing movements passed any relevant receptors. Potential impacts are therefore *negligible*. Predicted additional operational LDV and HDV movements along the A1(M) are similarly below the IAQM indicative criteria with resulting *negligible* impacts.
- 8.4.42 The effects of vehicle emissions associated with additional traffic movements generated by the Proposed Development and vehicles within the MSA itself are therefore considered **not significant**.

8.5 Mitigation

Construction Phase – Construction Dust

- 8.5.1 In the absence of adequate mitigation, the estimated risk of adverse impacts due to dust soiling and PM₁₀ impacts at nearby residential properties is **low**. To further reduce the impact, construction activities would be readily controlled through the implementation of standard best practice in respect of dust control and site management, as detailed in the IAQM Guidance. Details will be incorporated within the Construction Environmental Management Plan (CEMP) to be produced prior to commencement of development.

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- 8.5.2 As an over-riding requirement, should winds carry visible dust towards the Site boundaries, and particularly towards the A1(M), the operations giving rise to the dust in that part of the Site would be modified or suspended until more suitable conditions pertain, or until effective dust control measures are implemented.
- 8.5.3 Haulage across the Site would be restricted to designated haul routes, which would as far as possible be located towards the centre of the Site. Wherever possible, haul routes would be prepared with compacted stone or other similar material. Once the internal access roads are constructed, haulage would wherever possible take place on these routes.
- 8.5.4 The surface of the internal haul routes would be inspected daily, and any potholes or other defects would be made good.
- 8.5.5 Further standard good practices in respect of haulage include:
- avoiding abrupt changes in horizontal and vertical alignment;
 - grading and maintenance of unsurfaced routes;
 - setting an appropriate site speed limit;
 - even loading of vehicles to avoid spillages;
 - regular removal of spilled material from site routes;
 - dust suppression by regular spraying in dry conditions;
 - inspection and cleaning of vehicles leaving site, through provision of a wheel washing system, equipped with a high pressure hose and an adequate water supply near the site entrance; and
 - cleaning of any track out or other deposits from the adjacent highways.
- 8.5.6 A suitable supply of water for dust suppression purposes would be maintained, under all climatic conditions, throughout the construction works. Dust suppression would be implemented through regular spraying of the haul routes, stockpiled material and any freshly exposed earthworks.
- 8.5.7 Other more general matters and the management of the Site can affect the likelihood of significant dust emissions. These include:
- minimisation of drop heights during tipping and loading;
 - loading and tipping in the lee of existing structures and stockpiles;
 - maintenance of equipment to ensure its efficient operation;
 - use of clean water for dust suppression, to avoid re-circulating fine material;

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- high standards of house-keeping to minimise track-out and wind blown dust; and,
 - effective staff training in respect of the causes and prevention of dust.

8.5.8 No additional mitigation measures to those standard measures utilised for construction are considered necessary.

8.5.9 The effectiveness of the mitigation measures outlined above would, to a large extent, rely on the actions and behaviour of contractors. The procedures and measures for the control of dust during the construction phase would be incorporated into a Dust Management Plan (DMP) to be used by contractors. The DMP, which would form part of the CEMP, would be developed and agreed with the Local Planning Authority, and other regulators / consultees as required, prior to the commencement of the construction activities.

Construction Phase – Vehicle Emissions

8.5.10 No additional mitigation measures to those incorporated through the proposed construction-related HGV movement restrictions are required.

Operational Phase – Vehicle Emissions

8.5.11 The vehicle emissions assessment demonstrates that the Proposed Development would have a **negligible** impact on air quality in the vicinity of the Site and the effects would not be significant. No further mitigation measures are required to reduce potential impacts associated with operational vehicle emissions.

8.5.12 The Proposed Development will however include the provision of electric vehicle charging points within the parking areas. This will serve to encourage the uptake in use of electric vehicles assisting in the future reduction of vehicle emissions.

8.6 Residual Effects and Conclusions

Residual Effects

Construction Phase

8.6.1 The foregoing standard good working practices and additional mitigation measures are generally accepted as providing effective control against the impact of airborne dust and fine particulates. The implementation of the recommended mitigation

measures are therefore predicated to result in the residual impacts shown in Table 8.13 below.

Table 8.13: Summary of Residual Impacts (with mitigation)

Source	Dust Soiling Effects	Ecological Effects	PM ₁₀ Effects
Demolition	Not Applicable		
Earthworks	Negligible	None	Negligible
Construction	Negligible	None	Negligible
Trackout	Negligible	None	Negligible
Overall Risk of Impacts	Negligible		
Overall Significance	Not Significant		

8.6.2 The overall risk of significant adverse impacts arising due to dust soiling and PM₁₀ effects during the construction phase, with mitigation, is **negligible**. The overall significance is considered to be **Not Significant**.

Operational Phase

8.6.3 The predicted impact at all receptors arising from vehicle emissions is **negligible**. The overall significance is considered to be **Not Significant**.

Summary and Conclusions

8.6.4 The air quality assessment has considered the potential impacts at receptors associated with fugitive dust and vehicle exhaust emissions during the construction and operational phases of the Proposed Development.

8.6.5 An assessment has been undertaken of the potential for fugitive dust that may arise during the earthworks and construction phases of the project, and from track-out from the access points, to impact nearby sensitive receptors through both soiling and human health effects. The assessment takes into account the size of the development and the sensitivity of the surrounding area. Through the incorporation of standard dust mitigation measures during the construction works no unacceptable impacts on human health, amenity or ecological receptors have been identified.

8.6.6 The air quality assessment has also incorporated an assessment of the potential impacts from additional vehicle exhaust emissions associated with the Proposed Development. No unacceptable impacts on human health, amenity or ecological

receptors have been identified through the additional traffic associated with the Proposed Development.

- 8.6.7 Overall the effects are not predicted to be significant with respect to air quality and no significant residual effects have been identified.