Air Quality Assessment

Pennine View, Batley

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Executive Summary

Redmore Environmental Ltd was commissioned by Heatons to undertake an Air Quality Assessment in support of a planning application for the change of use of a paper/card recycling facility at Pennine View, Batley, to incorporate a waste transfer station.

The proposals have the potential to cause air quality impacts as a result of fugitive dust, fugitive odour and road traffic exhaust emissions during operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and consider potential effects as a result of the scheme.

Potential air quality impacts may occur due to fugitive dust emissions during operation. A risk assessment was therefore undertaken which included consideration of a number of factors including the scale and nature of emissions from the site, the location and sensitivity of nearby receptors and prevailing meteorological conditions. Following consideration of the relevant factors, overall effects as a result of fugitive dust emissions were not predicted to be significant.

Potential air quality impacts may occur due to fugitive odour emissions during operation. A risk assessment was therefore undertaken which included consideration of a number of factors, including the scale and nature of the potential emissions, location of relevant receptors, the prevailing meteorological conditions and the proposed control measures. Following consideration of the relevant factors, overall effects as a result of fugitive dust emissions were not predicted to be significant.

Potential air quality impacts may occur due to traffic exhaust emissions associated with vehicles travelling to and from the site during operation. These were assessed against the relevant screening criteria. Due to the low number of anticipated vehicle trips associated with the proposals, road traffic exhaust emission impacts were not predicted to be significant.

Based on the assessment results, air quality factors are not considered a constraint to planning consent for the proposals.

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Appendix 1 - Curriculum Vitae

1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Heatons to undertake an Air Quality Assessment in support of a planning application for the change of use of a paper/card recycling facility at Pennine View, Batley, to incorporate a waste transfer station.

1.1.2 The proposals have the potential to cause air quality impacts. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and consider potential effects as a result of the scheme.

1.2 Site Location and Context

1.2.1 The site is located on land off Pennine View, Batley, at approximate National Grid Reference (NGR): 423210, 427160. Reference should be made to Figure 1 for a site location plan.

1.2.2 The proposals comprise the change of use of a paper/card recycling (B2) facility to incorporate a waste transfer station (sui generis). This will be located within the main building and include a mobile shredder for the production of Refuse Derived Fuel (RDF). New fast closing doors will be installed as part of the development, as well as fabric canopies for the paper/ card recycling facility which will continue in the smaller unit on site.

1.2.3 The site will operate 06:00 to 17:00 Monday to Friday and 06:00 to 14:00 on Saturday. There will be no working on Sundays. It is anticipated that approximately 3,500-tonnes of Commercial and Industrial (C&I) waste and 1,000-tonnes of cardboard will be processed per month. This is equivalent to 54,000- tonnes per annum (tpa). All activities will be undertaken within fully enclosed buildings, with partial storage of baled cardboard in external areas.

1.2.4 Material will be transferred to site in Refuse Collection Vehicles (RCVs) and Front End Loaders (FELs). These will drive directly into the main building through a fast closing door, deposit the load, and then exit through another fast closing door. RDF will be exported

from site in articulated Heavy Goods Vehicles (HGVs). It is anticipated that there will be approximately 100 material deliveries and 45 RDF collections per week.

1.3 Assessment Scope

1.3.1 The proposals have the potential to cause air quality impacts at sensitive locations. These include:

- Fugitive dust emissions during operation;
- Fugitive odour emissions during operation; and,
- Road traffic exhaust emissions from vehicles travelling to and from the site during operation.

1.3.2 An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider potential effects as a result of the proposals. This is detailed in the following report.

2.0 LEGISLATION AND POLICY

2.1 Legislation

2.1.1 The Air Quality Standards Regulations (2010) and subsequent amendments include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO_2);
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- Particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$);
- Benzene; and,
- Carbon monoxide.

2.1.2 Air Quality Target Values were also provided for several additional pollutants. It should be noted that the AQLV for $PM_{2.5}$ stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020).

2.1.3 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published on 28th April 2023[1]. The document contains standards, objectives and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 The Environmental Improvement Plan 2023[2] was published in January 2023, providing long term and Interim Targets in order to reduce population exposure to $PM_{2.5}$. The concentration target for 2040 was subsequently adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

[1] AQS: Framework for Local Authority Delivery, DEFRA, 2023.

[2] Environmental Improvement Plan 2023, DEFRA, 2023.

2.1.5 Table 1 presents the AQOs and Interim Target for pollutants considered within this assessment.

Table 1 Air Quality Objectives/Interim Target

Pollutant	Air Quality Objective/Interim Target	
	Concentration (µg/m³)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM_{10}	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
$PM_{2.5}$	12(a)	Annual mean

Note: (a) Interim Target to be achieved by end of January 2028.

2.1.6 Table 2 summarises the advice provided in DEFRA guidance[3] on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term

[3] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.2 Local Air Quality Management

2.2.1 Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 Industrial Emissions Control Legislation

2.3.1 Atmospheric emissions, including dust and odour, from industrial facilities are controlled in England through the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments. The operation of a waste transfer station is included within the Regulations and therefore the facility will be required to operate in accordance with an Environmental Permit issued by the Environment Agency (EA). This will include conditions for operation. Compliance with these must be demonstrated through periodic monitoring requirements which will be set in order to limit potential impacts in the surrounding area.

2.3.2 Enforcement of the Environmental Permit conditions is by the EA. If they are satisfied that emissions from a facility are causing pollution beyond the site boundary, then they can serve an improvement notice that requires remedial works to be undertaken to reduce

impacts to an acceptable level. The measures that are deemed appropriate will depend on the industry sector and site-specific circumstances and will take costs and benefits into account. Should appropriate actions not be taken by the operator then the regulator has a number of available options, cumulating in the revocation of the Environmental Permit and cessation of all activities on site.

2.4 National Planning Policy

2.4.1 The revised National Planning Policy Framework[4] (NPPF) was published in December 2023 and sets out the Government's planning policies for England and how these are expected to be applied.

2.4.2 The purpose of the planning system is to contribute to the achievements of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives including the following of relevance to air quality:

> "c) an environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

2.4.3 Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It 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, or 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

[4] NPPF, Ministry of Housing, Communities and Local Government, 2023.

possible, help to improve local environmental conditions such as air and water quality […]"

2.4.4 The NPPF specifically recognises air quality as part of delivering sustainable development and 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."

2.4.5 The implications of the NPPF have been considered throughout this assessment.

2.5 National Planning Practice Guidance

2.5.1 The National Planning Practice Guidance[5] (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 and updated on 1st November 2019 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. What air quality considerations does planning need to address?
2. What is the role of plan-making with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality be relevant to the planning development management process?
6. What specific issues may need to be considered when assessing air quality impacts?

[5] https://www.gov.uk/guidance/air-quality-3.

7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

2.5.2 These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

2.6 Local Planning Policy

2.6.1 The Kirklees Local Plan (KLP)[6] was adopted by Kirklees Council (KC) on 27th February 2019. The KLP sets out the spatial vision and strategy for the development of Kirklees for the period up to 2031 and is used to guide decisions on planning, development and regeneration.

2.6.2 A review of the document indicated the following policies in relation to air quality which are relevant to this assessment:

> "Policy LP47 - Healthy, active and safe lifestyles
>
> The council will, with its partners, create an environment which supports healthy, active and safe communities and reduces inequality.
>
> Healthy, active and safe lifestyles will be enabled by:
>
> […]
>
> g. ensuring that the current air quality in the district is monitored and maintained and, where required, appropriate mitigation measures included as part of new development proposals; […]"
>
> "Policy LP51 - Protection and improvement of local air quality
>
> 1. Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air pollution which would unacceptably affect or cause a nuisance to the national or build environment or to people.

[6] Kirklees Local Plan, KC, 2019.

2. Proposals that have the potential to increase local air pollution either individually or cumulatively must be accompanied by evidence to show that the impact of the development has been assessed in accordance with the relevant guidance. Development which has the potential to cause levels of local air pollution to increase to unsafe levels must incorporate sustainable mitigation measures that reduce this impact to a safe level. If sustainable measures cannot be introduced the development will not be permitted.

3. Where the development introduces new receptors into Air Quality Management Areas or Areas of Concern or near other areas of relatively poor air quality, for example near roads or junctions, the development must incorporate sustainable mitigation measures that protect the new receptors from unacceptable levels of air pollution. Where sustainable mitigation measures cannot be introduced which prevent receptors from being exposed to unsafe levels of air pollution, development will not be permitted."

2.6.3 The above policies were taken into consideration throughout the undertaking of the assessment.

3.0 METHODOLOGY

3.1 Introduction

3.1.1 The proposed development has the potential to cause air quality impacts during operation. These have been assessed in accordance with the following methodology.

3.2 Fugitive Dust Emissions

3.2.1 The development has the potential to cause dust emissions during normal operation. These have therefore been assessed utilising an approach based on the Institute of Air Quality Management (IAQM) 'Guidance on the Assessment of Mineral Dust Impacts for Planning V1.1'[7]. It is noted that the guidance is designed for the assessment of fugitive dust emissions from mineral extraction, rather than waste management activities. However, given the similarities in emission dispersion and subsequent impacts, the application of the risk assessment methodology is considered suitable for the purpose of this report in lieu of sector specific guidance.

3.2.2 The first step in the assessment was to estimate the dust generating potential of the site activities. This is termed the Source Emissions Potential, which takes into account the scale (magnitude) of the release from the emission source, as well as the effectiveness of any control or mitigation measures that are already in place. This involves judging the relative size of the release rate after mitigation and taking account of any pattern of release (e.g. intermittency).

3.2.3 Using the example risk ranking in Table 3, the Source Emission Potential was categorised as **small**, **medium** or **large**.

Table 3 Dust Emissions - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Materials Handling	• More than 10 loading vehicles • Transferring material of a high dust potential and/or low moisture content on dry, poorly surfaced ground

[7] Guidance on the Assessment of Mineral Dust Impacts for Planning V1.1, IAQM, 2016.

Magnitude	Activity	Criteria
	Material Processing	• Processing more than 1,000,000tpa of material
	Stockpiles/ Exposed Surfaces	• Stockpile duration of greater than 12 months • Total exposed area more than 10ha in an area exposed to high wind speeds • Processing more than 1,000,000tpa of material
	Off-Site Transportation	• More than 200 HDV movements in any one day on unsurfaced site access road less than 20m in length
Medium	Materials Handling	• 5 to 10 loading vehicles • Transferring material of a medium dust potential and/or low moisture content on unsurfaced ground
	Material Processing	• Processing between 200,000tpa and 1,000,000tpa of material
	Stockpiles/ Exposed Surfaces	• Stockpile duration between 1 and 12-months • Stockpiles with a total exposed area between 2.5ha and 10ha • Processing between 200,000tpa and 1,000,000tpa of material
	Off-Site Transportation	• Total HDV movements between 25 and 200 movements in any one day
Small	Materials Handling	• Less than 5 loading vehicles • Transferring material of low dust potential and/or high moisture content on surfaced ground
	Material Processing	• Fixed plant with effective design in dust control • Processing less than 200,000tpa of material
	Stockpiles/ Exposed Surfaces	• Stockpile duration less than 1-month • Stockpiles with a total exposed area of less than 2.5ha • Processing less than 200,000tpa of material
	Off-Site Transportation	• Less than 25 HDV movements per day • Paved surfaced site access road more than 50m in length • Effective HDV cleaning facilities and procedures

3.2.4 The next step was to estimate the effectiveness of the pollutant pathway as the transport mechanism for the emission through the air to the receptor, versus the dilution/dispersion in the atmosphere. The primary factor influencing the pathway is the distance between

the sensitive receptor and the dust sources. However, other factors can cause a higher or lower category to be assigned. These factors include:

- Orientation of receptors relative to the prevailing wind direction; and,
- Topography, terrain and physical features.

3.2.5 Table 4 provides the criteria for determining the frequency of potentially dusty winds, based on twelve 30° wind direction sectors.

Table 4 Dust Emissions - Categorisation of Frequency of Potentially Dusty Winds

Frequency Category	Criteria
Infrequent	Frequency of winds (>5m/s) from the direction of the dust source on dry days is less than 5%
Moderately frequent	Frequency of winds (>5m/s) from the direction of the dust source on dry days is between 5% and 12%
Frequent	Frequency of winds (>5m/s) from the direction of the dust source on dry days is between 12% and 20%
Very frequent	Frequency of winds (>5m/s) from the direction of the dust source on dry days is greater than 20%

3.2.6 It should be noted that the assessment was undertaken based on all meteorological data, rather than just potentially dusty winds as a worst-case.

3.2.7 The criteria used to categorise the distance from each receptor to the source is provided in Table 5.

Table 5 Dust Emissions - Categorisation of Receptor Distance from Source

Frequency Category	Criteria
Distant	Receptor is between 200m and 400m from the dust source
Intermediate	Receptor is between 100m and 200m from the dust source
Close	Receptor is less than 100m from the dust source

3.2.8 The Pathway Effectiveness was classified using the wind frequency categories from Table 4 and the receptor distance from source from Table 5, as shown in Table 6.

Table 6 Dust Emissions - Pathway Effectiveness

Category	Frequency of Potentially Dusty Winds			
	Infrequent	Moderately frequent	Frequent	Very frequent
Close	Ineffective	Moderately effective	Highly effective	Highly effective
Intermediate	Ineffective	Moderately effective	Moderately effective	Highly effective
Distant	Ineffective	Ineffective	Moderately effective	Moderately effective

3.2.9 The Source Emission Potential and Pathway Effectiveness were combined to predict the impact risk, as shown in Table 7.

Table 7 Dust Emissions - Estimation of Dust Impact Risk

Pathway Effectiveness	Source Emission Potential		
	Small	Medium	Large
Highly effective	Low	Medium	High
Moderately effective	Negligible	Low	Medium
Ineffective	Negligible	Negligible	Low

3.2.10 The magnitude of effect was predicted based on the interaction between dust impact risk and sensitivity of the receptor. The sensitivity of the receiving receptor was defined based on the criteria shown in Table 8.

Table 8 Dust Emissions - Receptor Sensitivity

Sensitivity	Description
High	Surrounding land where: • Users can reasonably expect enjoyment of a high level of amenity; and, • People would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land Examples may include residential dwellings, hospitals, schools/education and tourist/cultural

Sensitivity	Description
Medium	Surrounding land where: • Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or, • People would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land Examples may include places of work, commercial/retail premises and playing/recreation fields
Low	Surrounding land where: • The enjoyment of amenity would not reasonably be expected; or, • There is transient exposure, where the people would reasonably be expected to present only for limited periods of time as part of the normal pattern of use of the land Examples may include industrial use, farms, footpaths and roads

3.2.11 The predicted effect magnitude was determined from the dust impact risk in Table 7 and the receptor sensitivity in Table 8, as shown in Table 9.

Table 9 Dust Emissions - Significance of Effect

Risk of Exposure	Receptor Sensitivity		
	Low	Medium	High
High	Slight	Moderate	Substantial
Medium	Negligible	Slight	Moderate
Low	Negligible	Negligible	Slight
Negligible	Negligible	Negligible	Negligible

3.2.12 The IAQM guidance[8] states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the effect is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**. This has been considered to determine the overall significance of potential effects associated with the proposed development.

8 Guidance on the Assessment of Mineral Dust Impacts for Planning V1.1, IAQM, 2016.

3.3 Fugitive Odour Emissions

3.3.1 The proposals have the potential to cause odour emissions during normal operation. These have therefore been assessed in accordance with IAQM 'Guidance on the Assessment of Odour for Planning'[9]. This states that a qualitative risk-based approach is appropriate for:

- Screening of odour impacts;
- Development proposals likely to have a low risk of adverse effects;
- Situations where there is insufficient information to carry out detailed predictive dispersion modelling;
- Situations where the information has wide uncertainties and its use as input to a detailed predictive dispersion model would be at best a waste of time, money and effort or, worse, would lead to an illusory and false impression of accuracy and precision in the numbers generated; and,
- When the model is not able to properly represent the reality of the situation being assessed, e.g. if the odour effects are likely to be significantly influenced by accidental, unexpected, or unknown releases. In such instances a qualitative estimate may be more appropriate, on the basis that it is better to be broadly correct than precisely wrong.

3.3.2 It is considered that the second, third, fourth and fifth criteria are met for this project. As such, a qualitative assessment methodology was deemed appropriate.

3.3.3 The first step in the assessment was to estimate the odour generating potential of the site activities. This is termed the Source Odour Potential, which takes into account three factors:

- The scale (magnitude) of the release from the odour source, taking into account the effectiveness of any odour control or mitigation measures that are already in place. This involves judging the relative size of the release rate after mitigation and taking account of any pattern of release (e.g. intermittency);
- How inherently odorous the emission is. In some cases it may be known whether the release has a low, medium or high Odour Detection Threshold (ODT). This is the

[9] Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

concentration at which an odour becomes detectable to the human nose. In most instances the odours released by a source will be a complex mixture of compounds and the detectability will not be known. However, for some industrial processes the odour will be due to one or a small number of known compounds and the detection thresholds will be a good indication of whether the release is highly odorous or mildly odorous; and,

- The relative pleasantness/unpleasantness of the odour.

3.3.4 Using the example risk ranking in Table 10, the Source Odour Potential was categorised as **small**, **medium** or **large**.

Table 10 Odour Emissions - Source Odour Potential

Source Odour Potential	Comments
Large	**Magnitude** - Larger Environmentally Permitted processes of odorous nature or large Sewage Treatment Works (STWs); materials usage hundreds of thousands of tonnes/m^3 per year; area sources of thousands of m^2. The compounds involved are very odorous (e.g. mercaptans), having very low ODTs where known **Unpleasantness** - processes classed as "Most offensive" in EA Guidance H4[10]; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score **Mitigation/control** - open air operation with no containment, reliance solely on good management techniques and best practice
Medium	**Magnitude** - smaller Environmentally Permitted processes or small STWs; materials usage thousands of tonnes/m^3 per year; area sources of hundreds of m^2. The compounds involved are moderately odorous **Unpleasantness** - processes classed in EA Guidance H4 as "Moderately offensive"; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score **Mitigation/control** - some mitigation measures in place, but significant residual odour remains
Small	**Magnitude** - falls below Environmental Permit Part B threshold; materials usage hundreds of tonnes/m^3 per year; area sources of tens m^2. The compounds involved are only mildly odorous, having relatively high ODTs where known **Unpleasantness** - processes classed as "Less offensive" in EA Guidance H4; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score **Mitigation/control** - effective, tangible mitigation measures in place leading to little or no residual odour

10 H4: Odour Management, EA, 2011.

3.3.5 The next step was to estimate the effectiveness of the pollutant pathway as the transport mechanism for odour through the air to the receptor, versus the dilution/dispersion in the atmosphere. Any factor that increases dilution and dispersion of the plume as it travels from source to receptor will reduce the concentration at the end point, and hence reduce exposure. Important factors for consideration are:

- The distance between sensitive receptors and the odour source;
- Whether receptors are downwind with respect to the prevailing wind direction. Odour episodes often tend to occur during stable atmospheric conditions with low wind speed, which gives poor dispersion and dilution. Receptors close to the source in all directions can be affected under these conditions. When circumstances are not calm, it will be the downwind receptors that are affected. As such, receptors that are downwind with respect to the prevailing wind direction tend to be at higher risk of odour impact;
- The effectiveness of the point of release in promoting good dispersion e.g. releasing emissions from a high stack will increase the pathway, dilution and dispersion; and,
- The topography and terrain between the source and receptor. The presence of topographical features such as hills and valleys, or urban terrain features such as buildings, can affect air flow and therefore increase, or inhibit, dispersion and dilution.

3.3.6 Using the example risk ranking in Table 11, the pollutant pathway from source to receptor was categorised as **ineffective**, **moderately effective**, or **highly effective**.

Table 11 Odour Emissions - Pathway Effectiveness

Pathway Effectiveness	Comments
Highly effective	**Distance** - receptor is adjacent to the source/site; distance well below any official set-back distances **Direction** - high frequency of winds from source to receptor, or, qualitatively, receptors downwind of source with respect to prevailing wind **Effectiveness of dispersion/dilution** - open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes
Moderately effective	**Distance** - receptor is local to the source **Where mitigation relies on dispersion/dilution** - releases are elevated, but compromised by building effects

Pathway Effectiveness	Comments
Ineffective	**Distance** - receptor is remote from the source; distance exceeds any official set-back distances **Direction** - low frequency of winds from source to receptor, or, qualitatively, receptors upwind of source with respect to prevailing wind **Where mitigation relies on dispersion/dilution** - releases are from high level (e.g. stacks, or roof vents greater than 3m above ridge height) and are not compromised by surrounding buildings

3.3.7 The sensitivity of the receiving receptor was defined based on the criteria shown in Table 8 for dust emissions.

3.3.8 The estimates of Source Odour Potential and Pathway Effectiveness were considered together to predict the risk of odour exposure (impact) at the receptor location, as shown by the matrix in Table 12.

Table 12 Odour Emissions - Risk of Odour Exposure

Pathway Effectiveness	Source Odour Potential		
	Small	Medium	Large
Highly effective	Low	Medium	High
Moderately effective	Negligible	Low	Medium
Ineffective	Negligible	Negligible	Low

3.3.9 The final step was to determine the significance of odour effect at the specified receptor location through the interaction between sensitivity and risk, as outlined in Table 13.

Table 13 Odour Emissions - Significance of Odour Effect

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High	Slight	Moderate	Substantial
Medium	Negligible	Slight	Moderate
Low	Negligible	Negligible	Slight
Negligible	Negligible	Negligible	Negligible

3.3.10 Following completion of the Risk Assessment, the IAQM guidance[11] states that a conclusion on the likely significance of the predicted impact should be reached. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the effect is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**. This has been considered to determine the overall significance of potential odour effects in the vicinity of the site.

3.3.11 The IAQM guidance recognises that assessment of odour requires some degree of professional judgement[12]. Qualitative methodologies such as those utilised within this report provide guidance for assessing potential impacts. However, professional judgement should be exercised in order to take account of the specific details which are unique to each development. This has been considered as necessary throughout the assessment.

3.4 Road Vehicle Exhaust Emissions

3.4.1 The development has the potential to increase concentrations of NO_2, PM_{10} and $PM_{2.5}$ as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase. A screening assessment was therefore undertaken using the criteria contained within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'[13] guidance to determine the potential for trips generated by the development to affect local air quality.

3.4.2 The following criteria are provided to help establish when an assessment of potential road traffic impacts on the local area is likely to be considered necessary:

- A change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA or more than 500 AADT elsewhere;
- A change of HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;

[11] Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

[12] Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

[13] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

- Realignment of roads where the change is 5m or more and the road is within an AQMA; or,
- Introduction of a new junction or removal of an existing junction near to relevant receptors.

3.4.3 Should these criteria not be met, then the IAQM guidance[14] considers air quality impacts associated with a scheme to be **not significant** and no further assessment is required.

[14] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

4.0 BASELINE

4.1 Introduction

4.1.1 Existing air quality conditions in the vicinity of the proposed development site were identified in order to provide a baseline for assessment. These are detailed in the following Sections.

4.2 Local Air Quality Management

4.2.1 As required by the Environment Act (1995), as amended by the Environment Act (2021), KC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that pollutant concentrations are above the AQOs within the district. As such, ten AQMAs have been declared. The closest of these to the site was designated due to exceedences of the annual mean AQO for NO_2 and is described as follows:

> "Kirklees AQMA 4 - The designated area incorporates Bradford Road (A651), Whitehall Road East (A58), Carlton Court, Grove Terrace, Swincliffe Crescent, Milford Grove, Tetley Drive and Manor Park Gardens, which is in close proximity to the M62 and A651- A58 Roundabout at Birkenshaw."

4.2.2 The site is located approximately 2.6km south-east of the AQMA. It is considered unlikely the proposals would affect air quality over a distance of this magnitude. As such, the designation was not considered further in the context of the assessment.

4.2.3 KC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMAs have been designated.

4.3 Air Quality Monitoring

4.3.1 Monitoring of pollutant levels is undertaken by KC throughout their area of jurisdiction. Recent NO_2 concentrations recorded in the vicinity of the site are shown in Table 14.

Table 14 Monitoring Results - NO_2

Monitoring Site		Monitored NO_2 Concentration (µg/m³)		
		2020	2021	2022
K18	Huddersfield Road Birstall - lampost 246	32.2	35.8	34.4
K79	Gelderd Road, Birstall, lamppost 001	30.2	33.2	31.5
K81	Gelderd Road, Hawthorne House, lamppost 276	28.4	29.5	28.2

4.3.2 As shown in Table 14, annual mean NO_2 concentrations were below the AQO of 40µg/m³ at all monitors in recent years.

4.3.3 Reference should be made to Figure 2 for a map of the survey positions.

4.3.4 KC do not undertake monitoring of PM_{10} or $PM_{2.5}$ concentrations within the vicinity of the site.

4.4 Background Pollutant Concentrations

4.4.1 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The site is located in grid square NGR: 423500, 427500. Data for this location was downloaded from the DEFRA website[15] for the purpose of the assessment and is summarised in Table 15.

Table 15 Background Pollutant Concentration Predictions

Pollutant	Predicted 2024 Background Pollutant Concentration (µg/m³)
NO_2	19.07
PM_{10}	13.71
$PM_{2.5}$	8.81

4.4.2 As shown in Table 15, predicted background NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the relevant AQOs and Interim Target at the site.

15 http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018.

4.5 Sensitive Receptors

4.5.1 A desk-top study was undertaken in order to identify any sensitive receptor locations in the vicinity of the site that required specific consideration during the assessment. These are summarised in Table 16.

Table 16 Sensitive Receptor Locations

Source		NGR (m)		Distance from Potential Emission Source (m)	Direction from Site
		X	Y		
R1	Commercial - The Pheasant Public House	423215.2	427226.0	25	North
R2	Residential - Nab Lane	423057.3	426981.6	205	South-west
R3	Commercial - Everlast Gym	423469.5	427348.1	250	North-east
R4	Commercial - Junction 27 Retail Park	423437.0	427451.6	305	North-east
R5	Commercial - Easy Bathrooms and Tiles	423006.2	427203.2	160	North-west
R6	Residential - Lowood Lane	422851.4	427152.9	305	West
R7	Residential - Gelderd Road	423023.1	427082.2	170	South-west

4.5.2 As shown in Table 16, there are few sensitive receptors within the vicinity of the site. Reference should be made to Figure 3 for a map of the identified positions.

4.6 Meteorological Conditions

4.6.1 The potential for dust and odour emissions to impact at sensitive locations depends significantly on the meteorology, particularly wind direction, during release. In order to consider prevailing conditions at the site review of historical weather data was undertaken. Leeds-Bradford Airport meteorological station is located at NGR: 422676, 441150, which is approximately 13.9km north of the proposals. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

4.6.2 Meteorological data was obtained from Leeds-Bradford Airport meteorological station over the period 1st January 2019 to 31st December 2023 (inclusive). This is summarised in Table 17.

Table 17 Wind Frequency Data

Wind Direction (°)	Frequency of Wind (%)
345 - 15	4.5
15 - 45	5.7
45 - 75	6.4
75 - 105	4.5
105 - 135	5.6
135 - 165	7.1
165 - 195	5.8
195 - 225	11.3
225 - 255	16.5
255 - 285	20.5
285 - 315	7.4
315 - 345	2.6
Sub-Total	98.1
Calms	0.6
Missing/Incomplete	1.3

4.6.3 As shown in Table 17, the prevailing wind direction at the site is from the west. Winds from the north and east are relatively infrequent, which is indicative of conditions throughout the majority of the UK.

4.6.4 Reference should be made to Figure 4 for a wind rose of the meteorological data.

5.0 ASSESSMENT

5.1 Introduction

5.1.1 The proposed development has the potential to cause air quality impacts during operation. These are assessed in the following Sections.

5.2 Fugitive Dust Emissions

5.2.1 There is the potential for fugitive dust emissions from the proposals to cause adverse impacts at sensitive locations in the vicinity of the site. The risk was therefore assessed in accordance with methodology outlined in Section 3.2.

5.2.2 The first step was to classify the Source Emission Potential. This is summarised in Table 18. It should be noted that the classification includes consideration of the effectiveness of control or mitigation measures implemented at the site. The facility will operate in accordance with the requirements of an Environmental Permit issued by the EA. This will include requirements for dust minimisation and provides regulatory control of potential impacts throughout the operational life of the plant. As such, this was considered as relevant throughout the assessment.

Table 18 Dust Emissions - Magnitude of Emissions

Activity	Residual Source Emission	Justification
Materials Handling	Small	All materials processing to be undertaken in enclosed buildings Site is hard surfaced throughout
Material Processing	Small	Processing less than 200,000tpa of material All materials processing to be undertaken in enclosed buildings
Stockpiles/ Exposed Surfaces	Small	Cardboard storage with a total exposed area of less than 2.5ha Processing less than 200,000tpa of material
Off-Site Transportation	Medium	Between 25 and 200 HDV movements in any one day

5.2.3 As shown in Table 18, the magnitude of residual source emissions ranged between **small** and **medium**. As such, a classification of **medium** was applied to all sources to ensure a worst-case assessment.

5.2.4 The Pathway Effectiveness was subsequently defined based on the distance between the identified receptors and the potential emission sources, as well as the prevailing meteorological conditions. This is summarised in Table 19.

Table 19 Dust Emissions - Pathway Effectiveness

Receptor		Frequency of Winds		Distance from Potential Emission Source		Pathway Effectiveness
		Frequency of Winds (%)	Category	Distance (m)	Category	
R1	Commercial - The Pheasant Public House	24.3	Very frequent	25	Close	Highly effective
R2	Residential - Nab Lane	12.2	Frequent	205	Distant	Moderately effective
R3	Commercial - Everlast Gym	16.5	Frequent	250	Distant	Moderately effective
R4	Commercial - Junction 27 Retail Park	11.3	Moderately frequent	305	Distant	Ineffective
R5	Commercial - Easy Bathrooms and Tiles	5.6	Moderately frequent	160	Intermediate	Moderately effective
R6	Residential - Lowood Lane	4.5	Infrequent	305	Distant	Ineffective
R7	Residential - Gelderd Road	6.4	Moderately frequent	170	Intermediate	Moderately effective

5.2.5 The Source Emission Potential, Pathway Effectiveness and receptor sensitivity were combined to assess potential impacts associated with the proposed development. This is summarised in Table 20.

Table 20 Dust Emissions - Risk Assessment

Receptor		Source Emission Potential	Pathway Effectiveness	Dust Impact Risk	Sensitivity	Effect Significance
R1	Commercial - The Pheasant Public House	Medium	Highly effective	Medium	Medium	Slight
R2	Residential - Nab Lane	Medium	Moderately effective	Low	High	Slight
R3	Commercial - Everlast Gym	Medium	Moderately effective	Low	Medium	Negligible
R4	Commercial - Junction 27 Retail Park	Medium	Ineffective	Negligible	Medium	Negligible
R5	Commercial - Easy Bathrooms and Tiles	Medium	Moderately effective	Low	Medium	Negligible
R6	Residential - Lowood Lane	Medium	Ineffective	Negligible	High	Negligible
R7	Residential - Gelderd Road	Medium	Moderately effective	Low	High	Slight

5.2.6 As shown in Table 20, the effect significance was predicted to be **negligible** at four receptors and **slight** at three locations.

5.2.7 The IAQM guidance[16] states that only if the impact is **moderate** or **substantial**, the effect is considered **significant**. As such, potential impacts as a result of dust emissions from the development are considered **not significant**, in accordance with the stated methodology.

5.3 Fugitive Odour Emissions

5.3.1 There is the potential for odour emissions from the proposals to cause adverse impacts at sensitive locations in the vicinity of the site. The risk was therefore assessed in accordance with the methodology outlined in Section 3.3.

16 Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

5.3.2 The first step was to classify the Source Odour Potential. This was determined as **medium** for the following reasons:

- The facility will operate under an Environmental Permit and processes 54,000tpa of material;
- Odours associated with the processes at the facility would be classed as 'moderately offensive' in EA Guidance H4; and,
- Activities will take place within enclosed buildings on site. This will control fugitive emissions during normal operation.

5.3.3 The Pathway Effectiveness was subsequently defined between the proposals and identified sensitive receptor locations based on the distance between the locations and the prevailing meteorological conditions. This is summarised in Table 21.

Table 21 Odour Emissions - Pathway Effectiveness

Receptor		Pathway Effectiveness	Justification
R1	Commercial - The Pheasant Public House	Highly effective	Receptor is local to the source High frequency of winds from source to receptor
R2	Residential - Nab Lane	Moderately effective	Receptor is remote from the source Medium frequency of winds from source to receptor
R3	Commercial - Everlast Gym	Moderately effective	Receptor is remote from the source Medium frequency of winds from source to receptor
R4	Commercial - Junction 27 Retail Park	Ineffective	Receptor is remote from the source Low frequency of winds from source to receptor
R5	Commercial - Easy Bathrooms and Tiles	Ineffective	Receptor is remote from the source Low frequency of winds from source to receptor
R6	Residential - Lowood Lane	Ineffective	Receptor is remote from the source Low frequency of winds from source to receptor
R7	Residential - Gelderd Road	Ineffective	Receptor is remote from the source Low frequency of winds from source to receptor

5.3.4 The above information has been used to assess odour risk from the site. This is summarised in Table 22.

Table 22 Odour Emissions - Risk Assessment

Receptor		Source Odour Potential	Pathway Effectiveness	Exposure Risk	Sensitivity of Receptor	Effect Significance
R1	Commercial - The Pheasant Public House	Medium	Highly effective	Medium	Medium	Slight
R2	Residential - Nab Lane	Medium	Moderately effective	Low	High	Slight
R3	Commercial - Everlast Gym	Medium	Moderately effective	Low	Medium	Negligible
R4	Commercial - Junction 27 Retail Park	Medium	Ineffective	Negligible	Medium	Negligible
R5	Commercial - Easy Bathrooms and Tiles	Medium	Ineffective	Negligible	Medium	Negligible
R6	Residential - Lowood Lane	Medium	Ineffective	Negligible	High	Negligible
R7	Residential - Gelderd Road	Medium	Ineffective	Negligible	High	Negligible

5.3.5 As shown in Table 22, the predicted odour effect significance was **negligible** at five receptors and **slight** at two locations.

5.3.6 The IAQM guidance[17] states that only if the impact is **moderate** or **substantial**, the effect is considered **significant**. As such, potential impacts as a result of odour emissions from the development are considered **not significant**, in accordance with the stated methodology.

5.4 Road Vehicle Exhaust Emissions

5.4.1 Any vehicle movements associated with the proposals will generate exhaust emissions on the local and regional road networks. Information provided by the Applicant indicated that the facility is predicted to produce 42 HDV trips per day as an AADT flow.

[17] Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

5.4.2 Based on the information above, the development is not predicted to result in an increase of LDV flows of more than 500 AADT or HDV flows of more than 100 AADT on any individual road link. Additionally, the proposals do not include significant highway realignment or the introduction of a junction. As such, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **not significant**, in accordance with the IAQM[18] screening criteria shown in Section 3.4.

[18] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

6.0 CONCLUSION

6.1.1 Redmore Environmental Ltd was commissioned by Heatons to undertake an Air Quality Assessment in support of a planning application for the change of use of a paper/card recycling facility at Pennine View, Batley, to incorporate a waste transfer station.

6.1.2 The proposals have the potential to cause air quality impacts as a result of fugitive dust, fugitive odour and road traffic exhaust emissions during operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and consider potential effects as a result of the scheme.

6.1.3 The risk of potential effects as a result of fugitive dust emissions from the facility during the operational phase was assessed using the IAQM methodology. This included consideration of the Source Emission potential, Pathway Effectiveness and sensitivity of relevant receptors in the vicinity of the site. The results of the assessment indicated overall effects as a result of the development were predicted to be **not significant**.

6.1.4 The risk of potential effects as a result of fugitive odour emissions from the facility during the operational phase was assessed using the IAQM methodology. This included consideration of the Source Odour Potential, pathway effectiveness and receptor sensitivity. The results of the assessment indicated overall effects as a result of the development were predicted to be **not significant**.

6.1.5 The risk of potential effects as a result of road vehicle exhaust emissions during the operational phase was assessed against screening criteria provided within the IAQM[19] guidance. Due to the low number of anticipated vehicle trips associated with the proposals, road traffic exhaust emission impacts were predicted to be **not significant**.

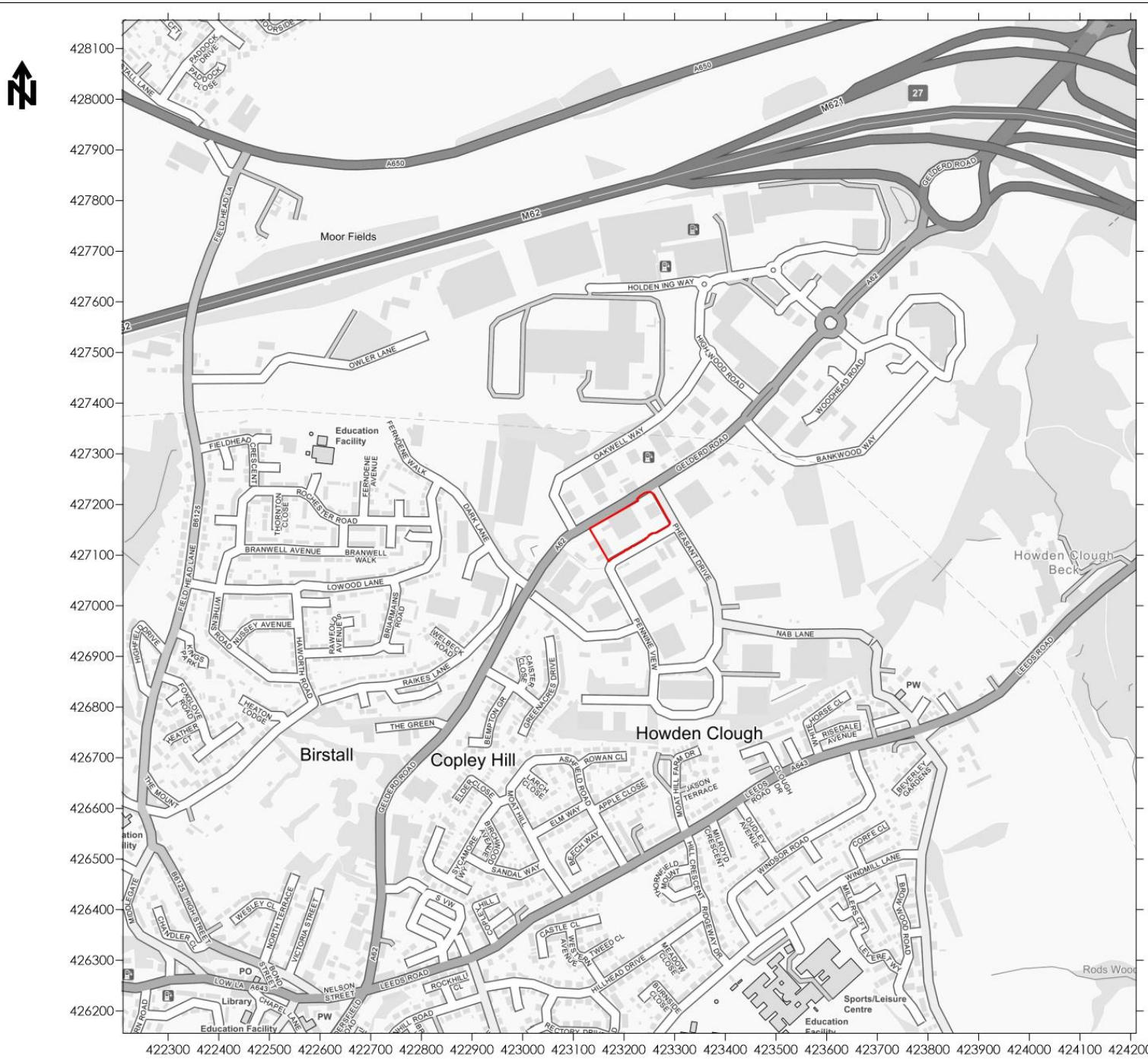
6.1.6 Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development.

[19] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

7.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
C&I	Commercial and Industrial
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
FEL	Front End Loader
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
KC	Kirklees Council
KLP	Kirklees Local Plan
LA	Local Authority
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
NGR	National Grid Reference
NO_2	Nitrogen dioxide
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5µm
RCV	Refuse Collection Vehicle
RDF	Refuse Derived Fuel
STW	Sewage Treatment Works
tpa	Tonnes per annum

Figures



Legend

Site Boundary

Title
Figure 1 - Site Location Plan

Project
Air Quality Assessment
Pennine View, Batley

Project Reference
7514

Client
Heatons

Contains Ordnance Survey Data
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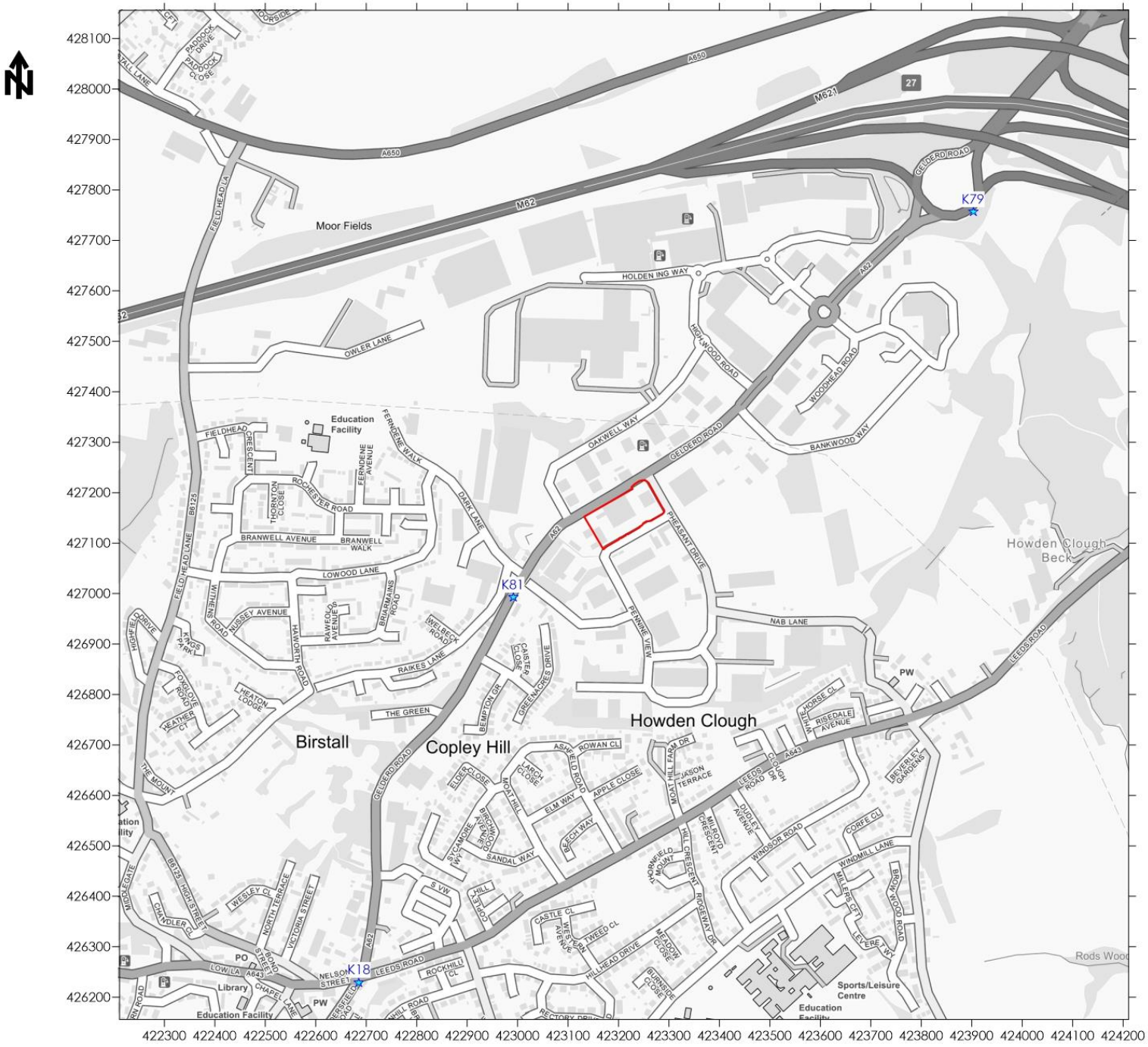

Legend

Site Boundary

Monitor

Title
Figure 2 - Monitoring Locations

Project
Air Quality Assessment
Pennine View, Batley

Project Reference
7514

Client
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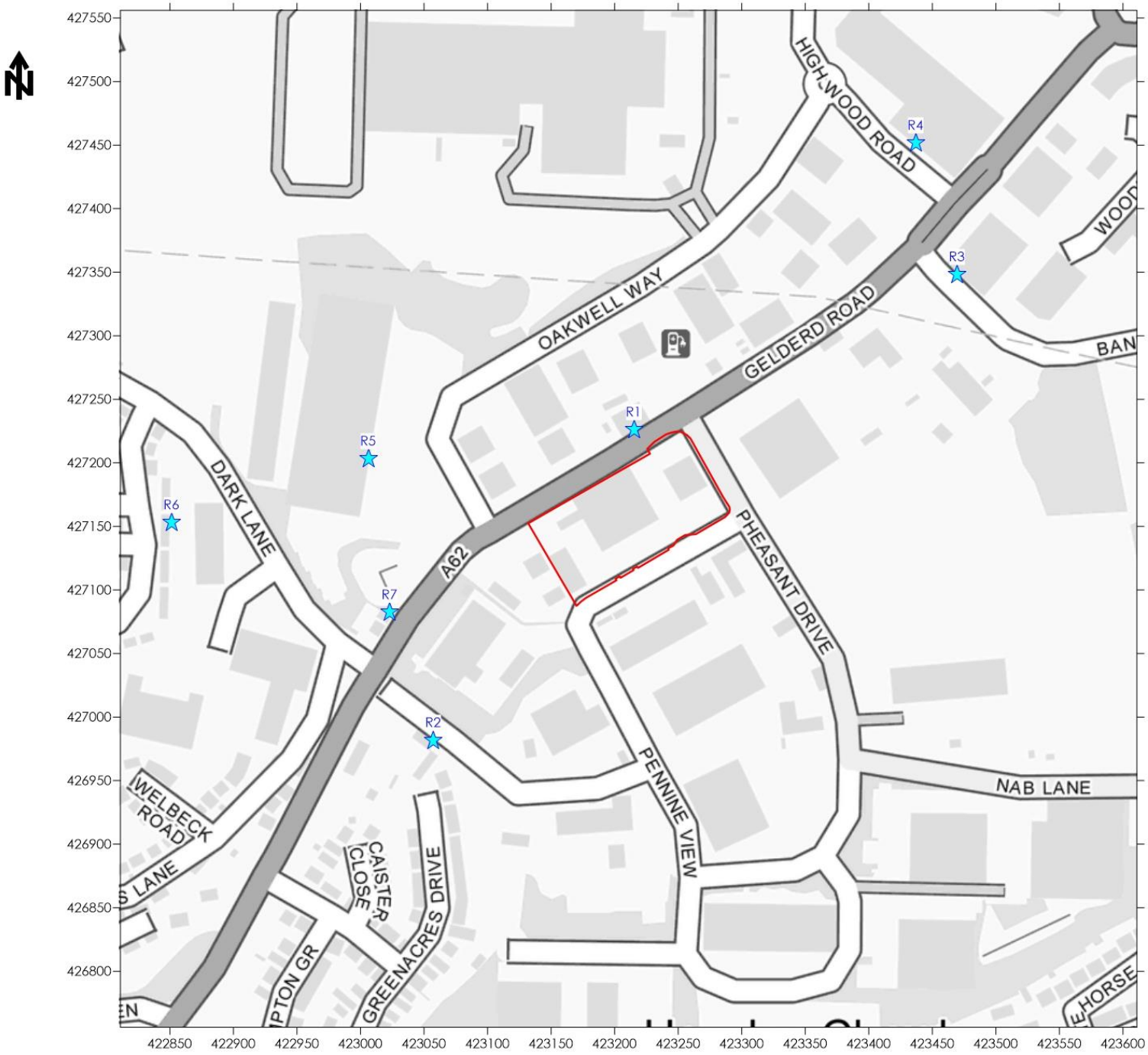

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Site Boundary

Receptor

Title
Figure 3 - Sensitive Receptor Locations

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Air Quality Assessment
Pennine View, Batley

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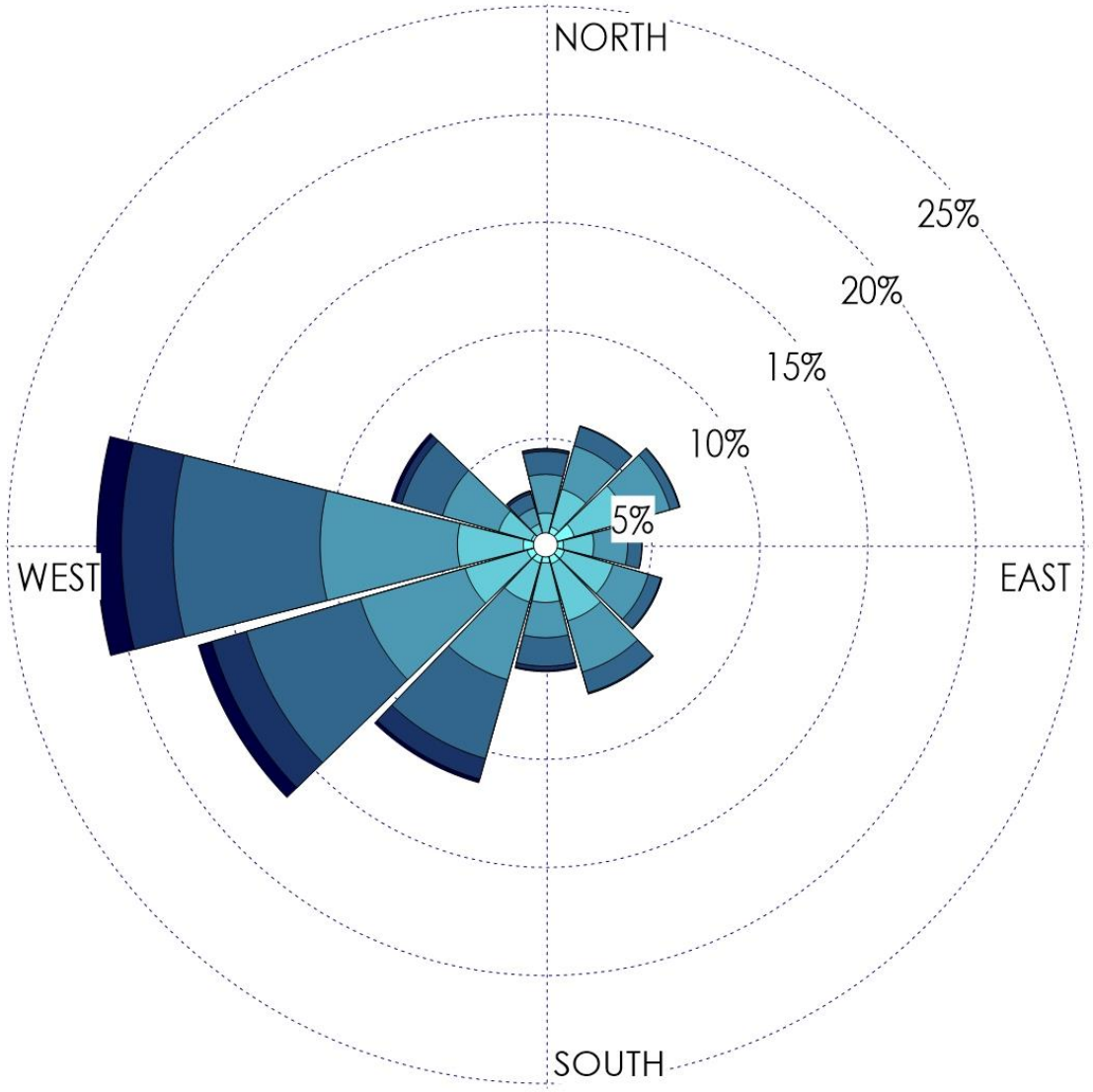

WIND SPEED (m/s)

- >= 11.1
- 8.8 - 11.1
- 5.7 - 8.8
- 3.6 - 5.7
- 2.1 - 3.6
- 0.5 - 2.1

Calms: 0.60%

Legend

Title
Figure 4 - Wind Rose of 2019 to 2023
Leeds-Bradford Airport
Meteorological Data

Project
Air Quality Assessment
Pennine View, Batley

Project Reference
7514

Client
Heatons

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Appendix 1 - Curriculum Vitae

JETHRO REDMORE

Director

BEng (Hons), MSc, MIAQM, MIEnvSc, PIEMA, CEnv

KEY EXPERIENCE:

Jethro is a Chartered Environmentalist and Director of Redmore Environmental with specialist experience in the air quality and odour sectors. His key capabilities include:

- Production and management of Air Quality, Dust and Odour Assessments for a wide-range of clients from the retail, residential, infrastructure, commercial and industrial sectors.
- Production and co-ordination of Environmental Permit applications for a variety of industrial sectors.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-Roads, ADMS-5, AERMOD-PRIME and BREEZE-ROADS. Studies have included impact assessment of ground level pollutant and odour concentrations and assessment of suitability of development sites for proposed end-use.
- Project management and co-ordination of Environmental Impact Assessments and scoping reports for developments throughout the UK.
- Provision of expert witness services at Planning Inquiries.
- Design and project management of pollutant monitoring campaigns.
- Co-ordination and management of large-scale multi-disciplinary projects and submissions.
- Provision of expert advice to local government and international environmental bodies, as well as involvement in production of industry guidance.

SELECT PROJECTS SUMMARY:

Industrial

Shanks Waste Management - Odour Assessments of two waste management facilities to support Environmental Permit Applications.

Tatweer Petroleum - dispersion modelling of Bahrain oil field.

Doha South Sewage Treatment Works - AQA for works extension in Qatar.

IRIS Environmental Appraisal Report Reviews, Isle of Man Government - odour assessment reviews.

Lankem, Greater Manchester - Environmental Permit Application for chemical manufacturing plant.

Newport Docks Bulk Drying, Pelleting and CHP Facility - air quality EIA for gas CHP.

Springshades, Leicester - Environmental Permit Variation Application for textile manufacturing plant.

Valspar, Chester - Odour Assessment and production of Odour Management Plan for a paint manufacturing plant in response to neighbour complaints.

Agrivert - dispersion modelling of odour and CHP emissions from numerous AD plants.

James Cropper Paper Mill, Cumbria - air quality EIA, Environmental Permit Variation and Human Health Risk Assessment for new biomass boiler adjacent to SSSI.

Rigg Approach, Leyton - Air Quality Assessment in support of waste transfer site.

Lynchford Lane Waste Transfer Station - biomass facility energy recovery plant.

Barnes Wallis Heat and Power, Cobham - biomass facility adjacent to AQMA.

Residential

Wood St Mill, Bury - residential development adjacent to scrap metal yard.

Hyams Lane, Holbrook - Odour Assessment to support residential development adjacent to sewage works.

North Wharf Gardens, London - peer review of EIA undertaken for large residential development.

Loxford Road, Alford - Air Quality EIA for residential development, included consideration of impacts from associated package sewage works

Elephant and Castle Leisure Centre - baseline AQA for redevelopment.

Carr Lodge, Doncaster - EIA for large residential development.

Queensland Road, Highbury - residential scheme including CHP.

Bicester Ecotown - dispersion modelling of energy centre.

Castleford Growth Delivery Plan - baseline air quality constraints assessment for town redevelopment.

York St, Bury - residential development adjacent to AQMA.

Temple Point Leeds - residential development adjacent to M1.

Commercial and Retail

Etihad Stadium - Air Quality EIA for the extension to the capacity of the Etihad Stadium, Manchester.

Wakefield College - redevelopment of city centre campus in AQMA.

Manchester Airport Cargo Shed - commercial development.

Manchester Airport Apron Extension - EIA including aircraft emission modelling.

National Youth Theatre, Islington - redevelopment to provide new arts space and accommodation.