FIELD HOUSE, WELLINGTON ROAD, DEWSBURY

AIR QUALITY ASSESSMENT

MAY 2019

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EXECUTIVE SUMMARY

Surface Property was commissioned to undertake an assessment of the potential impact to local air quality associated with the proposed redevelopment of Field House ('the Development'), consisting of construction of 23 residential units and 732sqm of A3 floorspace at Wellington Road, Dewsbury ('the Development site'). This assessment is in support of an outline planning application for the Development.

Kirklees Council (the Council) has investigated air quality within its area as part of its responsibilities under the LAQM regime and have declared Air Quality Management Areas (AQMAs) and whilst the Development is not within an AQMA it is located approximately 400 m west of AQMA No. 5. The Development site is located in close proximity to the A638 (Dewsbury Ring Road), which has an Average Annual Daily Traffic flow of more than 10,000. Given this, and at the request of the Council, an air quality assessment, including dispersion modelling, has been undertaken. The assessment considers potential impacts of existing air quality (arising from traffic emissions only) on the proposed new receptors. ADMS Roads dispersion modelling has been used to determine the effects for the year 2023 when the Development would be occupied. The assessment predicts the following pollutant concentrations at new receptors introduced by the Development:

- The long-term NO_2 concentrations range from 23.8 µg/m^3 to 29.7 µg/m^3, which is 59.5% and 74.3% of the AQO.
- The short-term NO_2 concentrations range from 46.2 µg/m^3 to 112.1 µg/m^3, which is 23.1% to 56.1% of the AQO.
- The long-term PM_{10} concentrations range from 11.8 µg/m^3 to 12.7 µg/m^3, which is 29.5% to 31.8% of the AQO.
- The short-term PM_{10} concentrations range from 23.5 µg/m^3 to 25.3 µg/m^3, which is 47% and 50.6% of the AQO.

Predicted concentrations are substantially below the AQOs and so there is no significant risk of unacceptable human health impacts and no specific mitigation is required to protect the air quality of new residents introduced by the Development.

The Development has also been assessed against the three stages of the West Yorkshire TPG, and in accordance with Stage 3, suitable mitigation has been proposed, including best practice construction dust mitigation and minimum specifications for gas-fired boilers.

1 INTRODUCTION

1.1 Background

Surface Property has been commissioned to undertake an assessment of the potential impact to local air quality associated with the proposed redevelopment of Field House ('the Development'), consisting of residential and commercial units at Wellington Road, Dewsbury ('the Development site').

This report details the methodology and assumptions adopted, baseline conditions, and determination of the likely potential impact, taking into account legislation, national and local planning policy and guidance.

The report is supported by Appendix A, which details the air dispersion modelling that has been undertaken, specifically the model parameters, scenarios and outputs.

1.2 Scope of the Assessment

The Development site is located in close proximity to the A638 (Dewsbury Ring Road) but not within an Air Quality Management Area (AQMA); the nearest AQMA declared by the Council is Kirklees AQMA 5, located approximately 400 m east. Given this an air quality assessment has been undertaken which considers potential impacts of existing air quality (arising from traffic emissions only) on new receptors proposed by the Development. The scope of the assessment has been agreed with the Environmental Health Department at the Council, through pre-application consultation. As agreed, ADMS Roads dispersion modelling has been used to assess these effects for the year 2023 when the Development would be occupied.

As the Development proposes no additional parking spaces, it has been assumed that there will be no direct addition to local traffic flows as a result of the Development. Additionally, the Development is not proposing any point sources of emissions, therefore the impact on existing receptors (human and ecological) arising from the Development has not been considered as part of this assessment.

Given the nature of the works proposed, as a re-development, no assessment has been undertaken in respect of construction dust, although it is acknowledged that best practice construction measures would be adhered to, to ensure potential dust emissions are minimised.

The impacts of exhaust emissions from construction vehicles has not been assessed. Based on IAQM/ EPUK guidance[1] an assessment of construction exhaust emissions on the local road network is only required where HGV flows exceed 100 movements per day and the criteria used in DMRB is 200 HGV movements per day. The Development construction-related HGV flows are expected to be substantially less than either of these.

A review of the Environment Agency's public register has identified 9 permitted industrial installations within 3 km of the Development site, two of which are located within 1 km. The identified sites are as follows:

- Standard Wool Ltd 0.6 km south-east; and
- Westex Ltd 0.8 km south-west.

[1] IAQM (2017). Land-Use Planning & Development Control: Planning for Air Quality. [online] Available at: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf [Accessed 11th Dec. 2018].

The industrial installations are considered to be at a sufficient distance not to have any significant impact on background concentrations of air pollutants; therefore, offsite pollutant sources are not considered in this report.

1.3 Overview of the Development and Development site

The Development proposed is situated in Dewsbury town centre, opposite to Dewsbury Station on the A638 Dewsbury Ring Road. The Development involves the renovation of an existing office building to form 23 new residential units comprising 1, 2 and 3 bed apartments and A3 floorspace across 5 total floors. The Development will not include any parking spaces. Further detail on the Development is included with other plans and documents submitted with the planning application.

The Development is bounded to the west and north-west by the A638 Dewsbury Ring Road, the north by Bond Street, the east by Grove Street and to the south by existing buildings.

1.4 Study Species

Air Quality Objectives (AQOs) exist for the following pollutants[2]:

- Fine particulate matter (PM_{10} and $PM_{2.5}$);
- Nitrogen dioxide (NO_2);
- Ozone;
- Sulphur dioxide (SO_2);
- Polyaromatic Hydrocarbons (PAHs);
- Carbon monoxide (CO);
- Benzene;
- 1,3-butadiene; and
- Lead.

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

In most urban areas of the UK, traffic-generated pollutants have become the most common pollutants. These are NO_2, PM_{10}, CO, 1,3-butadiene and benzene.

The air quality assessment focuses on NO_2 and PM_{10}, as these pollutants are least likely to meet their Air Quality Strategy objectives near roads.

The following traffic-generated pollutants have been excluded from the assessment, along with justification:

- Lead, because it has now been removed from petrol fuels;
- SO_2, because of the introduction of low sulphur diesel and the relatively insignificant sulphur content of petrol fuels; and
- CO, benzene or 1,3-butadiene, because only one of the 168 Local Authorities having designated Air Quality Management Areas (AQMAs) within the UK did so due to an exceedance of CO, benzene or 1,3-butadiene objectives.

[2] DEFRA (2016). National Air Quality Objectives. Available at: https://uk-air.defra.gov.uk/assets/documents/National_air_quality_objectives.pdf [accessed on 2/12/2016]

1.5 Study Area

The assessment has considered the traffic effects associated with the A638 (Dewsbury Ring Road) only. No other roads have been modelled.

The study area for this assessment includes six receptor locations within the Development site, identified as representing new residential properties introduced by the Development. The receptors have been included as they are the closest receptors to the modelled route and as such, they constitute worst-case effects. As the development contains no parking provision, the effects at other offsite receptors is not explicitly modelled.

A range of receptor heights have been modelled across the Development site to account for the Ground, First and Fourth floor levels of accommodation which are proposed.

2 LEGAL AND PLANNING POLICY CONTEXT

2.1 National Policy and Legislation

2.1.1 Legislation

The principal air quality legislation in the UK is the Air Quality (England) Regulations (2000 and 2002 Amendment)[3], which were enacted as part of the National Air Quality Strategy (NAQS) For England, Scotland, Wales and Northern Ireland (2000, and 2003 and 2007 addendums)[4] under Section 80 of the Environment Act 1995.

The Strategy provides an over-arching strategic framework for air quality management by:

- Setting out a way forward for air quality issues;
- Setting out the air quality standards and objectives to be achieved; and
- Introducing a new policy framework for tackling fine particles.

Current assessment criteria applicable to the protection of human health and Local Air Quality Management are presented in Table 2.1 below for the study species in this assessment. Concentrations are expressed in micrograms per cubic metre (µg/m^3).

Table 2.1 National Air Quality Strategy Objectives (µg/m^3) for the protection of Human Health

Pollutant	**Air Quality Objective**	
	Concentration	**Measured as**
Nitrogen dioxide (NO_2)	200 µg/m^3	1-hour mean not to be exceeded more than 18 times per year
	40 µg/m^3	Annual mean
Particles (PM_{10})	50 µg/m^3	24-hour mean not to be exceeded more than 35 times per year
	40 µg/m^3	Annual mean
Particles ($PM_{2.5}$)	25 µg/m^3	Annual mean

Whilst road traffic can make substantial contributions to $PM_{2.5}$ concentrations at the kerbside (within 1 m of the kerb), at the roadside (a few metres from the kerb) the contributions are relatively limited[5]. As such, this assessment has not considered $PM_{2.5}$.

The Regulations require that Local Authorities undertake a tiered appraisal of air quality within the borough to establish compliance or non-compliance with the targets established in the NAQS. Where the objectives are likely to be exceeded, the Authority must designate an AQMA and establish an Action Plan for the region that outlines measures to achieve the objectives.

2.1.2 National Planning Policy and Guidance

On a national level, air quality can be a material consideration in planning decisions.

[3] The Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043 (2002), HMSO and The Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000), HMSO.

[4] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland, July 2007'

[5] https://uk-air.defra.gov.uk/assets/documents/reports/cat11/1212141150_AQEG_Fine_Particulate_Matter_in_the_UK.pdf

The National Planning Policy Framework (NPPF) (2019)[6] sets out national planning policy for England; designed to make the planning system less complex, to protect the environment and promote sustainable development. The NPPF states at paragraph 170 that planning policies and decisions should contribute to and enhance the natural and local environment by 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"*.

The NPPF states that the effects of pollution on health and the sensitivity of the area and the development should be taken into account.

Paragraph 181 of the NPPF states *"Planning policies and decisions should sustain compliance with and contribute towards compliance with relevant EU 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 on air quality from individual sites in local areas... 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"*.

The NPPF is supported by Planning Practice Guidance (PPG), which includes guiding principles on how planning can take account of the impacts of new development on air quality. This is detailed below under the Air Quality Guidance section.

2.2 Local Planning Policy

The Kirklees Local Plan was adopted in February 2019[7]. The Draft Plan sets out the Council's planning policies for securing growth, investment, sustainable development and improving the environment in the district. The Local Plan will cover the period to 2036 and will provide updated planning framework of policies. Policies relevant to air quality are detailed below:

- Policy PLP 15 Residential use in town centres:
  "The protection of amenity of existing residents and future occupiers of the proposed residential use in accordance with amenity and design policies within the plan, and will in particular consider matters such as privacy, noise and air quality".
- Policy PLP 51 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 natural and built environment or to people.
  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.

[6] Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework. [online] Gov.uk. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 [Accessed 23 May 2019].
[7] https://www.kirklees.gov.uk/beta/planning-policy/pdf/local-plan-strategy-and-policies.pdf [Accessed 17th May 2019]

Where sustainable mitigation measures cannot be introduced which prevent receptors from being exposed to unsafe levels of air pollution, development will not be permitted".

2.3 Air Quality Guidance

2.3.1 National Planning Policy Framework Planning Practice Guidance, 2014

The Government's online Planning Practice Guidance (PPG) states that air quality concerns are more likely to arise where development is proposed within an area of existing poor air quality, or where it would adversely impact upon the implementation of air quality strategies and/or action plans.

Under the Air Quality section, paragraph 005 of the PPG states that *"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)"*.

Paragraph 007 of the PPG sets out the information that may be required in an air quality assessment, making clear that *"Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality"*.

Paragraph 008 provides guidance on mitigating air quality impacts, stating *"Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact"*.

When deciding whether air quality is relevant to a planning application, consideration should be given to whether the development would lead to:

- Significant effects on traffic, such as volume, congestion, vehicle speed or composition;
- The introduction of new point sources of air pollution, such as furnaces, centralised boilers and Combined Heat and Power (CHP) plant; and
- Exposing occupants on any new developments to existing sources of air pollutants and areas with poor air quality.

2.3.2 Land Use Planning and Development Control: Planning for Air Quality

In January 2017, guidance released by Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK)[8] provided a set of criteria used to determine whether a development will have a significant impact on air quality to ensure that air quality is adequately considered in the land-use planning and development control processes. If the proposed development results in a significant change in air quality or results in a change of relevant exposure to air quality, then it is reasonable to expect an air quality assessment to be undertaken.

[8] Institute of Air Quality Management (IAQM)/EPUK Guidance - Land-Use Planning & Development Control: Planning for Air Quality 2017. Available online: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf Accessed 23/05/2019

2.3.3 Local Air Quality Management Policy Guidance LAQM PG(09), 2009

The Local Air Quality Management Policy Guidance LAQM.PG(09)[9] provides additional guidance on the links between transport and air quality. Road transport contributes to local air pollution and transport measures may bring improvements in air quality. Key transport-related Government initiatives are set out, including regulatory measures and standards to reduce vehicle emissions and improve fuels.

LAQM.PG(09) also provides guidance on the links between air quality and the use of the planning system; air quality considerations should be integrated within the planning process at the earliest stage, and is intended to aid local authorities in developing action plans to deal with specific air quality issues and create strategies to improve air quality.

2.3.4 Local Air Quality Management Technical Guidance (TG16), 2016

The Local Air Quality Management Policy Guidance LAQM TG16[10] is designed to support local authorities in carrying out their duties under the Environment Act 1995. LAQM is the statutory process by which local authorities monitor, assess and take action to improve local air quality. Where a local authority identifies areas of non-compliance with the air quality objectives, and there is relevant public exposure, there remains a statutory need to declare the geographic extent of non-compliance as an Air Quality Management Area (AQMA) and to draw up an action plan detailing remedial measures to address the problem.

2.3.5 Kirklees Air Quality Action Plan, 2010

The Air Quality Action Plan (AQAP)[11] outlines the steps being taken locally and regionally to improve air quality. The action plan sets out the measures that Kirklees Council intends to introduce to improve air quality in pursuit of the National Air Quality Objectives.

2.3.6 West Yorkshire Low Emissions Strategy 2016-2021

The West Yorkshire Low Emissions Strategy[12] (WYLES) demonstrates the commitment of the West Yorkshire local authorities, together with West Yorkshire Combined Authority and other key stakeholders to work together to improve air quality for the benefit of all in the region. The following specific aims are proposed:

- Aim 1: Accelerate improvements in air quality, above that which would occur without intervention, to achieve air quality limit values set out in law in all parts of West Yorkshire by 2020 at the latest.
- Aim 2: Working with the wider economic, social and environmental context for West Yorkshire to create a Low Emissions Future that will maximise opportunities to improve air quality, minimise risks of worsening air quality and create healthier places to live, work and visit.

[9] Defra (2009), 'Local Air Quality Management Policy guidance PG(09)', DEFRA, London. Available online: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69334/pb13081-tech-guidance-laqm-tg-09-090218.pdf

[10] Local Air Quality Management Technical Guidance (TG16). Available Online: https://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf Accessed 21/02/2018

[11] Local Air Quality Management Action Plan (2010) Available Online https://www.kirklees.gov.uk/beta/crime-and-safety/pdf/AirQualityAction.pdf Accessed 20th May 2019

[12] West Yorkshire Low Emissions Strategy (2016). [Online] Available at https://www.kirklees.gov.uk/beta/crime-and-safety/pdf/WYLES-air-quality-and-emissions-planning-technical-guide.pdf [Accessed 20th May 2019]

- Aim 3: Immediate focus on tackling transport emissions, targeting interventions that will deliver the most significant air quality improvements in the areas of greatest concern.

Additional technical guidance[13] forms part of the WYLES and deals primarily with pollutants regulated under the local air quality management regime and the impact of traffic emissions. The guidance provides a template for integrating air quality considerations into land-use planning and development management policies that can influence the reduction of road transport emissions and to be used to inform air quality action planning.

The assessment follows a 3-stage process:

- Stage 1: Determine the classification of the development proposal;
- Stage 2: Assess and quantify the impact on local air quality; and
- Stage 3: Establish the level of mitigation required by the proposal to meet National Planning Policy, Local Plan requirements and WYLES objectives.

[13]West Yorkshire Air Quality and Emissions Technical Planning Guidance [Online] Available at https://www.kirklees.gov.uk/beta/crime-and-safety/pdf/WYLES-air-quality-and-emissions-planning-technical-guide.pdf [Accessed 20th May 2019]

3 ASSESSMENT METHODOLOGY

3.1 Dispersion Modelling

3.1.1 Background

Dispersion modelling (ADMS Roads Extra 4, version 4.1.1) has been used to assess the impact of emissions on the environment by calculating the predicted ground level concentrations arising from emissions to atmosphere, based on Gaussian approximation techniques. The worst-case concentrations have been compared with appropriate air quality standards to determine whether there is a significant impact on the receiving environment.

ADMS-Roads utilises site-specific hourly sequential meteorological data to enable a realistic assessment of dispersion from point sources to be conducted for weather conditions that occur at the site.

Further details on the model parameters are presented in Appendix A including the modelled scenarios, the modelled roads and receptors, meteorological data used and model verification against monitored diffusion tube data held by the Council. This information is not repeated here.

3.1.2 Model Verification

The 2016 scenario was modelled in order to compare modelled NO_2 concentrations with measured data reported by the Council[14], in accordance with LAQM TG(09). The closest Council diffusion tube location was used in the model verification exercise as detailed in Section 4.1 of Appendix A.

The measured concentration is 10.4% lower than the modelled concentrations. The Root Mean Square Error (RMSE) is typically used to define the average difference between the model and the monitored concentrations (where there are more than one used in the verification), as per LAQM TG(09)[15]. In this case the if the difference is ±25% of the objective being assessed, the guidance recommends that the model be adjusted. For example, for the annual mean NO_2 objective of 40 µg/m^3, if the difference is more than 10 µg/m^3 it would require adjustment of the model.

The difference between the modelled concentration, and the measured diffusion tube concentration is 5.2 µg/m3, which is 13% of the AQO. Therefore, the model is deemed to be acceptable without the need for any adjustment.

3.2 Assessment Methodology

The IAQM/EPUK guidance, "Land-Use Planning & Development Control: Planning For Air Quality"[16], details recommendations for describing impacts in paragraphs 6.27 to 6.40.

[14] Diffusion tube data was obtained from the Councils 2018 Annual Progress Report, Available online: https://www.dundeecity.gov.uk/sites/default/files/publications/aqprogress_report_2018_final.pdf

[15] LAQM TG(09), Available online https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69334/pb13081-tech-guidance-laqm-tg-09-090218.pdf [accessed on 16/11/2018]

[16] IAQM/EPUK (2017). Land-Use Planning & Development Control: Planning For Air Quality. Available at: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf [accessed on 25/10/2017]

3.2.1 Long-term Impacts

Paragraph 6.33 provides suggestions relevant for the study of long-term concentrations:

"6.33 The suggested framework for describing the impacts on the basis set out above is set out in Table 6.3. The term AQAL is used to include air quality objectives or limit values, where these exist. Users of the impact descriptors set out in Table 6.3 are encouraged to follow the explanatory notes carefully and recognise the spirit in which they apply. In particular, the intention is that the descriptors should not be applied too rigidly and assessors should recognise the inevitable uncertainties embedded within the process of their determination."

The notes in Table 6.3 state "the table is only designed to be used with annual mean concentrations". Table 6.3 is replicated below in Table 3.1.

Table 3.1: Assessment Matrix (IAQM/ EPUK)

Long term mean Background Concentration	**% 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

In accordance with IAQM and EPUK guidance, the above framework for describing impacts has been used as a starting point to make a judgement on significance of effect but the extent of impact (both geographic coverage and numbers of receptors affected) and other factors will also be considered. Professional judgement has been used to consider the significance of effects, having regard to the influence and validity of assumptions adopted when undertaking the prediction of impacts.

3.2.2 Short-term Impacts

Paragraph 6.39 of the IAQM/EPUK guidance provides for the description of short-term, peak concentrations of pollutants:

"6.39 Where such peak short term concentrations from an elevated source are in the range 11-20% of the relevant AQAL, then their magnitude can be described as small, those in the range 21-50% medium and those above 51% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. That is not to say that background concentrations are unimportant, but they will, on an annual average basis, be a much smaller quantity than the peak concentration caused by a substantial plume and it is the contribution that is used as a measure of the impact, not the overall concentration at a receptor. This approach is intended to be a streamlined and pragmatic assessment procedure that avoids undue complexity."

3.2.3 Assessing Significance

The approach to the assessment of significance is set out in section 7 of the IAQM/EPUK guidance. This states that:

"Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as 'significant' or 'not significant'."

The AQOs referred to in this document are set by the government for the protection of human health. Paragraph 7.5 of the guidance states that:

"… a 'moderate' or 'substantial' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health."

The assessment of significance of effects takes into account the following factors:

- *"the existing and future air quality in the absence of the 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."*

3.2.4 Cumulative Effects

The future baseline in 2023, which has been used in the assessment of effects during the operational phase of the Development, includes natural growth on the road network between 2017 and 2023. No specific cumulative developments have been included in the assessment and none were requested by the Council during consultation.

3.3 Limitations and Assumptions

There are many elements within the assessment that generate potential uncertainty with the modelled results; uncertainty associated with the modelled traffic emissions data is likely to have the greatest impact on the outcome of the assessment.

The trend shown in the DEFRA background air quality dataset is that NO_2 and PM_{10} concentrations are decreasing over time. Given this trend the projected concentration in the future year (2023) has been used, and this is expected to be a realistic worst-case approach for assessing air quality impacts on the Development.

Locations of the proposed new receptors have been identified based on plans and elevations produced by DLA Architecture Ltd. The selected receptors are considered to be representative of other receptors, with those closest to Dewsbury Ring Road representing the worst-case impact; impact at other receptors will be lower. Worst case impacts are identified at ground floor receptors with effects reducing with height.

4 BASELINE CONDITIONS

4.1 Background Air Quality

4.1.1 DEFRA Background Maps

Information on estimated background pollutant concentrations has been obtained from the DEFRA background maps provided on the UK-AIR, the Air Quality Information Resource[17].

Estimated air pollution concentrations have been extracted from the background pollution maps for the UK. These maps are available in 1 km x 1 km grid squares and provide an estimate of concentrations across the UK. Average concentrations have been taken from the grid location 424500, 421500, approximately 275 m south, to obtain background concentrations in the vicinity of the Development site and are provided in Table 4.1. In summary:

- NO_2: the 2015 dataset was used, with the appropriate year for each model scenario selected (2016 and 2023);
- PM_{10}: the 2015 dataset was used, with the appropriate year for each model scenario selected (2016 and 2023).

Table 4.1 Background Concentrations from DEFRA

Scenario	2016	2023
NO_2 (µg/m^3)	26.3	19.5
PM_{10} (µg/m^3)	14.3	11.7

The data indicates that background concentrations are substantially below the Air Quality Objectives in the vicinity of the Development site.

4.1.2 Local Authority Monitoring Data

The background air quality in the vicinity of the Development site has been determined through a review of the Council's local air quality management reports[18].

Kirklees Council's local ambient monitoring data has been reviewed to provide a comparison with the DEFRA background data. Kirklees Council has 2 automatic monitoring stations in the district, the closest is Roadside 3, at Bradley, approx. 7.5 km west of the Development site at NGR 417255, 420761 which monitors roadside concentrations on Leeds Road (A62). The other location at Ainley Top is a roadside location to the northwest of Huddersfield on Halifax Road (A629). These locations are distant from the Development site and not considered representative of the Development site, and so the monitoring data has not been considered further in this assessment. In addition to the automatic monitoring, diffusion tube monitoring is also undertaken to measure NO_2 concentrations. Diffusion tubes allow for a much greater spatial coverage than with automatic monitoring sites but are acknowledged as a less accurate method of monitoring ambient air pollutants.

[17] https://uk-air.defra.gov.uk/data/laqm-background-home

[18] Kirklees Council (2018). Annual Status Report – 2018. Available at: https://www.kirklees.gov.uk/beta/crime-and-safety/pdf/kirklees-annual-status-report-2018.pdf [accessed on 17/05/2019]

The closest diffusion tube location is on Dewsbury ring Road approximately 300 m to the south of the Development site (K1), outside Dewsbury bus station. The results of the available diffusion tube monitoring are provided in Table 4.2.

Table 4.2 Background Monitoring Data (Diffusion Tubes)

Diffusion Tube Location	Annual Mean Pollutant Concentration (µg/m^3)				
	2013	2014	2015	2016	2017
K1; Dewsbury Bus Station (424506, 421535)					
Nitrogen Dioxide (NO_2)	47.67	46.64	45.34	47.42	42.50

There have been exceedances of the hourly mean AQO since 2013. Between 2016 and 2017 NO_2 concentrations reduced by 4.92 µg/m^3 and in 2017 the concentration was 106.3% of the AQO. The location is not considered to be representative of the Development site, given the proximity to the road, less than 1 m, and proximity to the bus station which has the potential for idling vehicles.

The Council's 2018 Annual Status Report stated that:

"Trends within the new AQMA's and at other non AQMA monitoring locations saw slightly increases by 1 to 2 µg/m3 until 2017, when levels fell, which is in line with what has been observed within the other AQMA's."

4.1.2.1 Summary

Both the council automatic and non-automatic monitoring data is not representative of the background concentrations at the Development Site. The automatic monitoring data is from 7.5 km away at a roadside site. The closest council diffusion tube (K1), shows consistent exceedance of the AQO for Nitrogen Dioxide. Given that this is a roadside tube, in close proximity to Dewsbury Bus Station and the potential exposure to large volumes of idling bus traffic, it does not provide a good representation of the background pollutant concentrations at the Development Site.

Given that road traffic emissions have been modelled, and so do not need including in the site-specific background concentration, the DEFRA background data (presented in Table 4.3, which is representative of the wider area) has been used as the background concentration of pollutants. The accuracy of the model has been verified against the Council's monitoring at K1 (see section 4.1 of Appendix A).

For the purposes of this assessment the background concentration values used in the assessment are presented in Table 4.3.

Table 4.3 Background Concentrations used in Assessment

Scenario	2016	2023
NO_2 (µg/m^3)	26.3	19.5
PM_{10} (µg/m^3)	14.3	11.7

4.2 Baseline Traffic Data

Baseline traffic flow data for the A638 (Dewsbury Ring Road) for 2016 was obtained from the Department for Transport[19]. A growth factor of 1.0713 was applied to traffic for 2023[20].

As reported in other documents submitted in support of the application for planning permission for the Development, when operational, the Development will not contribute any direct traffic to the surrounding road network as no parking is proposed. Therefore, only the air quality impact of future baseline traffic flows on the A638 (Dewsbury Ring Road) will be considered on the new receptors introduced by the Development.

Road Traffic was modelled for both scenarios as shown in Table 4.4.

Table 4.4: Hourly Average Traffic Movements as modelled

Road	2016		2023	
	LDV	HDV	LDV	HDV
Dewsbury Ring Road (A638)	630	19	675	20

4.3 Meteorological Conditions

Hourly sequential meteorological data for the calendar years 2012-2016 was input to the model. The data were provided by the Met Office, and were taken from measurements recorded at Bramham, supplemented with cloud cover data from Bingley. Following sensitivity analysis, the data from 2012 was found to give rise to the greatest impact and therefore is considered to the most conservative data set to use in the model.

Analysis of the meteorological data shows that the Development site is subject to a west to southwest prevailing wind, with additional north-westerlies constituting the majority of the winds. A wind rose is presented as Figure 2 in Appendix A.

[19] https://www.dft.gov.uk/traffic-counts/area/regions/Yorkshire+and+the+Humber/local-authorities/Kirklees

[20] https://laqm.defra.gov.uk/documents/RTF-Automated-Traffic-Growth-Calculator-v3-1.xls

5 POTENTIAL IMPACTS, MITIGATION MEASURES AND RESIDUAL IMPACTS

The ADMS modelling is detailed in full in Appendix A. A summary of the modelling results is replicated in Table 4.5 and discussed below.

5.1.1 Air Quality Assessment2023: Baseline

For NO_2, the predicted road source contribution was calculated from the modelled concentration of NO_X using DEFRA's NO_X to NO_2 calculator v6.1. The NO_2 value was added to the background value (which was doubled for peak concentrations) to give the total predicted concentration of NO_2 at each receptor location for each scenario.

For PM_{10}, the predicted total concentration from modelled sources was added to the background value (which was doubled for peak concentrations) to give the total predicted concentration at each receptor location.

The modelling is based on the traffic data provided in Table 4.4, added to the background concentrations for each pollutant provided in Table 4.3.

The 2023 baseline air quality results are presented in Table 5.1.

Table 5.1 Baseline Air Quality

Receptor	**2023 Annual Mean Concentration (µg/m³)**		**2023 Short Term Concentration (µg/m³)**	
	NO_2	**PM_{10}**	**NO_2**	**PM_{10}**
Air Quality Objective	**40**	**40**	**200**	**50**
Ground Floor NW Flat	29.7	12.7	112.1	25.3
Ground Floor N Flat	28.4	12.5	103.9	25.0
First Floor NW Flat	25.4	12.0	66.1	24.0
First Floor N Flat	25.3	12.0	65.9	24.0
Fourth Floor NW Flat	23.8	11.8	46.3	23.5
Fourth Floor N Flat	23.8	11.8	46.2	23.5

5.1.2 Description of Impacts

Predicted concentrations, for both the 2023 baseline scenario are detailed in Appendix A.

5.1.2.1 Long-term Impacts

NO_2

The 2023 long-term NO_2 concentrations predicted at new receptors introduced by the Development range from 23.8 µg/m³ to 29.7 µg/m³, which is 59.5% to 74.3% of the AQO.

Long term average concentrations of NO_2 at the receptors are less than 75% of the AQO, the top row of Table 3.1 (Table 6.3 in the IAQM guidance) applies. As there is no impact arising from the Development any air quality effects on the receptors are considered to be negligible.

PM_{10}

The 2023 long-term PM_{10} concentrations predicted at new receptors introduced by the Development ranges from 11.8 µg/m^3 to 12.7 µg/m^3, which is 29.5% to 31.8% of the AQO.

Long term average concentrations of PM_{10} at the receptors (both the baseline and "with Development" scenarios) are less than 32% of the AQO. As this is less than 75% of the AQO, the top row of Table 3.1 (Table 6.3 in the IAQM guidance) applies. As there is no impact arising from the Development any air quality effects on the receptors are considered to be negligible.

5.1.2.2 Short-term Impacts

NO_2

The 2023 short-term NO_2 concentrations predicted at new receptors introduced by the Development range from 46.2 µg/m^3 to 112.1 µg/m^3, which is 23.1% to 56.1% of the AQO. As there is no impact arising from the Development any air quality effects on the receptors are considered to be negligible.

PM_{10}

The 2023 short-term PM_{10} concentrations predicted at new receptors introduced by the Development range from 23.5 µg/m^3 to 25.3 µg/m^3, which is 47% to 50.6% of the AQO. As there is no impact arising from the Development any air quality effects on the receptors are considered to be negligible.

5.1.3 Significance

In the case of the Development:

- Future baseline air quality is substantially below all AQOs at the proposed new receptor locations introduced by the Development;
- There will be no impact from additional traffic arising from the Development;
- The assumptions made when undertaking the prediction of impacts have been a combination of best-estimate (i.e., most accurate) and worst-case assumptions. The influence these will have is to over-estimate impacts. This has been done in order to account for uncertainties inherent in modelling; the results are therefore conservative, and in reality the impacts are expected to be lower than predicted.

Given the above, the effects on human health associated with air quality at the Development are assessed as **not significant**.

5.1.4 Mitigation Measures

As a result of air dispersion modelling, AQOs are not predicted to be exceeded and all air quality effects are predicted to be negligible. As such no mitigation measures are proposed or considered necessary for the protection of human health from air quality pollution effects.

5.2 Assessment Against the West Yorkshire TPG

5.2.1 Stage 1 – Development Classification

Following the criteria in the TPG, the Development constitutes a minor proposal, *i.e.* the development does not exceed 50 residential units or more than 2500 sqm of A3 floorspace. The 'other criteria' at the end of the table are not triggered.

5.2.2 Stage 2 - Assessment

At the request of the Council the traffic emissions have been modelled and assessed in this report. This constitutes a detailed assessment, which concludes there are negligible air quality impacts on the receptors introduced as part of the Development.

5.2.3 Stage 3 - Impact Mitigation

The level of mitigation required to make the Development acceptable has been classed as Type 1 proposal mitigation. The TPG document presents default mitigation measures for Type 1 proposals in order to achieve the minimum air quality requirements. These measures are set out in the following sections.

5.2.3.1 Construction Dust

A number of best practice mitigation measure could be employed to minimise dust emissions during construction. The following measures should be considered:

- Develop a Dust Management Plan;
- Damping down of brick walls during building demolition;
- Regular inspection and wet suppression of material/soil stockpiles where necessary (including wind shielding or complete enclosure, storage away from site boundaries, and restricted height of stockpiles), with an increased frequency when activities with high potential to generate dust are carried out during prolonged dry or windy conditions;
- Appropriate orientation of material stockpiles;
- Provision of wheel washing and wet suppression during loading of wagons/vehicles;
- Covering vehicles carrying dry spoil and other wastes to prevent escape of materials;
- Shielding of dust-generating construction activities;
- Use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques;
- Use enclosed chutes, conveyors and covered skips;
- Avoid site runoff of mud or water; and
- Provision of suitable site hoarding.

5.2.3.2 Boiler Specifications

Where dwellings have gas-fired boilers, boilers must not exceed the minimum standard of 40 mg NO_x/kWh. Dwellings with a gas-fired Combined Heat and Power (CHP) plant must meet the following minimum emissions standards:

- Spark ignition engine 250 mg NO_x/Nm^3;
- Compression ignition engine 400 mg NO_x/Nm^3;
- Biomass boiler 278 mg NO_x/Nm^3.

5.2.3.3 ELV Charging Points

As there is no parking proposed by the Development there is no requirement for EV charging points.

6 CONCLUSIONS

The Development will not lead to an increase in road traffic in the locality, but will introduce new sensitive receptors in close proximity to the A638 Dewsbury Ring Road.

The Development introduces 23 residential units adjacent to the A693 (Dewsbury Ring Road). An assessment of air quality based on dispersion modelling, predicts the following pollutant concentrations at new receptors introduced by the Development:

- The long-term NO_2 concentrations range from 23.8 µg/m^3 to 29.7 µg/m^3, which is 59.5% and 74.3% of the AQO.
- The short-term NO_2 concentrations range from 46.2 µg/m^3 to 112.1 µg/m^3, which is 23.1% to 56.1% of the AQO.
- The long-term PM_{10} concentrations range from 11.8 µg/m^3 to 12.7 µg/m^3, which is 29.5% to 31.8% of the AQO.
- The short-term PM_{10} concentrations range from 23.5 µg/m^3 to 25.3 µg/m^3, which is 47% and 50.6% of the AQO.

Predicted concentrations are substantially below the AQOs and so there is no significant risk of unacceptable human health impacts and no specific mitigation is required to protect the air quality of new residents introduced by the Development.

The Development has also been assessed against the three stages of the West Yorkshire TPG, and in accordance with Stage 3, suitable mitigation has been proposed, including best practice construction dust mitigation and minimum specifications for gas-fired boilers.

APPENDIX A

Air Dispersion Modelling – Technical Note

FIELD HOUSE, WELLINGTON ROAD, DEWSBURY

APPENDIX A
AIR DISPERSION MODELLING TECHNICAL NOTE

MAY 2019

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1 INTRODUCTION

This document sets out the model input and output parameters used in assessing the air quality impacts associated with the proposed redevelopment at Field House, Wellington Road in Dewsbury (the Development).

The software ADMS Roads Extra 4, version 4.1.1.0, was used.

The input data are stated, with sources of information and assumptions.

The following scenario was modelled:

1. "2016 Verification" to check model accuracy by comparison with the nearest council diffusion tube; and
2. "2023 baseline", as the Development proposes no new traffic, only the effects of the natural increase in road traffic need to be taken into account on the new receptors to be introduced as a result of the Development.

2 MODEL INPUTS

Model inputs are described in the sections below, and shown on plan on Figures 1a and 1b.

Figure 1a: A map-based representation of the model inputs

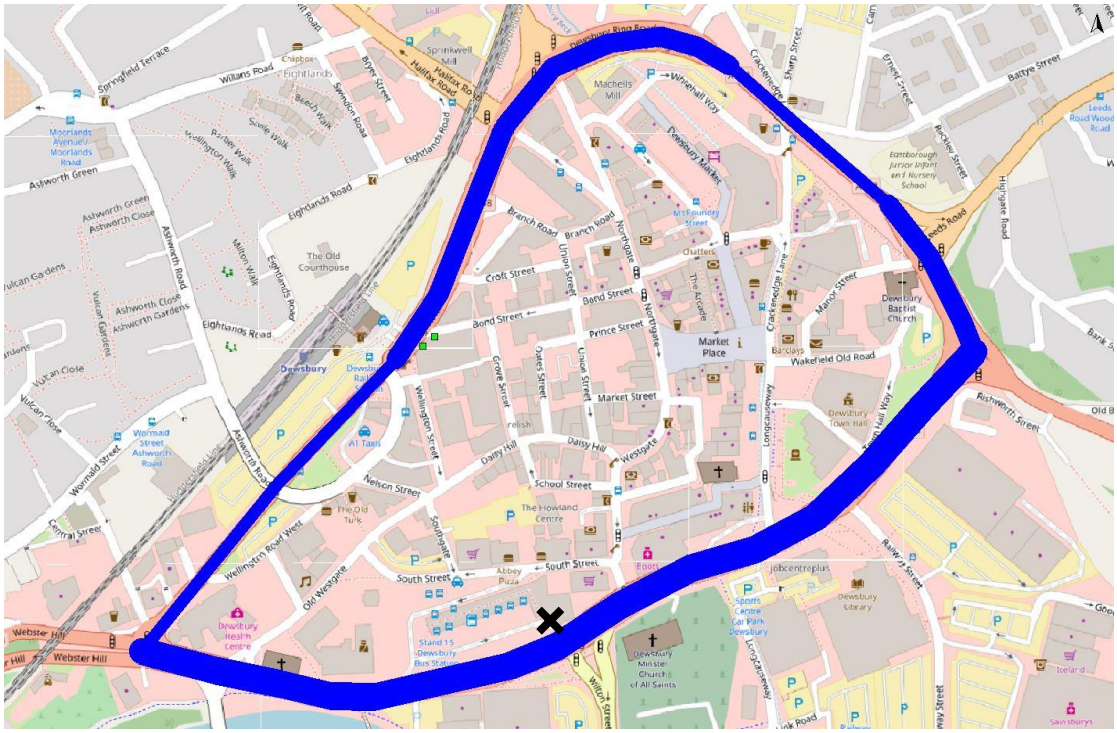


Figure 1a notes:

- Blue line: modelled road, A638 (Dewsbury Ring Road);
- Green squares: receptor locations (labelled on Figure 1b); and
- Black cross: Council diffusion tube K1.

Figure 1b: Zoomed in Extract of Figure 1a

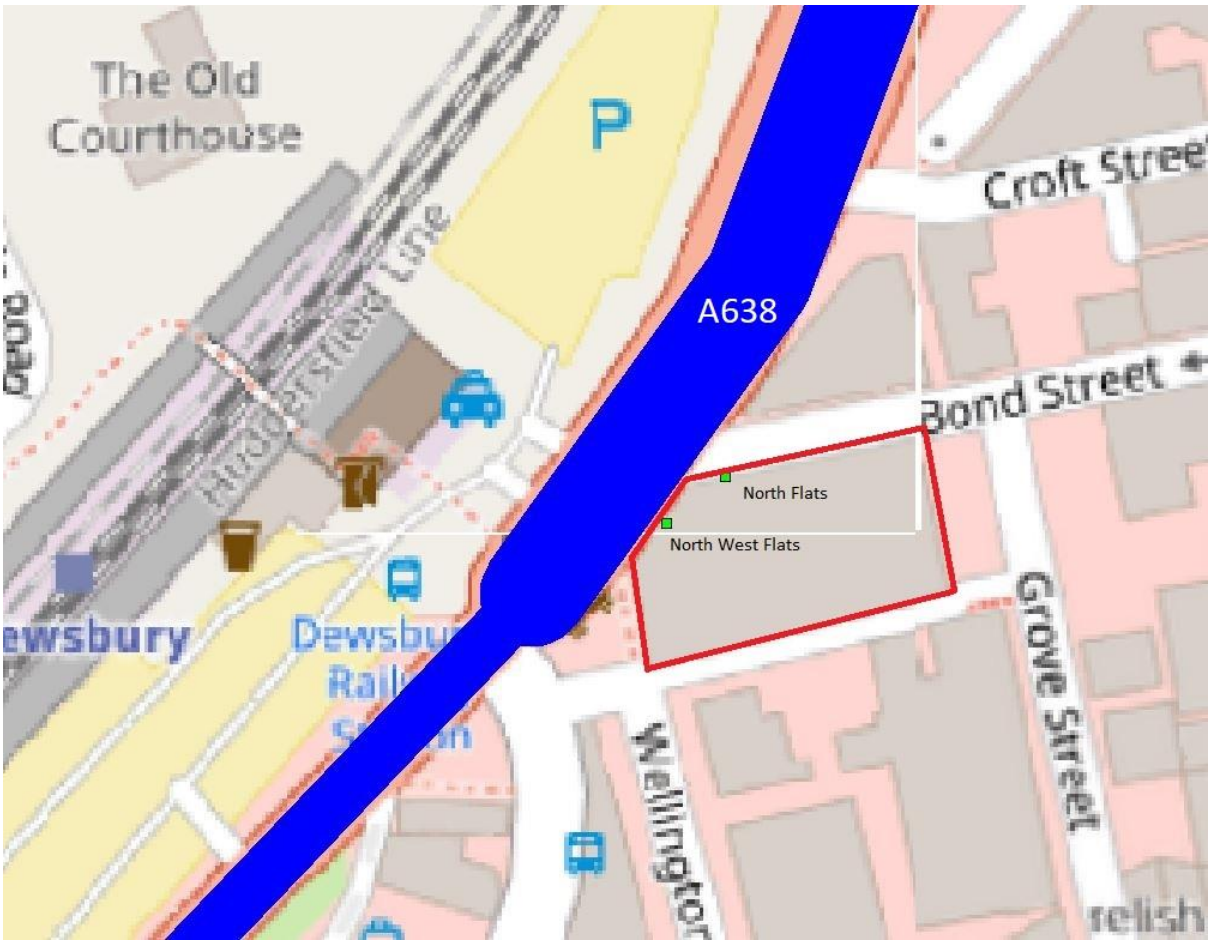


Figure 1b notes:

- Blue line: modelled road, A638 (Dewsbury Ring Road);
- Green squares: receptor locations, labelled; and
- Red line: approximate Development site.

2.1 Pollutant Emission Sources

2.1.1 Point Source Emissions

No point source emissions have been modelled, either on site or offsite.

2.1.2 Road Emission Sources

As reported in other documents submitted in support of the application for planning permission for the Development, when operational, the Development will not contribute any traffic to the surrounding road network as no parking is proposed. Therefore, only the air quality impact of the future baseline traffic flows on the A638 (Dewsbury Ring Road) will be considered on the new receptors introduced by the Development.

The representation of the road in the model is shown in Figure 1.

For verification of the model, traffic flows for 2016 (the most recent year of Council monitoring) were obtained. As there is no proposed road traffic from the Development,

only future baseline traffic flows are required for the year when the Development would be occupied (assumed to be 2023).

ADMS calculated emissions along Dewsbury Ring Road based on annual average daily traffic (AADT) levels obtained from the Department for Transport for the year 2016. A growth factor of 1.0713 was then applied to 2016 traffic flows for 2023[1] to allow for natural growth.

Road traffic was modelled for both of the scenarios as shown in Table 1.

Table 1: Hourly Average Traffic Movements as modelled

Road	2016		2023	
	LDV	HDV	LDV	HDV
Dewsbury Ring Road (A638)	630	19	675	20

Emissions from road traffic were calculated using the dataset "UK EFT v8.0 (2 VC), for the years appropriate to each model scenario (2016 and 2023, respectively). Whilst it is noted on the DEFRA website that there is a version 8.0.1 this did not affect the emission factors for individual vehicle sub-categories. As noted on the DEFRA website, version 8.0.1 addressed the following issues:

- Bug fix to correct the bus and coach split on London roads when entering data using the Alternative Technologies traffic format input option only; and
- Bug fixes to allow compatibility with Excel 2007 and 64-bit instances of Excel.

The problem with the bus and coach split was identified by Cambridge Environmental Research Centre (CERC)[2], and the correct bus and coach split was used when putting the data into the ADMS models. EFT version 8.0.1 is effectively already included in the ADMS models, even though the version number shown by the interface is 8.0.

The "road type" was set to "England (urban)". Hourly and daily variations in traffic flow relative to the averages presented above were modelled based on Department for Transport statistics[3].

2.2 Meteorology

Sensitivity analysis was carried out on 5 years of hourly sequential meteorological data (for 2012-2016 inclusive). The data were provided by the Met Office, and were taken from measurements recorded at Bramham, supplemented with cloud cover data from Bingley.

For prediction purposes, to ensure a worst-case approach is taken to deal with uncertainty in meteorological conditions, the model was run with the five met data sets and the met data set giving rise to the greatest pollutant concentrations at the worst-case receptor was used for all modelling scenarios. This was found to be the 2012 data. A wind rose for this data set is provided in Figure 2, illustrating a dominant westerly wind with other wind from the southwest and northwest.

[1] https://laqm.defra.gov.uk/documents/RTF-Automated-Traffic-Growth-Calculator-v3-1.xls

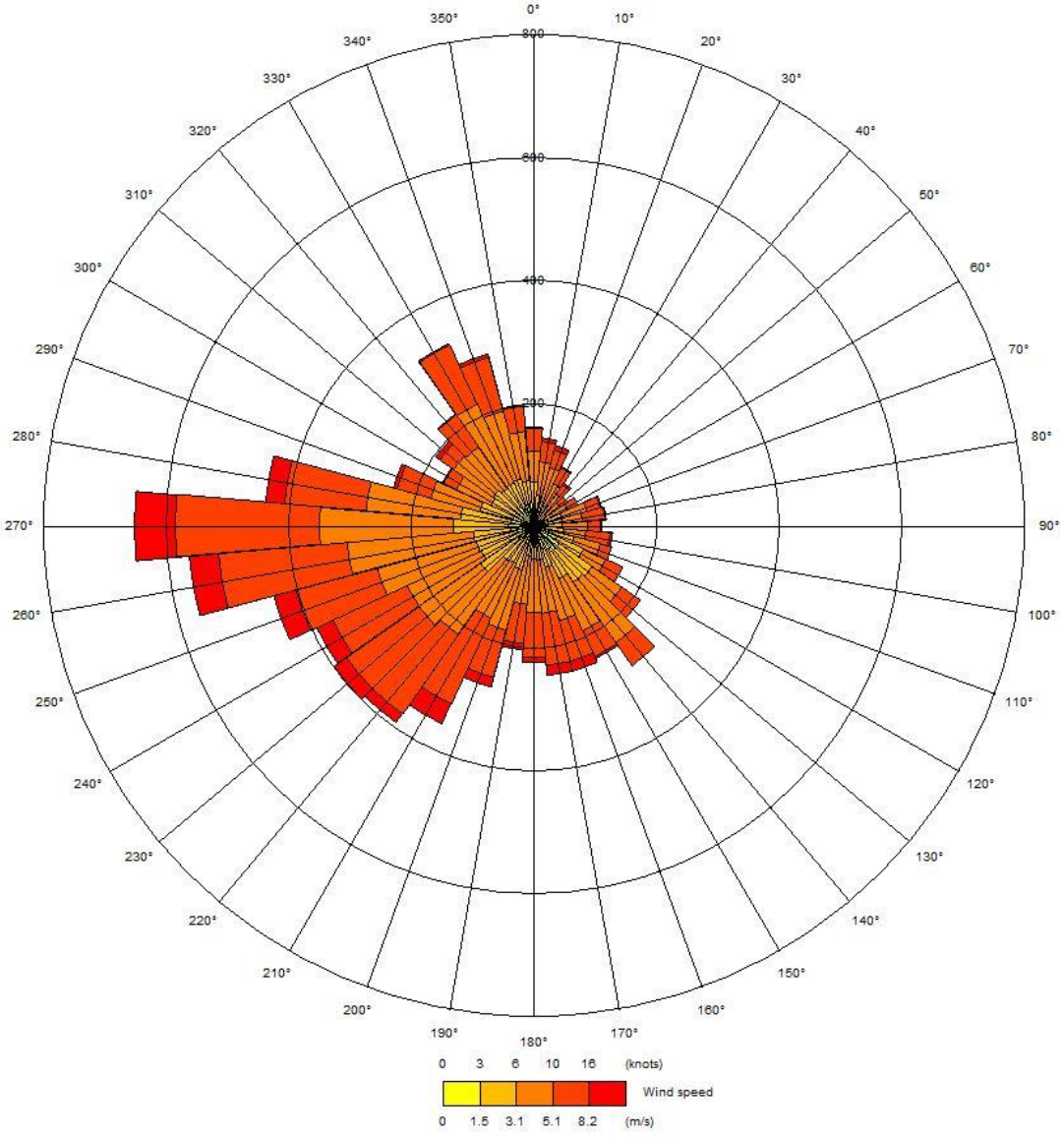
[2] CERC are providers of the ADMS Roads dispersion model software

[3] Department for Transport (2017). Department for Transport statistics: Table TRA0307: Traffic Distribution by time of day on all roads in Great Britain 2015. Available at: www.gov.uk/government/organisations/department-for-transport/series/road-traffic-statistics [accessed on 7/04/2018]

The most recent year of hourly sequential met data representing the same year as council diffusion tube monitoring results was used for model verification (2016).

A surface roughness value of 1.0 was used, which responds to the typical height of structures in the area being c. 10 m and which is described in ADMS as being appropriate for "cities, woodlands". A surface roughness value of 0.2 was used for the met measurement site, defined as "agricultural areas (min)".

Figure 2 – Wind Rose - 2012 Met Data from Bramham



2.3 Other Model Settings

- Terrain - following a review of the terrain in the vicinity of the Development site terrain has not been included in the model. Whilst some slopes are present none exceed a gradient of 10% which is the threshold referred to in the ADMS Roads manual;
- Street Canyons- no sections of the A638 were considered to be a street canyon[4] and therefore no sections of road were modelled as a street canyon. Buildings or

[4] Defined by ADMS as 'deep, narrow, valley-like spaces created when a road is enclosed by tall buildings on both sides'.

structures are either set back from the road or are absent on one side of the road or the other; and
- Buildings - no buildings have been represented in the model. Individual buildings are not likely to impact significantly on the dispersion of emissions, particularly from the road sources around the site.

2.4 Background Concentrations

Background concentrations of modelled pollutants are values that are typical of the area but away from the specific sources of pollution modelled explicitly. When the impacts of the modelled sources are added to the background, this should give a realistic representation of actual values at receptor locations.

Background concentrations of modelled pollutants have been taken from the DEFRA background air quality database[5], for the location 424500, 421500, with pollutant-specific notes as follows:

- NO_2: the 2015 dataset was used, with the appropriate year for each model scenario selected (2016 and 2023); and
- PM_{10}: the 2015 dataset was used, with the appropriate year for each model scenario selected (2016 and 2023).

The long-term background concentrations used in the model are shown in Table 2. Short-term background concentrations were assumed to be double the long-term values.

Table 2: Background Pollutant Concentrations

Scenario	2016	2023
NO_2 (µg/m^3)	26.3	19.5
PM_{10} (µg/m^3)	14.3	11.7

2.5 Receptor Locations

The receptor locations set out in Table 3, and shown on Figure 1, were specified for pollutant concentration evaluation in the model. Two locations were modelled at three different heights: 1.5 m (ground floor), 6.2 m (first floor) and 16 m (fourth floor).

Table 3: Modelled Receptor Locations

Receptor	Easting	Northing	Elevation above ground level
Ground Floor NW Flat	424391	421774	1.5m
Ground Floor N Flat	424401	421782	1.5m
First Floor NW Flat	424391	421774	6.2m
First Floor N Flat	424401	421782	6.2m
Fourth Floor NW Flat	424391	421774	16m
Fourth Floor N Flat	424401	421782	16m

[5] DEFRA (2017). Pollutant background concentration map. Available at: https://uk-air.defra.gov.uk/data/laqm-background-home [accessed on 07/04/2018]

3 MODEL PROCESSING

NO_X was modelled in ADMS for road sources. This was then converted to NO_2 using the DEFRA "NOx to NO2 conversion spreadsheet", version 6.1 (as appropriate for the EFT database implemented in ADMS, version 8.0)[6].

Total NO_2 and PM_{10} was calculated at each receptor location by adding the background (which was doubled for peak concentrations) to the modelled road traffic contribution to give the total predicted concentration of NO_2 and PM_{10} at each receptor location for each scenario.

4 MODEL OUTPUTS

The following sections summarise the model outputs from the following scenarios:

- 2016 Verification Scenario; and
- 2023 Baseline with new receptors.

4.1 2016 NO_2 Verification Scenario

The 2016 scenario was modelled in order to compare modelled NO_2 concentrations with measured data reported by the Council[7], in accordance with LAQM TG(09).

The nearest council diffusion tube location (K1), also located on the A638, was used in the model verification exercise. The monitored concentrations from the diffusion tube are detailed in Table 4 below, along with the relevant modelled concentration and percentage difference. The location of the diffusion tube was taken from the coordinates provided in the 2018 Annual Progress Report as was the height of 2 m. It is noted that the site type is listed as "Other". The tube is located adjacent to Dewsbury bus station, 0.8 m from the road.

Table 4 Model Verification Summary

Diffusion Tube	Modelled Concentration (µg/m³)	Monitored Concentration (µg/m³)	Difference (µg/m³)	RMSE (µg/m3)
K1	42.2	47.4	5.2	5.2

The modelled concentration is 10.9% lower than the measured concentrations with the difference being 5.2 µg/m³. The Root Mean Square Error (RMSE) is typically used to define the average difference between the model and the monitored concentrations (where there are more than one), as per LAQM TG(09)[8]. As there is only one monitoring location in the verification the RMSE is simply the difference between the monitored and the modelled result. If the difference is higher than ±25% of the objective being assessed, the guidance recommends that the model be adjusted. For example, for the annual mean NO_2 objective of 40 µg/m³, if a difference of 10 µg/m³ or above is determined for a model it would require adjustment.

As can be seen the difference is 5.2 µg/m³, which is 13% of the AQO. However, the location of the diffusion tube adjacent to Dewsbury bus station would mean the presence of idling

[6] https://laqm.defra.gov.uk/documents/NOx_to_NO2_Calculator_v6.1.xls

[7] Diffusion tube data was obtained from the Councils 2018 Annual Progress Report, Available online: https://www.kirklees.gov.uk/beta/crime-and-safety/pdf/kirklees-annual-status-report-2018.pdf

[8] LAQM TG(09), Available online https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69334/pb13081-tech-guidance-laqm-tg-09-090218.pdf [accessed on 16/11/2018]

buses for extended periods of time, the effects of which will not have been modelled. With this, along with the distance between the monitoring location and the Development site (c. 250m) and the difference between the kerbside nature of the monitoring site (0.8 m from the nearest road) and the roadside nature of the Development (4 m from the nearest road) the model is deemed to be acceptable without the need for any adjustment.

4.2 2023 Baseline

The 2023 NO_2 and PM_{10} predicted total concentrations at existing receptors are shown in Tables 5 and 6, respectively.

Table 5: Modelled Concentrations of NO_2 (µg/m^3)

Receptor	Annual Mean		1-hour mean	
	Limit Value	2023 Baseline	Limit Value – (not to be exceeded > 18 times per year)	2023 Baseline
Ground Floor NW Flat	40	29.7	200	112.1
Ground Floor N Flat	40	28.4	200	103.9
First Floor NW Flat	40	25.4	200	66.1
First Floor N Flat	40	25.3	200	65.9
Fourth Floor NW Flat	40	23.8	200	46.3
Fourth Floor N Flat	40	23.8	200	46.2

Table 6: Modelled Concentrations of PM_{10} (µg/m^3)

Receptor	Annual Mean		24-hour mean	
	Limit Value	2023 Baseline	Limit Value – (not to be exceeded > 35 times per year)	2023 Baseline
Ground Floor NW Flat	40	12.7	50	25.3
Ground Floor N Flat	40	12.5	50	25.0
First Floor NW Flat	40	12.0	50	24.0
First Floor N Flat	40	12.0	50	24.0
Fourth Floor NW Flat	40	11.8	50	23.5
Fourth Floor N Flat	40	11.8	50	23.5