



Lidl UK GmbH

Former William Freeman Site, Wakefield Road, Mapplewell

Air Quality Assessment

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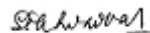
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This work has been undertaken in accordance with the quality management system of RSK Group Limited.

Abbreviations

AQMA	Air Quality Management Area
AQOs	Air Quality Objectives
AQs	Air Quality Standards
BMBC	Barnsley Metropolitan Borough Council
CO	Carbon Monoxide
COCP	Code of Construction Practice
DEFRA	Department of Environment, Food and Rural Affairs
EC	European Commission
EU	European Union
LDV	Light Duty Vehicle
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
NAQS	National Air Quality Strategy
NPPF	National Planning Policy Framework
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
NRMM	Non Road Mobile Machinery
RSK	RSK Environment Limited
PM _{2.5}	Particulate matter of size fraction approximating to <2.5mm diameter
PM ₁₀	Particulate matter of size fraction approximating to <10mm diameter

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1 INTRODUCTION

RSK Environment Ltd (RSK) was commissioned to undertake an assessment of the potential air quality impacts associated with the proposed Lidl store and associated car parking (approximately 139 spaces) at the former William Freeman site, Wakefield Road, Mapplewell. The proposed development falls within the jurisdiction of Barnsley Metropolitan Borough Council (BMBC).

This report presents the findings of an assessment of existing/baseline air quality conditions and the impact of ambient air quality of the development on the surrounding area, and the impact of ambient air quality on future site users with the development in place. The report also recommends mitigation measures as appropriate. Figures 1.1 and 1.2 (overleaf) show the location of the former William Freeman site. The proposed Lidl supermarket would be located in the southern section the site within the redline boundary, whilst a planning application has been submitted separately for the remaining area to be developed for residential end use.

RSK prepared an air quality assessment (AQA) for the site during December 2017 (RSK reference: 442852/AQ/01 (00)) ('the original AQA'). At that time, traffic data for one of the committed developments (325 residential units at the former North Gawber Colliery (planning reference: 2014/0452), located in the vicinity of the proposed development site, were not available. The air quality assessment for the North Gawber Colliery development estimated that the development would be fully occupied by 2023, five years after the proposed food store (the subject of this assessment) is scheduled to be complete. The proposed residential development adjacent to the food store is also scheduled to be operational by 2023. For these reasons, an Addendum Air Quality Assessment ('AAQA') was prepared (RSK reference: 442852/AQ/02 (00)), to determine whether air quality effects associated with the development may get worse over time

The AAQA also incorporated the following changes to the methodology used in the original AQA:

- A Temprow growth factor was made available by Byron G Hall Limited (since the original AQA was prepared and submitted) to enable 'projection' of their 2017 surveyed traffic data to 2016, where previously base case data for the roads included in the S1 model were obtained from the Department for Transport (DFT) website in the absence of such a factor. The model verification was therefore rerun to determine the impact this may have on the modelled results;
- Future 'base case' traffic data were factored from 2018 to 2023 and the North Gawber and contributions from the proposed residential developments added to the growthed baseline in all future development scenarios; and,
- Some improvements to the dispersion model setup were also made, including the inclusion of DT67 in the model verification process, the modification of some receptor locations to align them closer to the modelled road links, and adjustments to the speeds at which vehicles were assumed to travel.

Owing to the changes made to the methods used in the original AQA within the addendum AQA, this updated modelling report should be viewed as superseding the original AQA.

Figure 1.1: Proposed Development Site Location



Note: Base mapping from Google Satellite Imagery, 2018.

Figure 1.2: Proposed Development Site Location; Lidl store and separate proposed residential development (submitted under a separate planning application)



2 LEGISLATION, PLANNING POLICY AND GUIDANCE

2.1 Air Quality Strategy

UK air quality policy is published under the umbrella of the Environment Act 1995, Part IV and specifically Section 80, the National Air Quality Strategy. The latest *Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air*, published in July 2007 sets air quality standards and objectives for ten key air pollutants to be achieved between 2003 and 2020.

The EU (European Union) Air Quality Framework Directive (1996) established a framework under which the EU could set limit or target values for specified pollutants. The directive identified pollutants for which limit or target values have been, or will be set in subsequent 'daughter directives'. The framework and daughter directives were consolidated by Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which retains the existing air quality standards and introduces new objectives for fine particulates (PM_{2.5}).

2.1.1 Air Quality Objectives and Standards

The air quality standards in the United Kingdom are derived from European Commission (EC) directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. The Air Quality Limit Values Regulations 2003 and subsequent amendments implement the EU Air Quality Framework Directive into English Law. Directive 2008/50/EC was translated into UK law in 2010 via the Air Quality Standards Regulations 2010.

The relevant¹ air quality objectives and air quality standards (AQSS) for England and Wales to protect human health are summarised in Table 2.1. The standard for PM_{2.5} is a target value and is not legally binding.

Table 2.1: Air Quality Objectives and standards relevant to the development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit (µg/m ³)
Nitrogen dioxide (NO ₂)	1 calendar year	-	40
	1 hour	18	200
Particles (PM ₁₀)	1 calendar year	-	40
	24 hours	35	50
PM _{2.5}	1 year	N/A	25

¹ Relevance, in this case, is defined by the scope of the assessment.

2.1.2 The Environment Act

The set objectives are to be used in the review and assessment of air quality by local authorities under Section 82 of the Environment Act (1995). If exceedances are measured or predicted through the review and assessment process, the local authority must declare an air quality management area (AQMA) under Section 83 of the Act, and produce an air quality action plan to outline how air quality is to be improved.

2.2 Planning Policy and Guidance

The land use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality concern that relates to land use and its development can be a material consideration in the determination of planning applications.

2.2.1 National Planning Policy Framework

In March 2012 The National Planning Policy Framework (NPPF) was published, superseding the bulk of previous Planning Policy Statements with immediate effect. The National Planning Policy Framework was intended to simplify the planning system and includes a presumption in favour of sustainable development.

Section 11 of the NPPF deals with Conserving and Enhancing the Natural Environment, and states that the intention is that the planning system should prevent *‘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’* and goes on to state that *‘new development [should be] appropriate for its location’* and *‘the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account.’*

With specific regard to air quality, the NPPF states that:

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

2.2.2 Local Planning Policy

BMBC adopted its Core Strategy in 2011, a spatial strategy for the future development of Barnsley up to the year 2026.

Policy CSP 41 (Development in Air Quality Management Areas) is most relevant to this assessment and states:

“Development in air quality management areas will be expected to demonstrate that it will not have a harmful effect on the health or living conditions of any future users of the

development in terms of air quality (including residents, employees, visitors and customers), or that any such harmful effects can be mitigated against.

We will only allow residential development in air quality management areas, where the developer provides an assessment that shows living conditions will be acceptable for future residents.

We will only allow development in air quality management areas which could cause more air pollution, where the developer provides an assessment that shows there will not be a significantly harmful effect on air quality.”

2.2.3 Local Planning Guidance

BMBC published their ‘Air Quality and Emissions: Good Practice Guidance’ in September 2014. 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.

The Guidance recommends that the air quality assessments follow a three stage process:

1. Classification of the development proposal based on scale and its potential effects on air quality;
2. Assessing and quantifying the impact on local air quality;
3. Determining the level of a mitigation required by the proposal to meet Local Development Plan requirements.

2.2.4 Guidance Document – Land-Use Planning & Development Control: Planning for Air Quality

Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) jointly published a guidance note ‘Land-Use Planning & Development Control: Planning for Air Quality’ in 2017. It provides a framework for air quality considerations within local development control processes, promoting a consistent approach to the treatment of air quality. The approach for assessing the significance of air quality impacts associated with a development is employed in this assessment, and is outlined in Appendix B. The guidance note is widely accepted as the most appropriate reference method for this purpose.

2.2.5 Guidance Document – Assessment of Dust from Demolition and Construction (Institute of Air Quality Management (IAQM), 2014) (‘the IAQM 2014 guidance’)

The Institute of Air Quality Management (IAQM) 2014 guidance establishes a method for the assessment of dust and emissions generated during the construction phase of a development, each for demolition, earthworks, construction and trackout. The assessment is used to define the appropriate level of mitigation required and the measures to reduce the identified potential impact. The method used in this guidance is summarised in Appendix A of this report.

3 ASSESSMENT SCOPE AND METHOD

3.1 Overall Approach

The approach taken for assessing the potential air quality impacts of the proposed development may be summarised as follows:

- consultation with the local authority on the proposed assessment methodology;
- characterisation of baseline characterisation of local air quality;
- advanced dispersion modelling assessment of air quality impacts of the proposed development;
- recommendation of mitigation measures, where appropriate, for any adverse effects on air quality; and,
- assessment of residual impacts resulting from the proposed development.

3.2 Baseline Characterisation

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources.

A desk based study has been undertaken using data obtained from continuous and diffusion tube monitoring stations maintained by BMBC and from the LAQM (Local Air Quality Management) Support/ United Kingdom Atmospheric Information Resource (UK-AIR) website maintained by the Department for Environment, Food and Rural Affairs (Defra).

3.3 Construction Phase

Construction of the proposed development may have the potential to lead to the release of fugitive dust and PM₁₀. There are human receptors within 350m of the boundary of the site and within 50m of the trackout route; therefore, a full qualitative construction impact assessment has been undertaken.

Appendix A explains how the magnitude of impacts associated with demolition, earthworks, construction and trackout, is combined with the sensitivity of ecological receptors, and human receptors to particulate matter and dust nuisance, to determine the overall dust risk.

The assessment is presented in Section 6 of this report.

3.4 Operation Phase Impact Assessment

The development can be classified as 'medium' as per the BMBC guidance and therefore the exposure of future site users to poor ambient air quality has been assessed. The potential for the development to effect air quality in the area surrounding

the site has also been assessed. The method used to determine the significance of impacts was the EPUK-IAQM guidance (see Appendix B).

Section 6 describes the methodology adopted for the operational phase assessment.

4 BASELINE AIR QUALITY CHARACTERISATION

For this assessment, the following public sources of information have been used to characterise the background air quality:

- Published results of local authority review and assessment studies of air quality, including local monitoring and modelling studies; and
- Estimated background concentrations in the UK-AIR/ LAQM Support website operated by Defra.

In the following paragraphs is a detailed description of how the baseline air quality has been characterised.

4.1 Air Quality Management Areas

The local authority, Barnsley Metropolitan Borough Council (BMBC), has designated six Air Quality Management Areas (AQMAs) due to elevated concentrations of nitrogen dioxide (NO₂) attributable to road traffic emissions.

The Application Site is not located within or close to any of the six designated AQMAs.

4.2 Local Urban Background Monitoring

Monitors at urban background locations measure concentrations away from the local influence of emission sources and are therefore broadly representative of residential areas within large conurbations. Monitoring at local urban background locations is considered an appropriate source of data for the purposes of describing baseline air quality for this Proposed Development site.

There is one local monitoring station where urban background concentrations of NO₂ are measured using continuous automatic instruments: Barnsley Gawber (CM3). The most recently measured annual-mean concentrations are presented in Table 4.1. There are no urban background monitoring stations which measure PM₁₀ in the vicinity of the site.

Table 4.1: Automatically Monitored Urban Background Annual-Mean NO₂ Concentrations

Monitor Name (Code)	Approx distance from proposed devt. (km)	Concentration (µg/m ³)				
		2012	2013	2014	2015	2016
Barnsley Gawber (CM3)	2.8	21.0	22.0	19.0	19.0	19.0

In addition, BMBC manually monitors NO₂ concentrations at a number of urban background locations using passive diffusion tubes and the most measured annual-mean concentrations are presented in Table 4.2.

Table 4.2: Passively Monitored Urban Background Annual-Mean NO₂ Concentrations

Monitor Name (Code)	Approx distance from proposed devt. (km)	Concentration (µg/m ³)				
		2012	2013	2014	2015	2016
Lansdowne Crescent, Darton (DT10)	3.2	31.6	28.8	30.3	29.6	29.1

4.3 DEFRA Estimated Background Concentrations

In addition to local monitoring data, estimated background air quality data are available from the LAQM Support website operated by Defra. The website provides estimated annual average background concentrations of nitrogen oxides (NO_x), NO₂, PM₁₀ and PM_{2.5} on a 1 km² grid basis. Table 4.2 reproduces estimated annual average background NO₂, PM₁₀ and PM_{2.5} concentrations for the 1km² containing the proposed development site for the years 2015 through to 2018.

In 2015, no exceedances of the annual mean AQSS for these pollutants is anticipated at background locations within the square, with concentrations estimated to decrease year on year until 2018.

Table 4.3: Estimated Background Annual Average NO₂, PM₁₀ and PM_{2.5} Concentrations at Proposed Development Site

Assessment Year	Estimated Annual Average Pollutant Concentrations Derived from the LAQM Support Website		
	Annual Average NO ₂ (µg/m ³)	Annual Average PM ₁₀ (µg/m ³)	Annual Average PM _{2.5} (µg/m ³)
2015	13.9	11.8	7.9
2016	13.4	11.7	7.8
2017	13.0	11.6	7.7
2018	12.4	11.5	7.6
Air Quality Standard	40	40	25

Notes: Presented concentrations for 1 km² grid centered on 434500,409500.

5 OPERATIONAL PHASE ASSESSMENT METHODOLOGY

The following subsections provide further information regarding input to the dispersion model including traffic emissions sources, meteorological data and receptors included, and the outcomes of the assessment.

5.1 Modelling Software

ADMS-Roads Extra (Version 4.1) was used for assessing the air quality impacts of road traffic emissions sources during the operational phase of the proposed development.

5.2 Modelling Scenarios

The following scenarios were modelled:

- **Scenario 1 (S1):** Base case (2016);
- **Scenario 2 (S2):** Without proposed development scenario (2018) - traffic during the anticipated year of proposed development operation, with three consented developments but without the proposed development (using 2018 traffic data, and 2016 emissions factors and background estimates);
- **Scenario 2a (S2a):** Without any development scenario (2018) - traffic during the anticipated year of proposed development operation, without the three consented developments or the proposed development (using 2018 traffic data, emissions factors and background estimates);
- **Scenario 3 (S3):** With all development scenario (2018) - traffic during the anticipated year of proposed development operation, with three consented developments and the proposed Lidl development in place (using 2018 traffic data, and 2016 emissions factors and background estimates); and,
- **Scenario 3a (S3a):** With proposed development scenario (2018) - traffic during the anticipated year of proposed development operation, without the three consented developments in place but with the proposed development in place (using 2018 traffic data, emissions factors and background estimates).

As discussed in Section 5.4 and 5.8, there is currently some uncertainty regarding vehicle emissions factors and future background pollutant concentrations, and the extent to which traffic will be generated by the three committed and consented developments.

S2 and S3 were therefore modelled using a conservative approach, where base case (2016) emissions factors and background pollutant concentrations are not predicted to fall with time, and where two committed and consented developments are predicted to open. S2a and S3a were modelled to present a scenario where emissions factors and background concentrations fall, and where the committed developments are not

operational. These two modelling scenarios are considered conservative and optimistic respectively.

The committed and consented developments included in S2 and S3 are as follows:

- The consented Wakefield Road development of 250 residences (ref. 2014/0249). This was due to be completed during 2017, although recent satellite imagery indicates that works had not been commenced; therefore it is anticipated that the development will be completed at a later stage than the Lidl development;
- The consented Lee Lane development of 200 residences (ref. 2013/0932). Recent satellite imagery also indicates that works had not been commenced; therefore it is anticipated that the development will be completed at a later stage than the Lidl development; and,
- The consented North Gawber residential development of 325 residences (ref. 2014/0452). The air quality assessment for this site indicated that the development is due to be completed in 2023 and the development did not appear to be approaching completion in satellite imagery.

It was for these reasons that RSK considered it appropriate to exclude all three consented developments in S2a and S3a. The sensitivity addendum submitted to accompany the original AQA (RSK reference 442852/AQ/02 (00)) contains the amended results, for 2023. This year was chosen as this is the estimated opening year for the North Gawber development, and proposed adjacent residential development.

5.3 Traffic Data

The traffic data (including % heavy duty vehicle / HDV movements) used in the modelling is presented in Appendix D. The road network included in the dispersion model is presented in Figure 5.1. Speed data for all road links are based on speed limits, with speeds slowed at junctions using professional judgment and with reference to the Local Air Quality Management Technical Guidance ('LAQM TG.16') (Defra, 2016).

The transport consultant, Bryan G Hall, provided the annual average daily traffic (AADT) flows and %HDVs for a 2017 base case, 2023 base case (including the committed and consented developments referenced), and a 2023 with development scenario. They also provided a Temprow factor which was used by RSK to convert 2017 AADTs to 2016 AADT's for use in the S1 base case scenario.

Byran G Hall did not provide data for modelled road links 19 and 20. These data were instead derived from traffic counts available on the Department for Transport (DFT) website for the year 2016 under their advice (and these data were used directly in S1). These were then factored to 2023 by RSK using Temprow growth factors provided by Byran G Hall for the future scenarios. RSK assumed that all development traffic using Wakefield Road between Rotherham Road and Carlton Road would originate from or continue southwards towards Barnsley as opposed to using Carlton Road.

5.4 Emission Factors

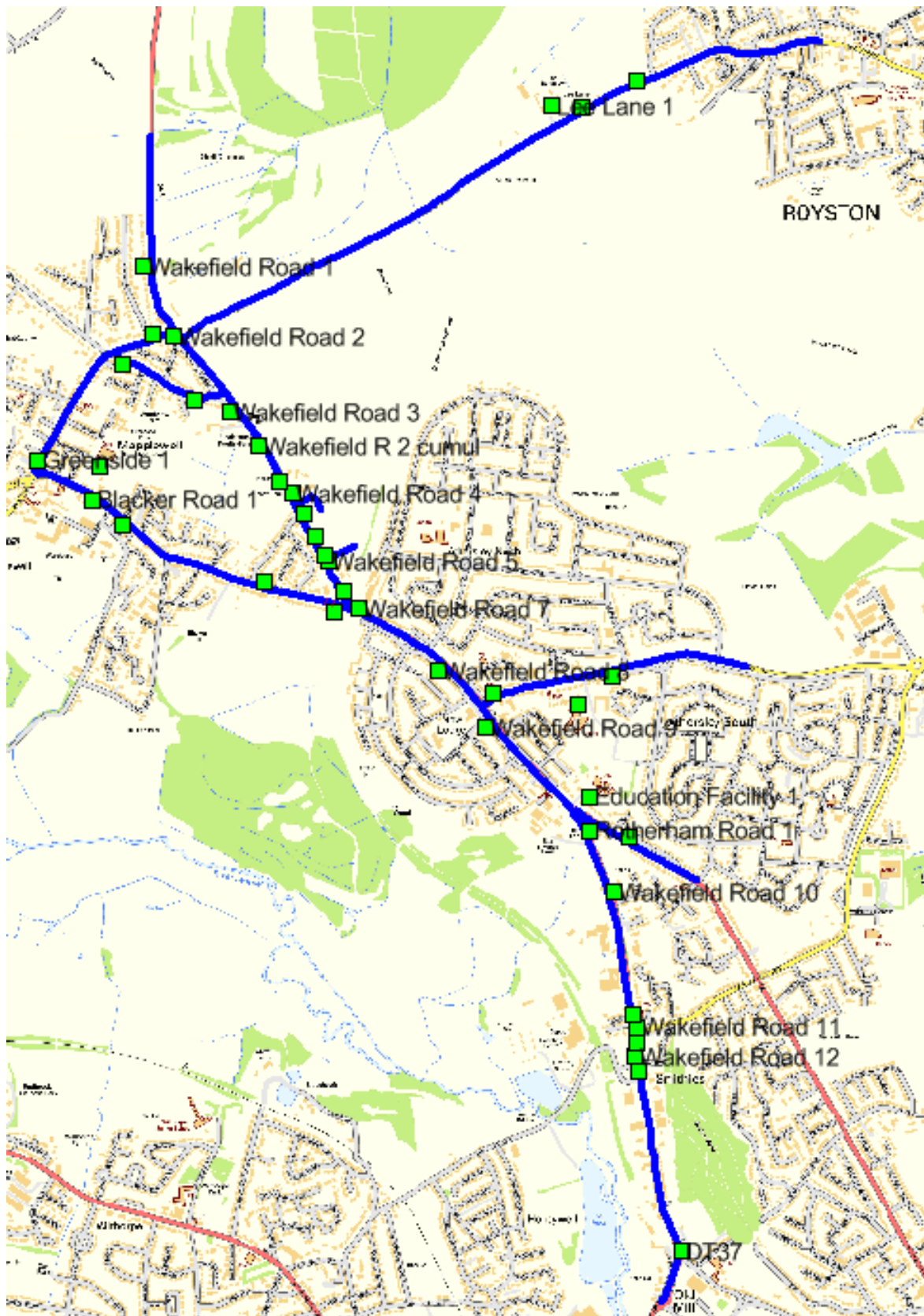
Nitrogen oxides (NO_x), PM₁₀ and PM_{2.5} emission factors were obtained using the Defra emissions factor toolkit (EFT) (v8.0.1), to estimate the grams of pollutant emitted per vehicle kilometre travelled per second, based on the average anticipated vehicle fleet for the year and part of the UK modelled.

There is some uncertainty over predictions of future emissions factors, with greater uncertainty the further into the future predictions are made. Emissions are predicted to fall with time but at a slower rate than is assumed within the EFT. Consequently 'base case' (2016) emissions factors were used for all modelled scenarios except S2a and S3a, for a conservative assessment. In order to assess the sensitivity of the model to emissions factors for different years, a sensitivity test using 2018 NO_x emissions factors was carried out in S2a and S3a.

5.5 Receptor Locations

Pollutant concentrations were predicted at a number of receptors in and around the development site. Details of all specific receptors included in the modelling study (and hence the air quality impacts assessed) are summarised in Appendix E. The locations of all assessed receptors are shown in Figure 5.1.

Figure 5.1: Roads and receptors in and around the development site included in the dispersion modelling assessment



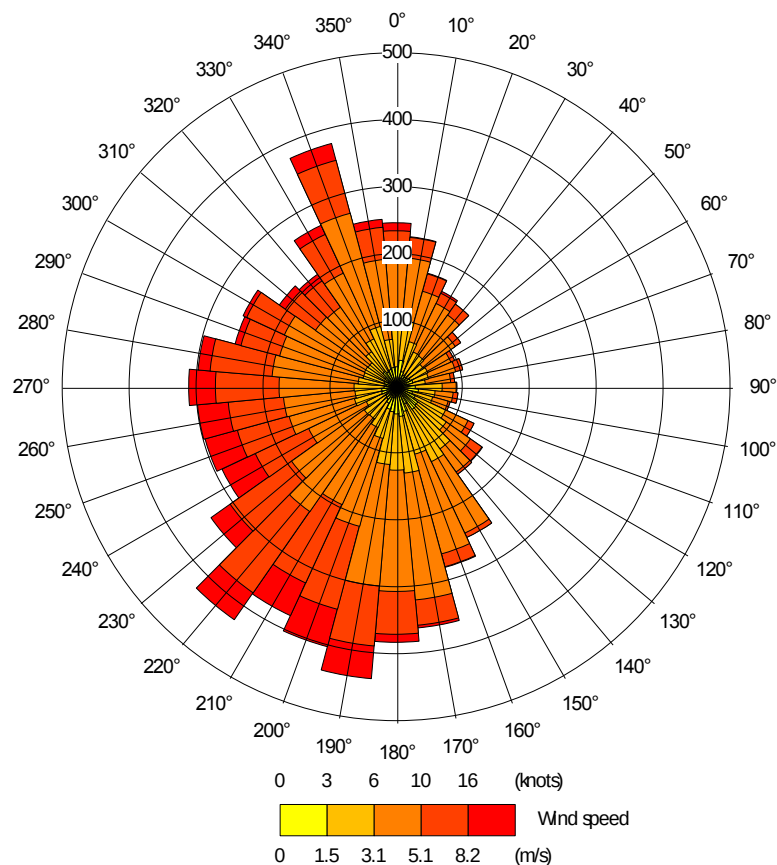
5.6 Time-Varying Profile

Vehicle movements and emissions from the proposed plant may vary with time. The national diurnal traffic profile for 2016 obtained from the DFT website was used for this assessment. The applied road emissions profiles are displayed in Figure C1 in Appendix C.

5.7 Meteorological Data

Hourly sequential meteorological data were employed in the dispersion model. Data for 2016 from the Doncaster Robin Hood Airport meteorological monitoring station was utilised. The windrose derived from the meteorological data is presented in Figure 6.2, below.

Figure 5.2: Windrose from the Doncaster Robin Hood Airport meteorological station in 2016



5.8 Background Air Quality Data Used in the Modelling

The CM3 urban background monitor is located in the northwest of Barnsley, 2.3km from the proposed development site, in a more densely populated area with a larger number of minor roads. Urban background diffusion tube DT10 is located in relatively close proximity to the M1 and therefore may be influenced by this road source. Therefore, in the absence of urban background monitoring data considered likely to be representative of the 'background' conditions applicable to all of the modelled domain, the estimated background annual mean NO₂, PM₁₀ and PM_{2.5} concentrations obtained from UK-AIR website were used.

Estimated concentrations for the year 2016 from the 2015 base year maps were used in this assessment for all modelling scenarios, with the exception of S2a and S3a, for which 2018 background data (from the 2015 base year maps) were used. Each discrete receptor was modelled using the background applicable for the 1km² site in which it is located. For the 2018 'optimistic' scenarios, the 'primary A roads in' contribution was removed from grid squares where appropriate; in the case of NO₂, this was achieved using version 6 of the 'NO₂ Adjustment for NOx Sector Removal Tool'. Table 5.1 summarises the background concentrations applied.

Table 5.1: Background Concentrations used within the Assessment

Scenario (including emission years modelled)	1km ² grid square	Estimated Annual Average Pollutant Concentrations Derived from the LAQM Support Website		
		Annual Average NO ₂ (µg/m ³)	Annual Average PM ₁₀ (µg/m ³)	Annual Average PM _{2.5} (µg/m ³)
S1, S2, S3, (2016)	433500,409500	13.42	11.69	7.77
	433500,410500	12.07	11.97	7.81
	435500,407500	17.90	Not modelled – background at model verification points only	
	435500,408500	14.74	11.86	7.91
	435500,411500	11.58	11.54	7.61
	434500,408500	13.03	12.06	7.88
	434500,409500	13.42	11.69	7.77
	434500,411500	10.34	12.12	7.83
S2a, S3a (2018)	433500,409500	10.92	11.55	7.53
	433500,410500	11.17	11.77	7.63
	435500,407500	16.59	12.14	8.00
	435500,408500	13.65	11.66	7.71
	435500,411500	10.73	11.36	7.44
	434500,408500	12.04	11.85	7.69
	434500,409500	12.40	11.47	7.56
	434500,411500	10.17	11.95	7.67
AQS		40	40	25

5.9 Other Model Input Parameters

The modelling input parameters for the dispersion modelling assessment are presented in Table 5.2.

Table 5.2: Summary of remaining inputs to the Dispersion Model

Parameter	Brief Description	Input into model
Road elevation	Elevation of road above ground level	No terrain file used
Road width	Width of road (m)	Road widths determined based on approximate measurement of roads (internet).
Canyon heights	Height of canyons effects turbulent flow patterns; these are greater with larger canyon heights	No canyons included.
Road type	Selection of different types of road to be assessed, inputted into the emission factor toolkit calculations	Urban (not London) settings used
Road speeds	Speed of the road effects the vehicle emissions to air	Based on speed limits on roads modelled. Reduced speeds have been used at junctions.
Meteorology	Representative hourly sequential meteorological data	Doncaster Robin Hood 2016
Latitude	Allows the location of the model area to be determined	53.5°
Surface roughness	This defines the surface roughness of the model area	0.4m (for the modelled domain and area in which meteorological station is located)
Monin-Obukhov length	A boundary layer parameter required to precisely describe the atmospheric stability conditions and to predict dispersion of pollutants released from road traffic	30m for the modelled domain and 10m for the area in which meteorological station is located

5.10 Verification

Modelled annual mean road NO_x, PM₁₀ and PM_{2.5} concentrations were verified using the method set out in Appendix E of this report and as per LAQM TG.16;

5.11 Interpretation of modelled NO_x, PM₁₀ and PM_{2.5} concentrations

The following method was used to estimate total annual mean concentrations:

- For annual mean NO_x only, the road source NO₂ at each receptor was estimated from the modelled NO_x concentration using version 6.1 of the NO_x to NO₂ calculator (Barnsley) (following verification); and
- These results were added to background concentrations.

- Annual mean PM₁₀ and PM_{2.5} concentrations represent the summation of background and road source impacts.

To estimate the number of days per annum where the daily mean PM₁₀ AQS may be exceeded, the following formula, derived from the Local Air Quality Management Technical Guidance (2016), was used: $-18.5 + 0.00145 \cdot ([N]^3) + (206/[N])$, where [N] is the predicted annual mean concentration at each receptor location.

The magnitude of changes in annual mean NO₂, PM₁₀ and PM_{2.5} concentrations associated with the proposed development (i.e. between S2 and S3, S2a and S3a, and S2b and S3b) was assessed in accordance with the EPUK-IAQM 2017 guidance.

Significance of effects was determined using professional judgement, based on the impact magnitudes assigned. The EPUK-IAQM method used is summarised in Appendix B of this report.

The results of the dispersion modelling are presented in section 6.2 and Appendix E.

6.12 Additional Uncertainties and Assumptions

- No on-site background monitoring was undertaken and therefore it is assumed that background data used are likely to reasonably represent conditions at site. Similarly, model verification has been undertaken using nearby roadside monitoring locations in a similarly built up urban area, but local conditions may mean that the model has been verified at locations which may not accurately represent conditions at site. It is assumed that the same model adjustment factor is applicable to the results generated at all modelled locations;
- Emissions from the average vehicle fleet using the local road network cannot be known, and therefore it is assumed those generated by the Eft (as appropriate) provided an accurate representation of emissions generated by vehicles which currently and will use the modelled roads;
- There will be uncertainties introduced because the modelling has simplified real-world processes into a series of algorithms. For example, it has been assumed that wind conditions measured at Doncaster Robin Hood Airport in 2016 are representative of wind conditions at the site. Furthermore, it has been assumed that the subsequent dispersion of emitted pollutants will conform to a Gaussian distribution over flat terrain in order to simplify the real-world dilution and dispersion conditions;
- The national diurnal profiles have been assumed to be applicable for the roads assessed;
- There is an element of uncertainty in all measured and modelled data. All values presented in this chapter are best possible estimates.

6 IMPACT ASSESSMENT

6.1 Construction Phase Impact Assessment

Atmospheric emissions from construction activities will depend on a combination of the potential for emissions (the type of activity and prevailing conditions) and the effectiveness of control measures. In general terms, there are two sources of emissions that will need to be controlled to minimise the potential for adverse environmental effects:

- exhaust emissions from site plant, equipment and vehicles; and
- fugitive dust emissions from site activities.

6.1.1 Exhaust Emissions from Plant and Vehicles

The operation of vehicles and equipment powered by internal combustion engines results in the emission of exhaust gases containing the pollutants oxides of nitrogen (NO_x), PM₁₀, volatile organic compounds, and carbon monoxide (CO). The quantities emitted depend on factors such as engine type, service history, pattern of usage and fuel composition.

Vehicle and plant movements will result in emissions to atmosphere of exhaust gases, but vehicle movements to and from the site will be on a temporary basis and can be mitigated following the implementation of construction phase travel plans and construction logistics plans, and plant emissions are unlikely to be significant when compared to background NO₂ and PM₁₀ concentrations.

6.1.2 Fugitive Dust Emissions

Fugitive dust emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture, road surface conditions and weather conditions. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust.

Construction activities that are considered to be the most significant potential sources of fugitive dust emissions include:

- Earthworks – removal of any remaining surface hard standing and subsurface features, piling works, haulage and stockpiling;
- Construction – use of materials including concrete with potential to generate dust in the construction of the building; and,
- Trackout – movement of vehicles and plant to and from site.

Fugitive dust arising from construction phase activities is mainly of a particle size greater than the PM₁₀ fraction (that which can potentially impact upon human health), however it is noted that construction related activities may contribute to local PM₁₀ concentrations. Appropriate dust control measures can be effective for controlling

emissions from potentially dust generating activities identified above, and adverse effects can be greatly reduced or eliminated.

See Appendix A for further explanation of the tendency of dust to remain airborne.

6.1.3 Construction Phase Dust Impact Risk

The IAQM 2014 guidance establishes a method for assessing the risk of dust and emissions affecting sensitive receptors in the area around the proposed development site, based on the 'area sensitivity' and the magnitude of emissions from each of the following four types of construction activity:

- demolition;
- earthworks;
- construction; and
- trackout.

In this case, demolition works are not to be undertaken and therefore demolition activities have not been included in this assessment.

For each activity, the risk of site-derived dust and emissions affecting local sensitive receptors is determined as either negligible, low, medium or high risk. The risk category may be different for each of the activities and depends on the potential emissions magnitude and the sensitivity of the area. Three different types of impact are considered:

- disamenity due to dust soiling;
- the risk of health effects due to an increase in exposure to PM₁₀; and
- harm to ecological receptors.

Appendix A sets out the construction dust assessment methodology in further detail.

As indicated in the addendum AQA, the construction phase assessment has not considered the impacts of the Wakefield Road development, as it is screened by existing vegetation and as it does not appear, from satellite imagery, that works have started in earnest. Moreover, the other two consented developments are not located within the vicinity of the site such that fugitive dust and emissions from the proposed and consented sites should not be considered cumulatively.

It is acknowledged that the proposed Lidl site may be affected by any fugitive dust and emissions generated should the adjacent proposed residential development commence; however, RSK's air quality assessment for the adjacent site (442840/AQ/01 (00)) recommended that a dust management plan (DMP) is developed and that the residual effects, following appropriate implementation of a DMP, would be insignificant. For these reasons, the proposed Lidl development is not likely to be introduced into an area where baseline dust and PM is high.

The construction phase assessment assumes the following:

- It is assumed earthworks activities may take place anywhere within the site (except the area excluded for the separate Lidl development), whilst construction activities are limited to the areas upon which new buildings will be located; and,
- It is assumed that trackout may occur on any arterial roads within 50 metres of the site exit, i.e. along Wakefield Road in both directions from the site exit. It is assumed that the site exit will be located in the same place as the site exit shown in the proposed development masterplan and that traffic will not use the exit associated with the Lidl development for this proposed development.

6.1.3.1 Potential Dust Emission Magnitude

With reference to the IAQM 2014 guidance criteria reproduced in Appendix B, the dust emissions magnitudes for earthworks, construction and trackout activities are summarised in Table 6.1 to Table 6.3. Any assumptions made by RSK have been signposted.

Table 6.1: Summary of Dust Emissions Magnitude of Earthworks Activities (Before mitigation)

Earthworks Criteria	Dust Emissions Class	Basis of Classification
Total site area	Medium	2,500 m ² -10,000m ²
Soil type	Small	It is understood that the soil type comprises siltstone seams within carboniferous beds
Earth moving vehicles at any one time	Small	Assumed <5
Height of stockpiles	Small	Assumed < 4 m
Total material moved	Small	Assumed <20,000 tonnes
Timing of works	Medium to large	It is anticipated that works may occur in periods of both wetter and drier weather.
Overall Rating	Medium	

Table 6.2: Summary of Dust Emissions Magnitude of Construction Activities (Before mitigation)

Construction Criteria	Dust Emissions Class	Evaluation
Total building volume	Small	<25,000 m ³ (~2,600m ² and assumed height of <5m)
On-site concrete batching or sandblasting proposed	Small to Medium	It is assumed that concrete batching may be proposed, but sandblasting is not proposed.
Potentially dusty construction activities undertaken	Medium to large	Assumed potentially dusty materials (such as concrete) may be used.
Overall Rating	Small	Considered sufficiently conservative due to building size.

Table 6.3: Summary of Dust Emissions Magnitude of Trackout Activities (Before mitigation)

Trackout Criteria	Dust Emissions Class	Basis of Classification
Number of HDV>3.5t per day	Small	Assumed <10
Site surface type	Medium	Siltstone. Assumed that site may be underlain by made ground, with the potential to contain clay-based materials which are easily entrained.
Length of unpaved road	Small	Assumed <50m
Overall Rating	Small	Small is considered sufficiently conservative.

On the basis of the above, the emissions magnitudes associated with earthworks, construction and trackout are likely small.

6.1.3.2 Sensitivity of Area for Earthworks and Construction

All earthworks and construction activities are assumed to occur within the site boundary. The sensitivity of the area has been classified and the results are provided in Table 6.4 below.

Table 6.4: Sensitivity of the Surrounding Area for Earthworks and Construction

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity / Classification
Dust Soiling	Medium	Between 1 and 10 high sensitivity receptors located within 20 m of the site boundary
Human Health	Low	Between 1 and 10 high sensitivity receptors located within 20 m of the site boundary Background PM ₁₀ concentrations below 24 µg/m ³ (see Table 5.1)
Ecological	Negligible	No ecological receptors within the relevant screening distance (as per MAGIC Maps website)

6.1.3.3 Sensitivity of Area for Trackout

The maximum dust emission magnitude for trackout is classified as medium (Table 6.3). The IAQM 2014 guidance however notes that for a small magnitude, trackout may occur on roads up to 50 m from the site exit. The major routes within 50m of the site exit are Wakefield Road (A61), along which it is assumed trackout could occur. The sensitivity of the area has been classified and the results are provided in Table 6.5.

Table 6.5: Sensitivity of the Surrounding Area for Trackout

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity / Classification
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Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity / Classification
Dust Soiling	Medium	Between 10 and 100 high sensitivity receptors located within 20 m of Wakefield Road
Human Health	Low	Between 10 and 100 high sensitivity receptors located within 20 m of Wakefield Road. Background PM ₁₀ concentrations below 24 µg/m ³
Ecological	Negligible	No ecological receptors within the relevant screening distance (as per MAGIC Maps website)

6.1.4 Risk of Impacts

The dust emission magnitude is combined with the sensitivity of the area to determine the risk of impacts of construction activities before mitigation; based on the matrices presented in Tables A5 to A7 in Appendix A. The risk of dust impacts from the construction activities are identified in Table 6.6. It can be seen that the risk of dust impacts has been assessed as a maximum of 'low risk' at the proposed development.

Mitigation measures to reduce potential impacts, based on this assessment, are defined in Section 7.

Table 6.61: Summary of the Dust Risk from Construction Phase Activities

Potential Impact	Dust Risk Impact			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	-	Medium Risk	Low Risk	Negligible Risk
Human health	-	Low Risk	Negligible Risk	Negligible Risk
Ecological	-	Negligible Risk		

6.2 Operational Phase Air Quality Assessment

Detailed dispersion modelling has been undertaken with the use of the ADMS-Roads dispersion model software, following guidance in accordance with LAQM TG.16 and the EPUK & IAQM (2017) guidance.

The modelled concentrations have been verified using monitoring data. For reference, the methodology for this has been described in Appendix E. Table D5 in Appendix D presents the predicted long- and short-term NO₂ and PM₁₀ concentrations at each of the receptor locations under the assessment scenarios.

6.2.1 Impacts of the Development on Local Air Quality

Annual mean Nitrogen Dioxide (NO₂)

Table 6.1 presents the predicted annual mean NO₂ concentrations under the S2 and S3 scenarios. As per the EPUK-IAQM guidance, the impact of the development on local air quality was assessed as 'negligible' at 29 of the 33 modelled existing receptor locations,

‘slight adverse’ at three locations and ‘moderate adverse’ at one location. However, the development did not expose any new receptors to annual mean NO₂ concentrations exceeding the annual mean NO₂ AQS.

Table 6.1: Comparison of Predicted annual mean NO₂ Concentrations between the ‘S2 Without Development’ and S3 ‘With All Development’ Scenarios

Receptor ID	Without Development		With Development		% Change NO ₂ concentration relative to AQUAL	Predicted Impact
	µg/m ³	% of AQUAL	µg/m ³	% of AQUAL		
Wakefield Road 1	16.47	41	16.57	41	0	Negligible
Wakefield Road 2	29.43	74	29.65	74	1	Negligible
Wakefield Road 3	18.33	46	18.51	46	0	Negligible
Wakefield Road 4	35.79	89	36.41	91	2	Slight adverse
Wakefield Road 5	34.92	87	36.07	90	3	Slight adverse
Wakefield Road 6	35.66	89	36.16	90	1	Negligible
Wakefield Road 7	44.76	112	45.36	113	1	Moderate adverse
Wakefield Road 8	23.02	58	23.23	58	1	Negligible
Wakefield Road 9	27.64	69	27.94	70	1	Negligible
Wakefield Road 10	24.41	61	24.65	62	1	Negligible
Rotherham Road 1	29.93	75	30.27	76	1	Negligible
Rotherham Road 2	22.82	57	22.97	57	0	Negligible
Education Facility 1	20.77	52	20.92	52	0	Negligible
Education Facility 2	16.64	42	16.69	42	0	Negligible
Laithes Lane 1	30.73	77	30.94	77	1	Negligible
Laithes Lane 2	20.34	51	20.40	51	0	Negligible
Bar Lane 1	24.44	61	24.67	62	1	Negligible
Paddock Road 1	16.92	42	17.09	43	0	Negligible
Paddock Road 2	18.25	46	18.40	46	0	Negligible
Shaw Lane 1	22.82	57	22.89	57	0	Negligible
Proposed Resi 1	29.38	73	29.88	75	1	Negligible
Proposed Resi 2	27.38	68	27.88	70	1	Negligible

Receptor ID	Without Development		With Development		% Change NO ₂ concentration relative to AQAL	Predicted Impact
	µg/m ³	% of AQAL	µg/m ³	% of AQAL		
Lee Lane 1	12.81	32	12.83	32	0	Negligible
Lee Lane 2 cumul	20.12	50	20.17	50	0	Negligible
Lee Lane 3 cumul	21.14	53	21.19	53	0	Negligible
Wakefield R. 1 cumul	24.48	61	24.84	62	1	Negligible
Wakefield R 2 cumul	22.60	57	22.91	57	1	Negligible
Blacker Road 1	24.66	62	24.86	62	0	Negligible
Blacker Road 2	23.84	60	24.03	60	0	Negligible
Education Facility 3	14.98	37	15.03	38	0	Negligible
Greenside 1	24.43	61	24.48	61	0	Negligible
Wakefield Road 11	40.54	101	40.89	102	1	Slight adverse

Note: AQAL – Air Quality Action Level, i.e. annual mean NO₂ AQS.

Table 6.2 presents the predicted annual mean NO₂ concentrations under the S2a and S3a scenarios. As per the EPUK-IAQM guidance, the impact of the development on local air quality was assessed as ‘negligible’ at 31 of the 33 modelled existing receptor locations and ‘slight adverse’ at 2 locations. The development did not expose any new receptors to annual mean NO₂ concentrations exceeding the annual mean NO₂ AQS.

Table 6.2: Comparison of Predicted annual mean NO₂ Concentrations between the ‘S2a Without Development’ and S3a ‘With Proposed Development’ Scenarios

Receptor ID	Without Development		With Development		% Change NO ₂ concentration relative to AQAL	Predicted Impact
	µg/m ³	% of AQAL	µg/m ³	% of AQAL		
Wakefield Road 1	14.20	36	14.29	36	0	Negligible
Wakefield Road 2	25.13	63	25.33	63	1	Negligible
Wakefield Road 3	15.65	39	15.82	40	0	Negligible
Wakefield Road 4	29.89	75	30.49	76	2	Slight adverse
Wakefield Road 5	28.52	71	29.64	74	3	Negligible
Wakefield Road 6	30.11	75	30.60	77	1	Negligible
Wakefield Road 7	38.23	96	38.82	97	1	Slight adverse

Receptor ID	Without Development		With Development		% Change NO ₂ concentration relative to AQAL	Predicted Impact
	µg/m ³	% of AQAL	µg/m ³	% of AQAL		
Wakefield Road 8	19.66	49	19.86	50	1	Negligible
Wakefield Road 9	23.45	59	23.73	59	1	Negligible
Wakefield Road 10	20.47	51	20.70	52	1	Negligible
Rotherham Road 1	25.30	63	25.62	64	1	Negligible
Rotherham Road 2	20.74	52	20.88	52	0	Negligible
Education Facility 1	17.82	45	17.96	45	0	Negligible
Education Facility 2	14.43	36	14.47	36	0	Negligible
Laithes Lane 1	26.44	66	26.64	67	1	Negligible
Laithes Lane 2	17.68	44	17.74	44	0	Negligible
Bar Lane 1	20.84	52	21.05	53	1	Negligible
Bar Lane 2	19.78	49	19.95	50	0	Negligible
Paddock Road 1	14.75	37	14.91	37	0	Negligible
Paddock Road 2	16.01	40	16.14	40	0	Negligible
Shaw Lane 1	19.89	50	19.96	50	0	Negligible
Proposed Resi 1	25.10	63	25.57	64	1	Negligible
Proposed Resi 2	23.46	59	23.94	60	1	Negligible
Lee Lane 1	11.59	29	11.60	29	0	Negligible
Lee Lane 2 cumul	17.57	44	17.61	44	0	Negligible
Lee Lane 3 cumul	18.56	46	18.61	47	0	Negligible
Wakefield R. 1 cumul	20.58	51	20.92	52	1	Negligible
Wakefield R 2 cumul	19.05	48	19.33	48	1	Negligible
Blacker Road 1	21.51	54	21.70	54	0	Negligible
Blacker Road 2	20.80	52	20.97	52	0	Negligible
Education Facility 3	13.06	33	13.10	33	0	Negligible
Greenside 1	21.36	53	21.40	54	0	Negligible
Wakefield Road 11	35.52	89	35.85	90	1	Negligible

Note: AQAL – Air Quality Action Level, i.e. annual mean NO₂ AQS.

Annual mean Particulate Matter (PM₁₀)

Table 7.3 presents the predicted annual mean PM₁₀ concentrations under the S2 and S3 scenarios. As per the EPUK-IAQM guidance, the impact of the development on local air quality was assessed as 'negligible' at all of the modelled existing receptor locations and no exceedance of the annual mean AQS were predicted with the development in place.

Table 7.3: Comparison of predicted annual mean PM₁₀ Concentrations (S2 – S3)

Receptor ID	Without Development		With Development		% Change in concentration relative to AQAL	Predicted Impact
	µg/m ³	% of AQAL	µg/m ³	% of AQAL		
Wakefield Road 1	12.73	32	12.74	32	0	Negligible
Wakefield Road 2	14.80	37	14.85	37	0	Negligible
Wakefield Road 3	13.05	33	13.09	33	0	Negligible
Wakefield Road 4	15.36	38	15.47	39	0	Negligible
Wakefield Road 5	14.71	37	14.90	37	0	Negligible
Wakefield Road 6	14.82	37	14.90	37	0	Negligible
Wakefield Road 7	16.14	40	16.26	41	0	Negligible
Wakefield Road 8	13.27	33	13.31	33	0	Negligible
Wakefield Road 9	13.76	34	13.81	35	0	Negligible
Wakefield Road 10	13.95	35	13.99	35	0	Negligible
Rotherham Road 1	14.64	37	14.70	37	0	Negligible
Rotherham Road 2	13.21	33	13.23	33	0	Negligible
Education Facility 1	12.71	32	12.73	32	0	Negligible
Education Facility 2	12.18	30	12.19	30	0	Negligible
Laithes Lane 1	13.94	35	13.98	35	0	Negligible
Laithes Lane 2	12.79	32	12.80	32	0	Negligible
Bar Lane 1	13.15	33	13.18	33	0	Negligible
Bar Lane 2	13.54	34	13.57	34	0	Negligible
Paddock Road 1	12.73	32	12.76	32	0	Negligible
Paddock Road 2	12.92	32	12.94	32	0	Negligible
Shaw Lane 1	13.55	34	13.57	34	0	Negligible
Proposed Resi 1	14.24	36	14.32	36	0	Negligible

Receptor ID	Without Development		With Development		% Change in concentration relative to AQAL	Predicted Impact
	$\mu\text{g}/\text{m}^3$	% of AQAL	$\mu\text{g}/\text{m}^3$	% of AQAL		
Proposed Resi 2	14.39	36	14.48	36	0	Negligible
Lee Lane 1	12.51	31	12.52	31	0	Negligible
Lee Lane 2 cumul	13.74	34	13.75	34	0	Negligible
Lee Lane 3 cumul	13.21	33	13.21	33	0	Negligible
Wakefield R. 1 cumul	14.13	35	14.20	36	0	Negligible
Wakefield R 2 cumul	13.87	35	13.93	35	0	Negligible
Blacker Road 1	13.58	34	13.61	34	0	Negligible
Blacker Road 2	13.26	33	13.29	33	0	Negligible
Education Facility 3	12.38	31	12.39	31	0	Negligible
Greenside 1	13.67	34	13.67	34	0	Negligible
Wakefield Road 11	15.38	38	15.44	39	0	Negligible

Note: AQAL – Air Quality Action Level, i.e. annual mean PM_{10} AQS.

Table 7.4 presents the predicted annual mean PM_{10} concentrations under the S2a and S3a scenarios. As per the EPUK-IAQM guidance, the impact of the development on local air quality was assessed as ‘negligible’ at all of the modelled existing receptor locations and no exceedance of the annual mean AQS were predicted with the development in place.

Table 7.4: Comparison of predicted annual mean PM_{10} Concentrations (S2a – S3a)

Receptor ID	Without Development		With Development		% Change in concentration relative to AQAL	Predicted Impact
	$\mu\text{g}/\text{m}^3$	% of AQAL	$\mu\text{g}/\text{m}^3$	% of AQAL		
Wakefield Road 1	12.43	31	12.44	31	0	Negligible
Wakefield Road 2	14.22	36	14.27	36	0	Negligible
Wakefield Road 3	12.69	32	12.73	32	0	Negligible
Wakefield Road 4	14.60	36	14.70	37	0	Negligible
Wakefield Road 5	14.10	35	14.29	36	0	Negligible
Wakefield Road 6	14.13	35	14.22	36	0	Negligible
Wakefield Road 7	15.33	38	15.44	39	0	Negligible

Receptor ID	Without Development		With Development		% Change in concentration relative to AQAL	Predicted Impact
	µg/m ³	% of AQAL	µg/m ³	% of AQAL		
Wakefield Road 8	12.86	32	12.89	32	0	Negligible
Wakefield Road 9	13.26	33	13.31	33	0	Negligible
Wakefield Road 10	13.45	34	13.49	34	0	Negligible
Rotherham Road 1	14.07	35	14.13	35	0	Negligible
Rotherham Road 2	12.91	32	12.94	32	0	Negligible
Education Facility 1	12.36	31	12.38	31	0	Negligible
Education Facility 2	11.91	30	11.92	30	0	Negligible
Laithes Lane 1	13.50	34	13.53	34	0	Negligible
Laithes Lane 2	12.50	31	12.51	31	0	Negligible
Bar Lane 1	12.74	32	12.77	32	0	Negligible
Bar Lane 2	13.16	33	13.19	33	0	Negligible
Paddock Road 1	12.45	31	12.48	31	0	Negligible
Paddock Road 2	12.64	32	12.66	32	0	Negligible
Shaw Lane 1	13.20	33	13.21	33	0	Negligible
Proposed Resi 1	13.67	34	13.75	34	0	Negligible
Proposed Resi 2	13.82	35	13.91	35	0	Negligible
Lee Lane 1	12.28	31	12.29	31	0	Negligible
Lee Lane 2 cumul	13.31	33	13.32	33	0	Negligible
Lee Lane 3 cumul	12.79	32	12.79	32	0	Negligible
Wakefield R. 1 cumul	13.60	34	13.67	34	0	Negligible
Wakefield R 2 cumul	13.38	33	13.44	34	0	Negligible
Blacker Road 1	13.19	33	13.22	33	0	Negligible
Blacker Road 2	12.89	32	12.92	32	0	Negligible
Education Facility 3	12.14	30	12.14	30	0	Negligible

Receptor ID	Without Development		With Development		% Change in concentration relative to AQAL	Predicted Impact
	µg/m ³	% of AQAL	µg/m ³	% of AQAL		
Greenside 1	13.31	33	13.31	33	0	Negligible
Wakefield Road 11	14.77	37	14.83	37	0	Negligible

Annual mean Particulate Matter (PM_{2.5})

Table 7.5 presents the predicted annual mean PM_{2.5} concentrations under the S2 and S3 scenarios. As per the EPUK-IAQM guidance, the impact of the development on local air quality was assessed as 'negligible' at all of the modelled existing receptor locations and no exceedance of the annual mean AQS were predicted with the development in place.

Table 7.5: Comparison of Predicted annual mean PM_{2.5} Concentrations (S2 – S3)

Receptor ID	Without Development		With Development		% Change in concentration relative to AQAL	Predicted Impact
	µg/m ³	% of AQAL	µg/m ³	% of AQAL		
Wakefield Road 1	8.19	33	8.20	33	0	Negligible
Wakefield Road 2	9.24	37	9.26	37	0	Negligible
Wakefield Road 3	8.34	33	8.36	33	0	Negligible
Wakefield Road 4	9.48	38	9.55	38	0	Negligible
Wakefield Road 5	9.28	37	9.39	38	0	Negligible
Wakefield Road 6	9.34	37	9.39	38	0	Negligible
Wakefield Road 7	10.06	40	10.13	41	0	Negligible
Wakefield Road 8	8.57	34	8.59	34	0	Negligible
Wakefield Road 9	8.82	35	8.85	35	0	Negligible
Wakefield Road 10	8.80	35	8.82	35	0	Negligible
Rotherham Road 1	9.17	37	9.20	37	0	Negligible
Rotherham Road 2	8.63	35	8.64	35	0	Negligible
Education Facility 1	8.29	33	8.31	33	0	Negligible
Education Facility 2	8.03	32	8.03	32	0	Negligible
Laithes Lane	8.97	36	8.99	36	0	Negligible

Receptor ID	Without Development		With Development		% Change in concentration relative to AQAL	Predicted Impact
	µg/m ³	% of AQAL	µg/m ³	% of AQAL		
1						
Laithes Lane 2	8.37	33	8.37	33	0	Negligible
Bar Lane 1	8.52	34	8.54	34	0	Negligible
Bar Lane 2	8.63	35	8.65	35	0	Negligible
Paddock Road 1	8.21	33	8.23	33	0	Negligible
Paddock Road 2	8.32	33	8.33	33	0	Negligible
Shaw Lane 1	8.65	35	8.66	35	0	Negligible
Proposed Resi 1	8.95	36	9.00	36	0	Negligible
Proposed Resi 2	9.02	36	9.07	36	0	Negligible
Lee Lane 1	8.02	32	8.02	32	0	Negligible
Lee Lane 2 cumul	8.62	34	8.63	35	0	Negligible
Lee Lane 3 cumul	8.43	34	8.44	34	0	Negligible
Wakefield R. 1 cumul	8.87	35	8.90	36	0	Negligible
Wakefield R 2 cumul	8.74	35	8.77	35	0	Negligible
Blacker Road 1	8.66	35	8.68	35	0	Negligible
Blacker Road 2	8.50	34	8.52	34	0	Negligible
Education Facility 3	8.03	32	8.03	32	0	Negligible
Greenside 1	8.72	35	8.72	35	0	Negligible
Wakefield Road 11	9.75	39	9.79	39	0	Negligible

Note: AQAL – Air Quality Action Level (i.e. the annual mean AQS).

Table 7.6 presents the predicted annual mean PM_{2.5} concentrations under the S2a and S3a scenarios. As per the EPUK-IAQM guidance, the impact of the development on local air quality was assessed as ‘negligible’ at all of the modelled existing receptor locations and no exceedance of the annual mean AQS were predicted with the development in place.

Table 7.6: Comparison of Predicted annual mean PM_{2.5} Concentrations (S2a – S3a)

Receptor ID	Without Development	With Development	% Change NO ₂	Predicted
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	$\mu\text{g}/\text{m}^3$	% of AQAL	$\mu\text{g}/\text{m}^3$	% of AQAL		
Wakefield Road 1	8.01	32	8.02	32	0	Negligible
Wakefield Road 2	9.06	36	9.08	36	0	Negligible
Wakefield Road 3	8.16	33	8.18	33	0	Negligible
Wakefield Road 4	9.30	37	9.36	37	0	Negligible
Wakefield Road 5	9.04	36	9.15	37	0	Negligible
Wakefield Road 6	9.13	37	9.18	37	0	Negligible
Wakefield Road 7	9.85	39	9.92	40	0	Negligible
Wakefield Road 8	8.36	33	8.38	34	0	Negligible
Wakefield Road 9	8.61	34	8.64	35	0	Negligible
Wakefield Road 10	8.61	34	8.64	35	0	Negligible
Rotherham Road 1	8.99	36	9.02	36	0	Negligible
Rotherham Road 2	8.43	34	8.45	34	0	Negligible
Education Facility 1	8.08	32	8.10	32	0	Negligible
Education Facility 2	7.82	31	7.82	31	0	Negligible
Laithes Lane 1	8.76	35	8.78	35	0	Negligible
Laithes Lane 2	8.16	33	8.16	33	0	Negligible
Bar Lane 1	8.31	33	8.33	33	0	Negligible
Bar Lane 2	8.46	34	8.47	34	0	Negligible
Paddock Road 1	8.03	32	8.04	32	0	Negligible
Paddock Road 2	8.13	33	8.14	33	0	Negligible
Shaw Lane 1	8.46	34	8.47	34	0	Negligible
Proposed Resi 1	8.78	35	8.82	35	0	Negligible
Proposed Resi 2	8.84	35	8.89	36	0	Negligible
Lee Lane 1	7.86	31	7.86	31	0	Negligible
Lee Lane 2 cumul	8.46	34	8.47	34	0	Negligible
Lee Lane 3 cumul	8.26	33	8.26	33	0	Negligible
Wakefield R. 1 cumul	8.68	35	8.72	35	0	Negligible
Wakefield R 2 cumul	8.55	34	8.59	34	0	Negligible
Blacker Road 1	8.49	34	8.51	34	0	Negligible
Blacker Road 2	8.33	33	8.34	33	0	Negligible
Education Facility 3	7.84	31	7.85	31	0	Negligible
Greenside 1	8.54	34	8.54	34	0	Negligible
Wakefield Road 11	9.56	38	9.59	38	0	Negligible

Note: AQAL – Air Quality Action Level (i.e. the annual mean AQS).

Hourly mean nitrogen dioxide, and particulate matter

Table D5 in Appendix D presents the daily mean PM_{10} and hourly mean NO_2 concentrations at all modelled receptor locations. The number of predicted exceedances of the daily mean PM_{10} AQS is less than the permissible 35 at all of the receptor locations, and no receptors were predicted to be exposed to concentrations of PM_{10} or $\text{PM}_{2.5}$ exceeding the applicable annual mean AQSs.

As shown in Table D5 in Appendix D, the predicted annual mean NO₂ AQS exceeded 60µg/m³ at on receptor only, Wakefield Road 12, in S3. No exceedances of the hourly mean NO₂ AQSs were predicted in S3a.

As indicated above, the actual annual mean NO₂ concentrations at any one receptor are likely to fall somewhere between the concentrations predicted in S3 and S3a, i.e. the pessimistic, conservative approach, and a more optimistic approach. The average of the annual mean NO₂ concentrations between S3 and S3a is 59.4µg/m³, which is below the 60µg/m³ criterion referenced in LAQM TG.16 for when the potential for hourly mean NO₂ exceedances should not be ruled out. It should also be noted that none of the development traffic was assumed to use Carlton Road, meaning that traffic continuing along Wakefield Road, and past receptors 11 and 12, may be overstated.

For these reasons, RSK consider that the potential for hourly mean NO₂ concentrations to exceed the AQS can be screened out.

6.2.2 Impact of Future Air Quality on the Proposed Development

As shown in Table E5 and Table E6 of Appendix E, annual mean NO₂ concentrations at the 'proposed Lidl' receptor are not predicted to exceed 60µg/m³ under S3 or S3a, therefore exceedances of the hourly mean NO₂ AQS are unlikely.

The annual and daily mean AQSs should not be applied at this location. As a result of the above, future ambient air quality at the proposed development site is likely to be acceptable.

6.3 Significance of Effects

Proposed receptors at the proposed development site were not predicted to be exposed to exceedances of any of the assessed AQSs; therefore the impact of air quality on future site users with the proposed development in place is considered not significant.

The development is predicted to cause a 'negligible' change in annual mean PM₁₀ and PM_{2.5} concentration at all modelled receptors and under both the optimistic and pessimistic scenarios.

The development is predicted to cause a 'negligible' change in annual mean NO₂ concentrations at all but two modelled receptors, where the change was assessed as 'slight', under the optimistic scenario. However, the development is predicted to cause a 'negligible' change in annual mean NO₂ concentrations at the great majority (90%) of modelled receptors, a 'slight' increase at 3 receptors and an increase classified as 'moderate' at one receptor, under the pessimistic scenarios.

Most receptors are predicted to experience negligible changes in concentrations of pollutants, which would not be regarded as significant, however a small number of receptors are predicted to experience a slight increase in annual mean NO₂

concentration, and one receptor only is predicted to experience a 'moderate' increase in annual mean NO₂ concentration only under the pessimistic scenarios only. In reality, future pollutant concentrations are likely to fall between the optimistic and pessimistic scenarios, therefore on balance, a maximum impact magnitude of 'slight' at a small number of receptors is likely.

The proposed development is not predicted to cause any additional exceedence of the AQSs. This assessment has also identified that the development would not lead to exceedances of the daily mean PM₁₀ AQS, and the potential for the development to lead to exceedances of the hourly mean NO₂ AQS has been ruled out.

On balance, the impact of the proposed development on local air quality is not considered likely to be significant.

Best practice mitigation measures are recommended in Section 7.2.

7 MITIGATION MEASURES

7.1 Construction Phase

7.1.1 Fugitive Dust Control Measures

The dust emitting activities outlined in Section 6.1 can be effectively controlled by appropriate dust control measures and any adverse effects can be greatly reduced or eliminated.

Prior to commencement of construction activities, it is recommended that agreement of a dust management plan (DMP) for the construction phase be reached with the local authority to ensure that any potential for adverse environmental effects on local receptors is minimised. The DMP, which could be prepared as part of a Construction Environmental Management Plan (CEMP), should include *inter alia*, measures for controlling dust and general pollution from site construction operations, and include details of any monitoring scheme, if appropriate. Controls should be applied throughout the construction period to ensure that emissions are mitigated. This statement should also include measures designed to reduce impacts in emergency circumstances.

Mitigation measures recommended in the IAQM 2014 guidance (and which could be reviewed and where applicable incorporated into the DMP) appropriate to the development and based on the risk categories identified in Section 6.1, are replicated in Table 7.1 below.

With the proposed construction activities mitigation measures as described above and in Table 7.1 in place, the likely residual impact of works undertaken during the construction phase on local air quality can be considered as 'not significant'.

Table 7.1: IAQM Highly Recommended and Desirable Control Measures for Construction-Phase Dust

Dust Control Measure	Highly Recommended (H) or Desirable (D)
Communications	
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	H
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	H
Display the head or regional office contact information.	H
Dust Management Plan	
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.	H

Dust Control Measure	Highly Recommended (H) or Desirable (D)
Site Management	
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	H
Make the complaints log available to the local authority when asked.	H
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	H
Monitoring	
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.	D
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	H
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	H
Preparing and maintaining the site	
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	H
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	H
Avoid site runoff of water or mud.	H
Keep site fencing, barriers and scaffolding clean using wet methods.	H
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.	H
Cover, seed or fence stockpiles to prevent wind whipping.	H
Operating vehicle/machinery and sustainable travel	
Ensure all vehicles switch off engines when stationary - no idling vehicles.	H
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)	D
Operations	
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	H
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H
Use enclosed chutes and conveyors and covered skips.	H
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H

Dust Control Measure	Highly Recommended (H) or Desirable (D)
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	H
Waste Management	
Avoid bonfires and burning of waste materials.	H
Measures specific to earthworks	
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	D
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate to cover with topsoil, as soon as practicable.	D
Only remove the cover in small areas during work and not all at once.	D
Measures specific to construction	
Avoid scabbling (roughening of concrete surfaces) if possible	D
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	D

7.1.2 Exhaust Emissions from Plant and Vehicles

7.1.2.1 Reducing Emissions from Site Plant and Vehicle Movements

As indicated above, mitigation measures can be applied to reduce emissions from plant and vehicles associated with site works. It is recommended that an appropriate selection of the following is implemented as far as reasonably practicable:

7.1.2.1.1 Non Road Mobile Machinery (NRMM)

NRMM is defined as any mobile machine, item of transportable industrial equipment, or vehicle - with or without bodywork - that is:

- Not intended for carrying passengers or goods on the road; or,
- Installed with a combustion engine - either an internal spark ignition petrol engine, or a compression ignition diesel engine.

In London, NRMM are required to meet the NO_x, PM and CO emissions standards specified in the EU Directive 97/68/EC and subsequent amendments as a minimum, where they have net power of between 37kW and 560kW. The emissions standards vary depending on the net power the engine produces. It is recommended that these emissions standards are also applied at this site as they are likely to apply equally outside of London. The following actions can be taken to enable compliance:

- Reorganising the fleet;
- Replacing equipment if required;
- Installing retrofit abatement technology (such as by diesel particulate filters in existing NRMM); and,
- 'Re-engining'.

7.1.2.1.2 *Construction Logistics Planning and Travel Planning*

A construction phase travel plan could be prepared for the site. This would enable the Applicant to give consideration to ways in which deliveries can be consolidated so that fewer journeys are needed. A travel plan could also be developed to encourage on-site employees to use modes of transport alternative to private vehicle usage, such as local bus or railway services.

7.1.2.2 *Reducing Vehicle Idling*

The site should be managed so that vehicles do not have to wait to park safely. However, should vehicles have to wait they should not idle. Generally, if a vehicle is stationary for more than a minute, turning off the engine will reduce emissions and fuel costs.

7.2 **Operational Phase**

As indicated in section 6.3, the development may have a slight to moderate adverse effect on local air quality. A selection of the following best practice mitigation measures could therefore be implemented to reduce or minimise the adverse impact identified:

- Selection of 'ultra low' NO_x boilers, wherever used throughout the development. Boilers installed in domestic buildings should achieve a NO_x rating of 40mg NO_x/kWh;
- Provision of on-site 'rapid charge' electric vehicle charging points, which should be maintained in good condition; and,
- Preparation of a travel plan to facilitate 'modal shift', discouraging the use of driving and encouraging walking, cycling, public transport and/or car sharing. The travel plan could include measures such as the promotion of car share schemes, provision of up-to-date public transport information (i.e. timetables, bus maps and routes, etc.) to residents; the development of a designated car sharing scheme, cycle bank scheme; subsidised cycling proficiency testing, subsidised or discounted cycling equipment and the provision of on-site cycle parking.

8 CONCLUSIONS

An air quality assessment for the proposed Lidl development at the former William Freeman site, Mapplewell, has been prepared with reference to existing air quality in the area and relevant air quality legislation, policy and guidance.

RSK prepared the original AQS during December 2017. At that time, traffic data for one of the committed developments (325 residential units at the former North Gawber Colliery, located in the vicinity of the proposed development site, were not available.

The air quality assessment for the North Gawber Colliery development estimated that the development would be fully occupied by 2023, five years after the proposed food store (the subject of this assessment) is scheduled to be complete. The proposed residential development adjacent to the food store is also scheduled to be operational by 2023. For these reasons, the AAQA was prepared, to determine whether air quality impacts if the development may increase over time.

The AAQA also incorporated the following changes to the methodology used in the original AQA:

- A Temprow growth factor was made available by Byron G Hall Limited (since the original AQA was prepared and submitted) to enable 'projection' of their 2017 surveyed traffic data to 2016, where previously base case data for the roads included in the S1 model were obtained from the Department for Transport (DFT) website in the absence of such a factor. The model verification was therefore rerun to determine the impact this may have on the modelled results;
- Future 'base case' traffic data were factored from 2018 to 2023 and the North Gawber and contributions from the proposed residential developments added to the growth baseline in all future development scenarios; and,
- Some improvements to the dispersion model setup were also made, including the inclusion of DT67 in the model verification process, the modification of some receptor locations to align them closer to the modelled road links, and adjustments to the speeds at which vehicles were assumed to travel.

Owing to the changes made to the methods used in the original AQA within the AAQA, it was considered necessary to update the original report so that the methods adopted in both reports are comparable. This updated version of the original AQA should be viewed as superseding the original AQA.

The assessment presented in this report has characterised 'baseline' (ambient) air quality, qualitatively assessed the construction phase impact of the proposed development, and used dispersion modelling to assess the impact of increased road traffic attributable to the development, and the contributions of other committed developments, on local air quality at existing sensitive receptor locations.

The potential risk of dust from construction activities was predicted to be a maximum of 'medium risk'. Mitigation measures, which may be secured by an appropriate planning condition, are been recommended to reduce the risk and the residual impact of the construction phase on air quality is likely to be 'not significant'.

ADMS Roads was used to assess the impact of the development on local air quality. Air quality was also assessed at the proposed development site. The relevant air pollutants of concern for operational phase impacts are considered to be NO₂, PM₁₀ and PM_{2.5}.

Proposed receptors at the development were not predicted to be exposed to exceedences of any of the assessed AQS's; therefore the impact of air quality on the proposed development is considered not significant.

The development is predicted to cause:

- a 'negligible' change in annual mean PM₁₀ and PM_{2.5} concentration at all modelled receptors under both the optimistic and pessimistic scenarios;
- a 'negligible' change in annual mean NO₂ concentrations at all but two modelled receptors, where the change was assessed as 'slight', under the optimistic scenario;
- a 'negligible' change in annual mean NO₂ concentrations at the majority (90%) of modelled receptors, a 'slight' increase at 3 receptors and a 'moderate' increase at one receptor, under the pessimistic scenarios.

Negligible changes in concentrations of pollutants would not regarded as significant, however a small number of receptors are predicted to experience a 'slight' increase in annual mean NO₂ concentration, and one receptor only is predicted to experience a 'moderate' increase in annual mean NO₂ concentration only, under the pessimistic scenarios only. In reality, future pollutant concentrations are likely to fall between the optimistic and pessimistic scenarios, therefore on balance, a maximum impact magnitude of 'slight' at a small number of receptors is likely.

On balance, the impact of the proposed development on local air quality is assessed as a maximum of slight adverse. Following the implementation of an appropriate selection of mitigation measures, such as those referenced within this report, the impact of the development on local air quality has been considered not significant.

9 REFERENCES

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APPENDIX A

CONSTRUCTION DUST ASSESSMENT

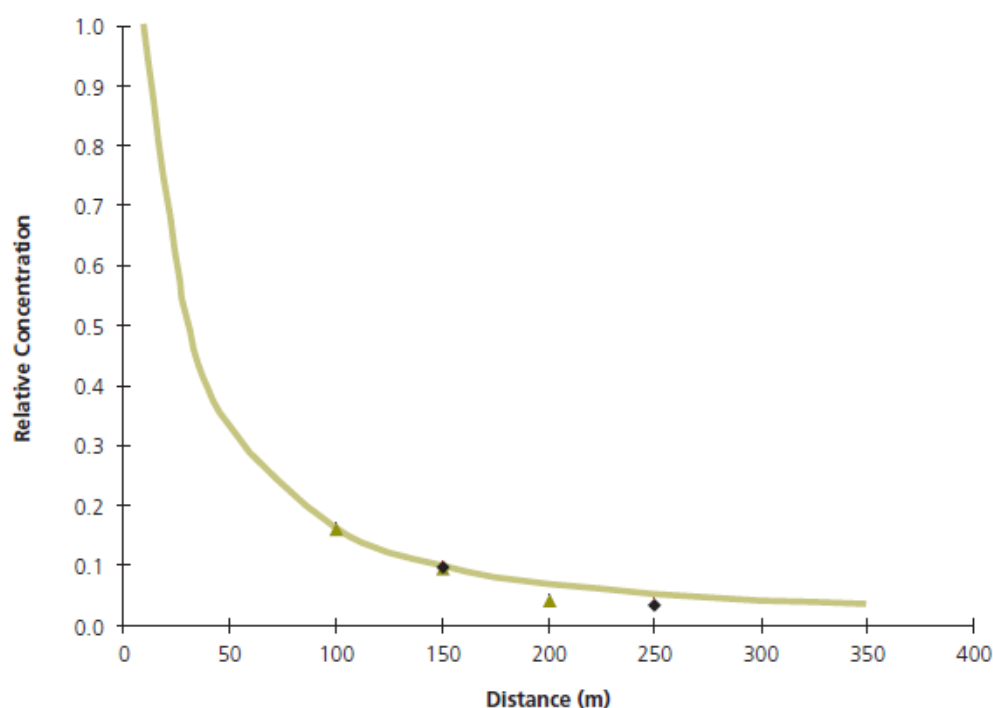
METHODOLOGY

This appendix contains the construction dust assessment methodology used in the assessment. To assess the potential impacts, construction activities are divided into demolition, earthworks, construction and trackout. The descriptors included in this section are based upon the IAQM 2014 guidance. The assessment follows the steps recommended in the guidance.

Step 1 and Step 2 methods from the IAQM 2014 guidance are described in this Appendix to assign dust risk categories for each of the construction activities.

The tendency of dust to remain airborne is determined by the particle size and weather conditions. Eventually, particles will drop from suspension as a deposit. The previous Local Air Quality Management Technical Guidance document (LAQM.TG(03))² identifies that PM₁₀ concentrations fall-off rapidly with distance from source. Figure B1 shows the fall-off in PM₁₀ concentration from source for a typical wind speed of 6m/s. At 100m from source, the PM₁₀ concentration is predicted to be less than 20% of that at the point of generation.

Figure A1: Typical Fall-off in PM₁₀ Concentration with Distance from Source



² LAQM TG (03). The Local Air Quality Management Technical Guidance Note published by the Department for Food and Rural Affairs in 2003. This guidance note is revised in 2009 and is available as LAQM TG(09).

Step 1: Screen the requirement for assessment

The first step is to screen out the requirement for a construction dust assessment; this is usually a somewhat conservative level of screening. An assessment is usually required where there is:

- a 'human receptor' within:
 - 350m of the boundary of the site; or
 - 50m of the route used by construction vehicles onto the public highway, up to 500m from the site entrance(s).
- an 'ecological receptor':
 - 50m of the boundary of the site; or
 - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Step 2A: Defining the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude category for demolition is varied for each site in terms of timing, building type, duration and scale. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large:** Total building volume $>50,000\text{m}^3$, potentially dusty construction material, on-site crushing and screening, demolition activities $>20\text{m}$ above ground level;
- **Medium:** Total building volume $20,000\text{m}^3 - 50,000\text{m}^3$, potentially dusty construction material, demolition activities $10\text{m} - 20\text{m}$ above ground level; and,
- **Small:** Total building volume $<20,000\text{m}^3$, construction material with low potential for dust release, demolition activities $<10\text{m}$ above ground, demolition during wetter months.

Earthworks

The dust emission magnitude category for earthworks is varied for each site in terms of timing, geology, topography and duration. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large:** Total site area $>10,000\text{m}^2$, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds $>8\text{m}$ in height, total material moved $>100,000$ tonnes;
- **Medium:** Total site area $2,500 - 10,000\text{m}^2$, moderately dusty soil type (e.g. silt), $5 - 10$ heavy earth moving vehicles active at any one time, formation of bunds $4 - 8\text{m}$ in height, total material moved $20,000 - 100,000$ tonnes; and,
- **Small:** Total site area $< 2,500\text{m}^2$, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds $<4\text{m}$ in height, total material moved $<10,000$ tonnes, earthworks during wetter months.

Construction

The dust emission magnitude category for construction is varied for each site in terms of timing, building type, duration, and scale. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large:** Total building volume $>100,000\text{m}^3$, piling, on site concrete batching;
- **Medium:** Total building volume $25,000 - 100,000\text{m}^3$, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and,

- **Small:** Total building volume <25,000m³, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

Factors which determine the dust emission magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large:** >100 HDV (3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- **Medium:** 25 – 100 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100m; and,
- **Small:** <25 HDV (<3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50m.

Step 2B: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health and ecosystems. The sensitivity of the area takes into account the following factors:

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

Table A1 has been used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Table A1: Sensitivity of Individual receptors in the area surrounding the Site

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
High	<ul style="list-style-type: none"> Users can reasonably expect a enjoyment of a high level of amenity. The appearance, aesthetics or value of their property would be diminished by soiling, and The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms. 	<ul style="list-style-type: none"> Locations where members of the public are exposed over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day) Examples include residential properties, hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment. 	<ul style="list-style-type: none"> Locations with an international or national designation <i>and</i> the designated features may be affected by dust soiling. Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. Examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	<ul style="list-style-type: none"> 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. The appearance, aesthetics or value of their property could be diminished by soiling. The people or property wouldn't 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 include parks and places of work. 	<ul style="list-style-type: none"> Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Examples include office and shop workers, but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation. 	<ul style="list-style-type: none"> Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. Locations with a national designation where the features may be affected by dust deposition. Example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	<ul style="list-style-type: none"> The enjoyment of amenity would not reasonably be expected. Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling. There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads. 	<ul style="list-style-type: none"> Locations where human exposure is transient. Indicative examples include public footpaths, playing fields, parks and shopping streets. 	<ul style="list-style-type: none"> Locations with a local designation where the features may be affected by dust deposition. Example is a local Nature Reserve with dust sensitive features.

Based on the sensitivities assigned of the different types of receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification for the area can be defined for each. Tables A2 to A4 indicate the method used to determine the sensitivity of the area for dust soiling, human health and ecological impacts, respectively.

For trackout, as per the guidance, it is only considered necessary to consider trackout impacts up to 50m from the edge of the road.

Table A2: Sensitivity of the area to dust soiling effects on people and property

Receptor Sensitivity	Number of Receptors	Distances from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table A3: Sensitivity of the area to Human Health Impacts (from the IAQM 2014 guidance)

Receptor Sensitivity	Annual Mean PM ₁₀ Conc.	Number of Receptors	Distances from the Source (m)				
			<20	<50	<100	<200	<350
High	>32µg/m ³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32µg/m ³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28µg/m ³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m ³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32µg/m ³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32µg/m ³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28µg/m ³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m ³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	-	>1	Low	Low	Low	Low	Low
		>1	Low	Low	Low	Low	Low

Table A4: Sensitivity of the area to Ecological Impacts

Receptor Sensitivity	Distances from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C: Defining the Risk of Impacts

The final step is to use both the dust emission magnitude classification with the sensitivity of the area, to determine a potential risk of impacts for each construction activity, before the application of mitigation. Tables A5 to A7 indicate the method used to assign the level of risk for each construction activity.

Table A5: Risk of Dust Impacts from Demolition

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

Table A6: Risk of Dust Impacts from Earthworks/Construction

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

Table A7: Risk of Dust Impacts from Trackout

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

APPENDIX B

OPERATION IMPACT ASSESSMENT

METHODOLOGY

This appendix contains the methodology used in the assessment for the operational impact assessment to include reference to EPUK-IAQM guidance.

The impacts of a development are usually assessed at selected 'receptors'. The magnitude of impacts is derived by the percentage of change in pollutant concentration relative to an Air Quality Assessment Level (AQAL) and long term average pollutant concentration at receptor, as presented in Table B1. The significance of effects is then determined using professional judgement.

Table B1: Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
79 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Note: AQAL – air quality assessment level, such as the annual mean NO₂, PM₁₀ or PM_{2.5} AQS.

The EPUK/IAQM guidance notes that the criteria in Table C1 should be used to describe impacts at individual receptors and should only be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- 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.

The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the severity of impacts.

APPENDIX C

TRAFFIC DATA

This appendix contains the traffic data used in the dispersion modelling assessment. Included are traffic flow data in AADT, percentage Heavy Duty Vehicle (HDV) and the speed for each road link.

Table C1 AADT Traffic Flows for Model Scenarios used in the dispersion modelling assessment

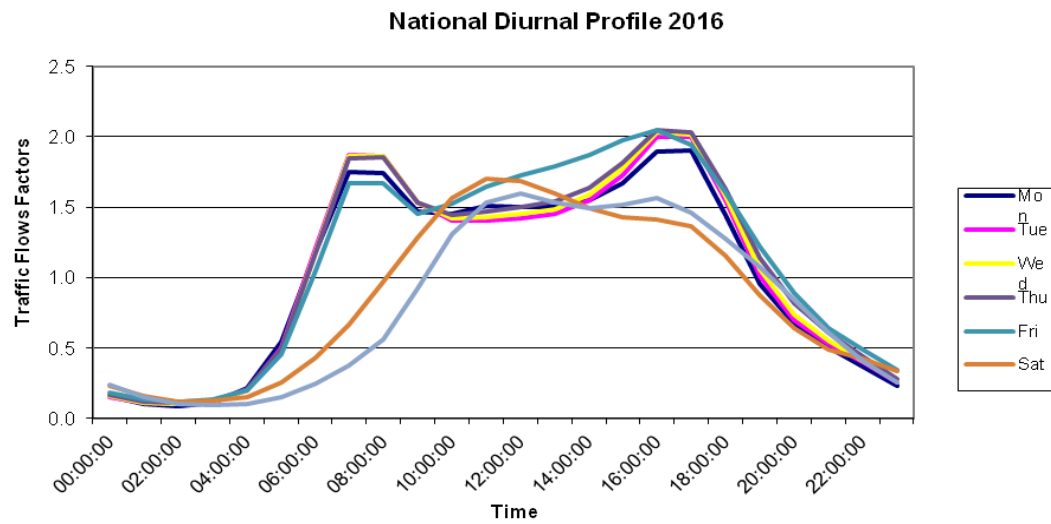
Figure C1 National diurnal Profile for other roads utilised in modelling assessment

Table C1: AADT and % heavy duty vehicles (%HDV) for model scenarios used in the dispersion modelling assessment

Ref	Road Link	Source of Data	S1 – base case		S2 & S2b		S3 & S3b		S2a		S3a	
			AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV
1	Wakefield Road - North of Lee Lane / Shaw Lane	Bryan G Hall	7791	3.36	9018	2.99	9275	2.93	8021	3.36	8278	3.28
2	Shaw Lane / Greenside	Bryan G Hall	9191	1.50	9869	1.44	9871	1.46	9463	1.50	9465	1.52
3	Lee Lane	Bryan G Hall	8374	1.32	9685	1.17	9726	1.19	8621	1.32	8663	1.33
4	Wakefield Road - North of Paddock Road	Bryan G Hall	9002	3.03	10944	2.56	11240	2.51	9267	3.03	9564	2.95
5	Paddock Road	Bryan G Hall	3314	0.83	3511	0.81	3681	0.83	3412	0.83	3583	0.85
6	Wakefield Road - North of Proposed Residential Development Site Access	Bryan G Hall	11261	2.63	13375	2.28	13840	2.22	11593	2.63	12058	2.55
7	Proposed Residential Development Site Access	Bryan G Hall	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00
8	Wakefield Road - North of Proposed Lidl Site Access	Bryan G Hall	11261	2.63	13085	2.33	13550	2.27	11593	2.63	12058	2.55
9	Proposed Lidl Site Access	Bryan G Hall	0	0.00	0	#DIV/0!	1277	0.00	0	0.00	1277	0.16
10	Wakefield Road - North of Bar Lane / Blacker Road	Bryan G Hall	11257	2.57	13133	2.27	13523	2.22	11590	2.57	11980	2.51
11	Bar Lane / Blacker Road	Bryan G Hall	9336	3.55	10354	3.29	10552	3.25	9612	3.55	9811	3.49
12	Wakefield Road - North of Newstead Road	Bryan G Hall	19786	3.00	22324	2.74	22941	2.67	20371	3.00	20988	2.92
13	Wakefield Road - North of Laithes Lane	Bryan G Hall	19859	3.14	22398	2.87	23016	2.80	20445	3.14	21063	3.06
14	Laithes Lane	Bryan G Hall	9136	5.40	9406	5.40	9474	5.38	9406	5.40	9474	5.38
15	Wakefield Road - South of Laithes Lane	Bryan G Hall	16738	2.42	19184	2.92	19736	2.85	17232	3.26	17783	3.17
16	Wakefield Road - South of New Lodge Crescent	Bryan G Hall	17545	3.03	20016	2.73	20567	2.67	18063	3.03	18614	2.95
17	Rotherham Road	Bryan G Hall	8495	1.34	8746	1.34	8917	1.34	8745	1.34	8916	1.34
18	Wakefield Road - South of	Bryan G Hall	11726	3.06	14026	3.57	14409	3.49	12073	4.15	12455	4.04

Ref	Road Link	Source of Data	S1 – base case		S2 & S2b		S3 & S3b		S2a		S3a	
			AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV
	Rotherham Road fork											
19 and 20	Wakefield Road - South of Carlton Road	DFT	16203	3.06	30708	3.29	31091	3.26	30707	3.29	31090	3.26
RA	Roundabout connecting road links 16, 17 and 18	DFT	16203	3.06	30708	3.29	31091	3.26	30707	3.29	31090	3.26

Figure C1: Diurnal Profile for Road Sources Included in the Dispersion Modelling Assessment



APPENDIX D

MODELLING OF OPERATIONAL PHASE – VERIFICATION METHODOLOGY AND MODEL RESULTS

The dispersion model results were verified following the relevant guidance in the Local Air Quality Management Technical Guidance (2016) (LAQM.TG(16)). Predicted results from a dispersion model may differ from measured concentrations for a variety of reasons; these are identified in TG(16) to include:

- Estimates of background concentrations;
- Meteorological data uncertainties;
- Uncertainties in source data for example, traffic flow data, stack emissions and emission factors;
- Model input parameters such as roughness length, minimum Monin-Obukhov and overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

Annual mean NO₂ data collected at DT34, DT35, DT36 and DT37 during 2016 were used to verify the dispersion model, as detailed in Section 5.

A comparison of modelled versus monitored NO₂ concentrations at these sites is presented in Table D1. They show that the model underpredicted road traffic concentrations by more than 25%. Therefore, model verification has been undertaken as per the procedure in LAQM TG.16.

Table D1: Modelled versus Monitored NO₂ Concentrations

Site	Background NO ₂	Monitored total NO ₂	Modelled total NO ₂	% Difference [(modelled – monitored)/monitored]x100
DT37	17.90	29.10	22.09	-24.1
DT34	14.74	29.30	17.98	-38.6
DT35	14.74	40.70	20.57	-49.5
DT36	14.74	34.80	20.30	-41.7

Modelled versus measured road NO_x data at the diffusion tube sites are shown in Table D2. The model as a whole underpredicted road NO_x concentrations by a factor of 4.14; this factor has been applied to model results.

Table D2: Modelled versus Monitored NO_x/NO₂

Site	Background NO ₂	Monitored NO ₂	Monitored Road Contribution NO ₂	Monitored Road Contribution NO _x	Modelled road contribution NO _x	Ratio of Modelled and Measured Road NO _x
DT37	17.90	29.10	11.20	22.36	8.08	2.77
DT34	14.74	29.30	14.56	29.12	6.14	4.74
DT35	14.74	40.7	25.96	55.09	11.18	4.93
DT36	14.74	34.8	20.06	41.26	10.66	3.87

The verified annual average modelled road contribution NO_x concentrations were used to estimate the annual average road NO₂ by using the DEFRA NO_x to NO₂ spreadsheet; a comparison of monitored and model adjusted total NO₂ is presented in Table D3 for the four diffusion tube results used for verification.

Table D3: Modelled versus Monitored NO₂ Concentrations

Site	Background NO ₂	Monitored NO ₂	Modelled total NO ₂ after adjustment	% Difference [(modelled – monitored)/monitored]x100
DT37	17.9	29.1	34.24	17.7
DT34	14.7	29.3	27.58	-5.9
DT35	14.7	40.7	37.00	-9.1
DT36	14.7	34.8	36.06	3.6

In the absence of local monitoring locations measuring data for PM₁₀ or PM_{2.5} within the vicinity of the site, verification for PM₁₀ and PM_{2.5} has been undertaken using the NO_x adjustment factor.

A list of the receptor locations included in the dispersion model is displayed in Table D4. Receptors shown in *italics* are on commercial premises, to which the annual and daily mean AQSS should not be applied (as per LAQM TG.16). Aside from the diffusion tubes, receptors were elevated to 1.5m above ground level, which is assumed to be ‘breathing height’.

Table D4: Receptors Included in the Dispersion Modelling Assessment

Receptor ID	X	Y	Height (m)
Wakefield Road 1	433388	410771	1.5
Wakefield Road 2	433486	410546	1.5
Wakefield Road 3	433673	410287	1.5
Wakefield Road 4	433878	410015	1.5
Wakefield Road 5	433999	409791	1.5
Wakefield Road 6	434051	409694	1.5
Wakefield Road 7	434104	409635	1.5
Wakefield Road 8	434367	409426	1.5
Wakefield Road 9	434534	409238	1.5
Wakefield Road 10	434950	408691	1.5

Receptor ID	X	Y	Height (m)
Rotherham Road 1	434870	408896	1.5
Rotherham Road 2	435000	408877	1.5
Education Facility 1	434870	409010	1.5
Education Facility 2	434827	409315	1.5
Laithes Lane 1	434545	409353	1.5
Laithes Lane 2	434941	409410	1.5
Bar Lane 1	434022	409624	1.5
Bar Lane 2	433788	409718	1.5
Paddock Road 1	433554	410328	1.5
Paddock Road 2	433319	410446	1.5
Shaw Lane 1	433414	410545	1.5
Proposed Resi 1	433916	409951	1.5
Proposed Resi 2	433956	409873	1.5
<i>Proposed Lidl 1</i>	<i>433989</i>	<i>409813</i>	<i>1.5</i>
Lee Lane 1	434741	411302	1.5
Lee Lane 2 cumul	434842	411300	1.5
Lee Lane 3 cumul	435022	411386	1.5
Wakefield R. 1 cumul	433838	410054	1.5
Wakefield R 2 cumul	433770	410172	1.5
Blacker Road 1	433219	409996	1.5
Blacker Road 2	433317	409915	1.5
Education Facility 3	433241	410107	1.5
Greenside 1	433033	410126	1.5
Wakefield Road 11	435024	408244	1.5
<i>Wakefield Road 12 (Funeral Parlour)</i>	<i>435020</i>	<i>408145</i>	<i>1.5</i>
DT37 (diffusion tube)	435173	407501	2.8
DT34 (diffusion tube)	435010	408283	3.5
DT35 (diffusion tube)	435026	408190	2.8
DT36 (diffusion tube)	435028	408100	2.7

Model results for long-term and short-term PM₁₀, and long-term NO₂ and PM_{2.5}, concentrations at receptors are presented in Table E5, for S1, S2 and S3.

Table D5: Predicted Pollutant Concentrations at Modelled Receptor Locations

Receptor ID	Long-term					Short-term					Long-term					Long-term				
	NO ₂ Annual Average Concentrations (µg/m ³)					No. days PM ₁₀ 24-Hour Average Concentrations (µg/m ³)					PM ₁₀ Annual Average Concentrations (µg/m ³)					PM _{2.5} Annual Average Concentrations (µg/m ³)				
	S1	S2	S3	S2a	S3a	S1	S2	S3	S2a	S3a	S1	S2	S3	S2a	S3a	S1	S2	S3	S2a	S3a
Wakefield Road 1	15.96	16.47	16.57	14.20	14.29	1	1	1	1	1	12.63	12.73	12.74	12.43	12.44	8.21	8.19	8.20	8.01	8.02
Wakefield Road 2	27.69	29.43	29.65	25.13	25.33	0	0	0	0	0	14.47	14.80	14.85	14.22	14.27	9.31	9.24	9.26	9.06	9.08
Wakefield Road 3	17.50	18.33	18.51	15.65	15.82	1	1	0	1	1	12.90	13.05	13.09	12.69	12.73	8.37	8.34	8.36	8.16	8.18
Wakefield Road 4	31.58	35.79	36.41	29.89	30.49	0	0	0	0	0	14.67	15.36	15.47	14.60	14.70	9.47	9.48	9.55	9.30	9.36
Wakefield Road 5	32.59	34.92	36.07	28.52	29.64	0	0	0	0	0	14.31	14.71	14.90	14.10	14.29	9.37	9.28	9.39	9.04	9.15
Wakefield Road 6	33.39	35.66	36.16	30.11	30.60	0	0	0	0	0	14.43	14.82	14.90	14.13	14.22	9.45	9.34	9.39	9.13	9.18
Wakefield Road 7	42.15	44.76	45.36	38.23	38.82	0	0	0	0	0	15.67	16.14	16.26	15.33	15.44	10.22	10.06	10.13	9.85	9.92
Wakefield Road 8	22.04	23.02	23.23	19.66	19.86	0	0	0	1	1	13.09	13.27	13.31	12.86	12.89	8.60	8.57	8.59	8.36	8.38
Wakefield Road 9	25.74	27.64	27.94	23.45	23.73	0	0	0	0	0	13.48	13.76	13.81	13.26	13.31	8.85	8.82	8.85	8.61	8.64
Wakefield Road 10	22.36	24.41	24.65	20.47	20.70	0	0	0	0	0	13.61	13.95	13.99	13.45	13.49	8.80	8.80	8.82	8.61	8.64
Rotherham Road 1	27.55	29.93	30.27	25.30	25.62	0	0	0	0	0	14.26	14.64	14.70	14.07	14.13	9.20	9.17	9.20	8.99	9.02
Rotherham Road 2	22.20	22.82	22.97	20.74	20.88	0	0	0	1	1	13.11	13.21	13.23	12.91	12.94	8.64	8.63	8.64	8.43	8.45
Education Facility 1	19.90	20.77	20.92	17.82	17.96	1	1	1	1	1	12.58	12.71	12.73	12.36	12.38	8.31	8.29	8.31	8.08	8.10
Education Facility 2	16.34	16.64	16.69	14.43	14.47	1	1	1	1	1	12.13	12.18	12.19	11.91	11.92	8.03	8.03	8.03	7.82	7.82
Laithes Lane 1	29.58	30.73	30.94	26.44	26.64	0	0	0	0	0	13.77	13.94	13.98	13.50	13.53	9.05	8.97	8.99	8.76	8.78
Laithes Lane 2	20.01	20.34	20.40	17.68	17.74	1	1	1	1	1	12.74	12.79	12.80	12.50	12.51	8.39	8.37	8.37	8.16	8.16
Bar Lane 1	23.43	24.44	24.67	20.84	21.05	1	0	0	1	1	13.00	13.15	13.18	12.74	12.77	8.57	8.52	8.54	8.31	8.33
Bar Lane 2	21.67	22.61	22.80	19.78	19.95	0	0	0	0	0	13.36	13.54	13.57	13.16	13.19	8.67	8.63	8.65	8.46	8.47
Paddock Road 1	16.49	16.92	17.09	14.75	14.91	1	1	1	1	1	12.66	12.73	12.76	12.45	12.48	8.23	8.21	8.23	8.03	8.04
Paddock Road 2	17.82	18.25	18.40	16.01	16.14	1	1	1	1	1	12.85	12.92	12.94	12.64	12.66	8.34	8.32	8.33	8.13	8.14
Shaw Lane 1	22.02	22.82	22.89	19.89	19.96	0	0	0	0	0	13.42	13.55	13.57	13.20	13.21	8.69	8.65	8.66	8.46	8.47
Proposed Resi 1	27.41	29.38	29.88	25.10	25.57	0	0	0	0	0	13.91	14.24	14.32	13.67	13.75	9.03	8.95	9.00	8.78	8.82
Proposed Resi 2	25.58	27.38	27.88	23.46	23.94	0	0	0	0	0	14.04	14.39	14.48	13.82	13.91	9.08	9.02	9.07	8.84	8.89
Proposed Lidl 1	29.75	31.93	33.13	27.25	28.42	0	0	0	0	0	14.16	14.52	14.72	13.91	14.10	9.19	9.10	9.21	8.92	9.04
Lee Lane 1	12.49	12.81	12.83	11.59	11.60	1	1	1	1	1	12.46	12.51	12.52	12.28	12.29	8.04	8.02	8.02	7.86	7.86
Lee Lane 2 cumul	18.88	20.12	20.17	17.57	17.61	0	0	0	0	0	13.52	13.74	13.75	13.31	13.32	8.67	8.62	8.63	8.46	8.47
Lee Lane 3 cumul	19.95	21.14	21.19	18.56	18.61	1	0	0	1	1	12.99	13.21	13.21	12.79	12.79	8.47	8.43	8.44	8.26	8.26
Wakefield R. 1 cumul	22.85	24.48	24.84	20.58	20.92	0	0	0	0	0	13.82	14.13	14.20	13.60	13.67	8.91	8.87	8.90	8.68	8.72
Wakefield R 2 cumul	21.18	22.60	22.91	19.05	19.33	0	0	0	0	0	13.60	13.87	13.93	13.38	13.44	8.77	8.74	8.77	8.55	8.59
Blacker Road 1	23.62	24.66	24.86	21.51	21.70	0	0	0	0	0	13.41	13.58	13.61	13.19	13.22	8.72	8.66	8.68	8.49	8.51
Blacker Road 2	22.89	23.84	24.03	20.80	20.97	0	0	0	1	1	13.12	13.26	13.29	12.89	12.92	8.56	8.50	8.52	8.33	8.34
Education Facility 3	14.73	14.98	15.03	13.06	13.10	1	1	1	1	1	12.34	12.38	12.39	12.14	12.14	8.04	8.03	8.03	7.84	7.85
Greenside 1	23.62	24.43	24.48	21.36	21.40	0	0	0	0	0	13.54	13.67	13.67	13.31	13.31	8.77	8.72	8.72	8.54	8.54
Wakefield Road 11	32.45	40.54	40.89	35.52	35.85	0	0	0	0	0	14.22	15.38	15.44	14.77	14.83	9.35	9.75	9.79	9.56	9.59
Wakefield Road 12	42.64	61.86	62.23	56.21	56.57	0	2	2	2	2	15.69	18.96	19.04	18.34	18.41	10.26	11.88	11.92	11.68	11.73

Notes: Results in **bold** exceed the relevant AQS.

