BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

ENVIRONMENT

THE PREMIER GROUP

LAND WEST OF GYPSY LANE, WOMBWELL

Air Quality Assessment

LDT2312

www.bwbconsulting.com

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Notice

EXECUTIVE SUMMARY

BWB Consulting was appointed by The Premier Group to undertake an air quality assessment for a proposed residential development at land west of Gypsy Lane, Wombwell.

The proposed development Site is located within the administrative area of Barnsley Metropolitan Borough Council and lies adjacent to existing residential areas. The proposed development Site is not situated within an Air Quality Management Area. The nearest Air Quality Management Area is 5.4km west of the Site and covers the section of the M1 between Junction 35a and 38.

A qualitative construction phase dust assessment was undertaken in accordance with Institute of Air Quality Management guidance and measures were recommended for inclusion in a Dust Management Plan to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions was considered to be 'not significant' in accordance with Institute of Air Quality Management and Greater London Authority guidance.

A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance, Institute of Air Quality Management & Environmental Protection UK guidance and the Barnsley Metropolitan Borough Council Air Quality and Emissions Good Practice Planning Guidance. The development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the development on local air quality was predicted to be 'negligible' in accordance with guidance.

Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were also predicted across the proposed development Site and the suitability of the Site for the proposed residential use considered with regard to air quality. Pollutant concentrations were predicted to be below the relevant air quality objectives and the Site was therefore considered suitable for the proposed use.

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1. INTRODUCTION

Appointment & Background

1.1 BWB Consulting was appointed by Premier Group to undertake an air quality assessment for a proposed residential development at land west of Gypsy Lane, Wombwell ('the Site').

1.2 The assessment considers construction phase dust impacts and operational phase road traffic emissions. A qualitative construction phase dust assessment was undertaken in accordance with relevant guidance. A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified receptor locations. In addition, pollutant concentrations were predicted across the Site.

1.3 This report is necessarily technical in nature, so to assist the reader, a glossary of air quality terminology can be found in **Appendix A.**

Site Setting

1.4 The Site is located off Gypsy Lane and is located within the administrative area of Barnsley Metropolitan Borough Council (BMBC). **Figure 1.1** details the location of the proposed development. The Site currently comprises vacant grassland.

1.5 To the north of the Site are a small area of woodland and Wombwell Park Street Primary School with existing residential dwellings beyond; to the east and south of the Site are residential dwellings with commercial units beyond to the north east; west of the Site there is grassland with the Hillies Golf Course and further residential dwellings beyond.

1.6 Principal air pollution sources in the vicinity of the development are likely to comprise road traffic vehicle emissions. The Site is not located within an existing Air Quality Management Area (AQMA), the nearest AQMA is Barnsley AQMA Number 1, which is situated 5.4km west of the Site and covers the sections of the M1 between junctions 35a and 38.

Proposed Development

1.7 The proposed development comprises 229 residential dwellings with associated highways improvements, infrastructure and landscaping.

1.8 The proposed development planning layout is detailed in **Appendix B**.

Figure 1.1: Site Location

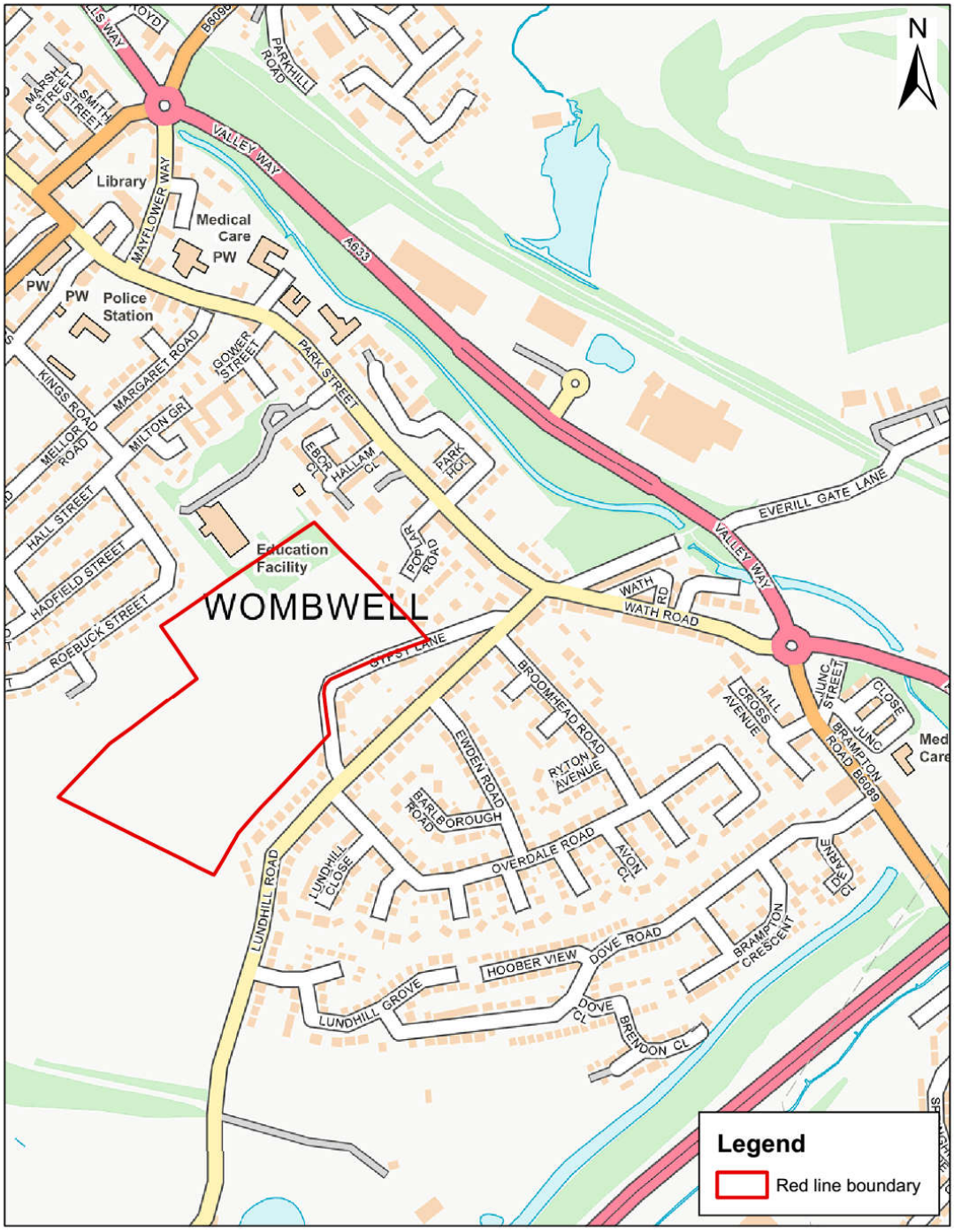

Figure 1.1: Site Location

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2. LEGISLATION AND PLANNING POLICY

National Legislation and Planning Policy

The UK Air Quality Strategy

2.1 European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive[1] sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000[2], as amended, for the purpose of the Local Air Quality Management Framework.

2.2 The UK Government are required under the Environment Act 1995[3] to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997[4] and was most recently reviewed and updated in 2007[5]. The AQS provides an overview of the Government's ambient air quality policy and sets out the air quality standards and objectives to be achieved and measures to improve air quality.

2.3 Part IV of the Environment Act[3] requires local authorities in the UK to review local air quality within their administrative area and, if relevant air quality standards and objectives are likely to be exceeded, designate AQMAs. Following the designation of an AQMA, local authorities are required to publish an Air Quality Action Plan (AQAP) detailing measures to be taken to improve local air quality and work towards meeting the relevant air quality standards and objectives.

National Planning Policy Framework

2.4 The National Planning Policy Framework (NPPF)[6] was amended in February 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

2.5 With regard to assessing cumulative effects the NPPF[6] states:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*
>
> *[…]"*

[1] European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe
[2] HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO
[3] HMSO (1995) The Environment Act 1995, London: TSO
[4] Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO
[5] Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO
[6] Ministry of Housing, Communities & Local Government (2019) National Planning Policy Framework, HMSO London

2.6 The NPPF[6] recognises air quality within Section 15: Conserving and enhancing the natural environment, and states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *[…]*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;*
>
> *[…]*
>
> *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*
>
> *[…]*
>
> *Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

Planning Practice Guidance

2.7 The Planning Practice Guidance (PPG) for air quality[7] was updated in 2014 and provides guiding principles on how the planning process can take account of the impacts of new development on air quality.

2.8 The PPG[7] sets out the role of Local Plans with regard to air quality and when air quality could be relevant to a planning decision stating that:

[7] Department for Communities and Local Government (2014) Planning Practice Guidance Air Quality

"Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).

[…]

When deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

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

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

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

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

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

2.9 The PPG provides guidance regarding what should be included within an air quality assessment. Examples of potential air quality mitigation measures are also provided.

Local Planning Policy

Barnsley Local Plan

2.10 The Barnsley Local Plan (2019)[8] sets out BMBC policies and proposals for the use and development of land and buildings up until 2033. Policies relevant to this assessment are detailed below.

"Policy Poll1 Pollution Control and Protection

Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment.

We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against.

Developers will be expected to minimise the effects of any possible pollution and provide mitigation measures where appropriate."

"Policy AQ1 Development in Air Quality Management Areas

Development which impacts on areas sensitive to air pollution 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), taking into account any suitable and proportionate mitigation required for the development.

We will only allow residential development which impacts on areas sensitive to air pollution, where the developer provides an assessment that shows living conditions will be acceptable for future residents, subject to any required mitigation.

We will only allow development which impacts on areas sensitive to air pollution 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, subject to any required mitigation.

Furthermore, development which impacts on areas sensitive to air pollution due to traffic emissions will be expected to demonstrate suitable and

[8] Barnsley Metropolitan Borough Council (2019) Barnsley Local Plan

proportionate mitigation relative to the increased traffic emissions generated by the development."

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

3. METHODOLOGY

Consultation with Barnsley Metropolitan Borough Council

3.1 Consultation was undertaken with the Environmental Health Department at BMBC, in which the proposed assessment methodology was provided via email and a response was received on 03/04/2019[9].

3.2 The agreed assessment methodology is detailed below:

- Construction Phase – A construction phase assessment was undertaken and relevant measures to mitigate construction phase dust emissions were recommended. The assessment was undertaken in accordance with guidance provided by the Institute of Air Quality Management (IAQM)[10] and the Greater London Authority (GLA)[11].
- Operational Phase – A detailed operational phase road traffic emissions assessment was undertaken to consider the impact of development-generated traffic on local air quality and predict pollutant concentrations at the proposed development Site. The dispersion model ADMS-Roads was used to model concentrations of oxides of nitrogen (NOx) and particulate matter (PM_{10} and $PM_{2.5}$) at identified existing receptor locations for both Without and With Development scenarios. The change in pollutant concentrations as a result of development-generated traffic was then calculated. The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance (LAQM.TG16)[12] and Institute of Air Quality Management and Environmental Protection UK (EPUK)[13]. Pollutant concentrations were also predicted across the proposed development Site to consider the suitability of the Site for the proposed use with regard to air quality.
- Consideration was also given to the BMBC Air Quality and Emissions Good Practice Planning Guidance[14].

3.3 Full details of the methodology used in the assessment as agreed with BMBC is provided in paragraph 3.12 of this report.

Construction Phase Assessment

3.4 An assessment of the potential impacts arising from the construction of the proposed development was undertaken in accordance with IAQM[10] and the GLA Guidance[11] as recommended by the BMBC Air Quality and Emissions Good Practice Planning Guidance[14]. The full assessment methodology is not reproduced within this report but a summary of the assessment steps are provided below:

- Step 1 – screen the requirement for a more detailed assessment. No assessment is required if there are no receptors within a certain distance of the works;

[9] Consultation request emails issued to Barnsley Metropolitan Borough Council Environmental Health Department on 29/03/2019 and further communication on 15/04/2019
[10] Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London
[11] Greater London Authority (2014) Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance, Greater London Authority, London
[12] Defra (2018) Local Air Quality Management Technical Guidance (LAQM.TG16), London: Defra
[13] Institute of Air Quality Management and Environmental Protection UK (2017) Land-Use Planning & Development Control: Planning for Air Quality, v1.2, London
[14] Barnsley Metropolitan Borough Council (2018) Air Quality and Emissions Good Practice Planning Guidance

- Step 2 – assess the risk of dust impacts separately for each of the four activities considered (demolition, earthworks, construction and trackout).
    - Step 2A – determine the potential dust emission magnitude for each of the four activities;
    - Step 2B – determine the sensitivity of the area;
    - Step 2C – determine the risk of dust impacts by combining the findings of steps 2A and 2B.
- Step 3 – determine the site-specific mitigation for each of the four activities; and
- Step 4 – examine the residual effects and determine significance.

Road Traffic Emissions – Air Dispersion Modelling

3.5 The air dispersion model ADMS-Roads, version 4.1.1.0 was utilised in the assessment to predict concentrations of NOx, PM_{10} and $PM_{2.5}$ at existing and proposed receptor locations.

3.6 The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance[12] and Institute of Air Quality Management and Environmental Protection UK guidance[13].

Assessment Scenarios and Traffic Data

3.7 The following scenarios were considered in the air dispersion modelling:

- Scenario 1: 2018 Verification and Base Year;
- Scenario 2: 2024 Opening Year Without Development; and
- Scenario 3: 2024 Opening Year With Development.

3.8 Traffic data were obtained from AECOM, the Transport Consultants for the project. 24-hour Annual Average Daily Traffic Data (AADT) and Heavy Duty Vehicle (HDV) proportions were provided for the following roads for use in the assessment:

- A633 Valley Way;
- A633 Wath Road;
- A6195 Dearne Valley Parkway;
- A6195 east;
- B6089 Brampton Road;
- Hemingfield Road;
- Park Street;
- Wath Road;
- Lundhill Road; and
- Site access / Gypsy Lane.

3.9 In addition traffic data for the A633 Manvers Way was obtained from the Department for Transport[15] for use in the verification of the ADMS-Roads model.

3.10 Consideration was given to the speeds at which vehicles are likely to travel within the study area. Free-flowing traffic conditions were modelled at speeds provided by the Transport Consultants. Queuing sections, including the junction of the A633 and A6195 were modelled in accordance with Defra guidance[12].

3.11 Traffic data used in the air dispersion modelling are provided in **Appendix C.**

ADMS-Roads Model Inputs

3.12 The following model inputs were utilised in the assessment:

- Emission Factors – emission factors were utilised from the Defra Emission Factor Toolkit (EFT)[16], version 8.0.1, for the years of assessment (2018 and 2024).
- Conversion of oxides of nitrogen – concentrations of NOx were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO_2) using the Defra NOx to NO_2 calculator[17], version 6.1.
- Meteorological Data – hourly sequential meteorological data for the base year of assessment (2018) were obtained for the Emley Moor recording station. This is the closest, most representative recording station to the proposed development Site. The wind rose for 2018 is provided in **Appendix D**.
- Surface roughness – a surface roughness of 0.5 was utilised in the dispersion model. This is representative of the suburban conditions of the study area.
- Monin-Obukhov length (MO) – an MO of 10 was utilised in the dispersion model. This is representative of the small town conditions of the study area.
- Background pollutant concentrations – background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the study area were obtained from the pollutant concentrations maps[18] provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2018 and 2024).
- Model verification – model verification was undertaken using 2018 Rotherham Metropolitan Borough Council (RMBC) monitoring data available for the study area[19]. Full details of the verification procedure are provided in **Appendix E.** Use of data from RMBC, rather than BMBC, was agreed during consultation[9].
- Calculation of short term PM_{10} concentrations – the following calculation, as detailed in Defra guidance[12], was utilised to calculate the number of exceedance of the 24-hour mean PM_{10} air quality objective:

$$\text{Number of 24-Hour Mean Exceedance} = -18.5 + 0.00145 * \text{Annual Mean}^3 + (206 / \text{Annual Mean})$$

- The IAQM released a position statement in July 2018[20] regarding dealing with the uncertainty in vehicle NOx emissions within air quality assessments. This recommends that sensitivity analyses be undertaken and professional judgement be applied to consider the scenario where NOx emissions do not reduce as rapidly as shown by the

[15] Department for Transport, traffic counts website https://roadtraffic.dft.gov.uk/ [accessed July 2018]
[16] Defra (2018) Emission Factor Toolkit [https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html]
[17] Defra (2018) NOx to NO_2 Calculator [https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc]
[18] Defra (2018) background pollutant concentration maps [https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015]
[19] Monitoring data provided by Rotherham Metropolitan Borough Council for 2018, assumed to be bias-adjusted.
[20] Institute of Air Quality Management (2018) Position Statement: Dealing with Uncertainty in Vehicle NOx Emissions within Air Quality Assessments, Version 1.1

EFT. As such a sensitivity analysis was undertaken and emission factors, NOx to NO_2 calculator inputs and background concentrations were kept at base year (2018) levels. Details of the sensitivity analysis are provided in **Appendix F**.

Assessment Criteria

3.13 Predicted pollutant concentrations were compared to the relevant air quality objectives. The current relevant air quality standards and objectives are detailed in **Table 3.1.**

Table 3.1: Air Quality Standards and Objectives (England)

Pollutant	Averaging Period	Air Quality Objective (µg.m^{-3})	Date to Achieve by
NO_2	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM_{10}	Annual Mean	40	31 December 2004
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
$PM_{2.5}$	Annual mean target (15% cut in annual mean (urban background exposure)	25	2010 - 2020

3.14 Guidance is provided by the IAQM and EPUK[13] to determine the significance of the impact of development-generated road traffic emissions on local air quality. The impact descriptors at receptor locations are detailed in **Table 3.2.** These impact descriptors consider the predicted magnitude of change in pollutant concentrations and the concentration in relation to the relevant air quality objectives.

Table 3.2: 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
76 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Note: Figures rounded up to the nearest whole number, therefore any value less than 1% after rounding (effectively less than 0.5%) will be described as negligible.

Barnsley Metropolitan Borough Council Air Quality and Emissions Good Practice Planning Guidance

3.15 BMBC has recently developed and adopted its own Air Quality and Emissions Good Practice Planning Guidance[14]. The development classification process detailed in the BMBC Air Quality and Emissions Good Practice Planning Guidance[14] was undertaken and mitigation measures recommended accordingly.

3.16 The BMBC Air Quality and Emissions Good Practice Planning Guidance[14] provides a three stage assessment process as follows:

- Stage 1 – determining the classification of the development proposal;
- Stage 2 – assessing and quantifying the impact on local air quality;
- Stage 3 – establishing the level of mitigation required by the proposal to meet National Planning Policy and Local Plan requirements.

3.17 This three stage process was undertaken and the classifications for each stage were agreed with BMBC during the consultation process[9].

4. BASELINE CONDITIONS

Local Air Quality Management

4.1 The proposed development is not within an existing AQMA designation. The nearest AQMA is 5.4km west of the Site and covers the section of the M1 between Junction 35a and 38.

Local Air Quality Monitoring

Nitrogen Dioxide (NO_2)

4.2 BMBC undertakes monitoring within its administrative boundary using a network of automatic monitoring locations and diffusion tubes; however the closest monitoring locations to the Site are operated by neighbouring RMBC. The closest monitoring locations are on Manvers Way (diffusion tubes RDT14 and RDT15), 2.1km south east of the Site.

4.3 Bias adjusted NO_2 monitoring results, for the locations in the vicinity of the proposed development Site, are detailed in **Table 4.1.**

Table 4.1: RMBC NO_2 Monitoring Data in 2014 – 2018

Location	Grid Reference		Monitoring Site Type[21]	Monitored Annual Average Concentration ($\mu g.m^{-3}$)				
				2014	2015	2016	2017	2018
RDT14 – Lamp Post 130 Manvers Way	442538	401818	R	33.7	39.5	35.6	34.0	30.0
RDT15 – A633 Manvers Way Holiday Inn	443065	401529	R	*	*	*	29.0	27.0
RDT13 – Manvers Way, Hummingbird Walk	443531	401446	UB	*	*	*	24.0	23.0
RDT12 Cawood Drive off Manvers Way	443647	401400	R	*	*	*	23.0	22.0

**Note: Diffusion tube installed in 2017.*

4.4 Monitored concentrations in 2018 were below the annual mean air quality objective for NO_2 of 40$\mu g.m^{-3}$ at all monitoring locations in the vicinity of the Site.

[21] Site Types: R = Roadside, UB =- Urban Background

Particulate Matter (PM_{10} and $PM_{2.5}$)

4.5 No monitoring of PM_{10} or $PM_{2.5}$ is undertaken by BMBC or RMBC in the vicinity of the Site.

Background Pollutant Concentrations

4.6 No background air quality monitoring is undertaken by BMBC within the study area.

4.7 Whilst RMBC undertakes background monitoring at diffusion tube RDT13, this is some distance from the Site and therefore background pollutant concentrations for proposed and existing receptor locations were obtained from the latest Defra background concentration maps[18], which are provided for the UK as a 1km x 1km grid network. The latest maps are based on 2015 monitoring and meteorological data. Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were obtained for the grid squares covering the study area for the years of assessment (2018 and 2024). The background concentrations used in the assessment are detailed in **Table 4.2.**

Table 4.2: Background Pollutant Concentrations used in the Assessment

Pollutant	Grid Square	Receptors	Annual Mean Concentration ($\mu g.m^{-3}$)	
			2018	2024
NO_2	438500, 402500	R21	11.6	9.1
PM_{10}			11.7	11.3
$PM_{2.5}$			7.7	7.3
NO_2	439500, 401500	R22-R23, R25	12.2	9.5
PM_{10}			12.0	11.7
$PM_{2.5}$			7.8	7.5
NO_2	440500, 402500	R1-R17, R19-R20, R26, PR1-PR4	13.1	10.4
PM_{10}			11.8	11.4
$PM_{2.5}$			7.8	7.4
NO_2	441500, 402500	R18, R24	15.1	12.3
PM_{10}			12.5	12.2
$PM_{2.5}$			8.3	7.9

Pollutant	Grid Square	Receptors	Annual Mean Concentration (µg.m^{-3})	
			2018	2024
NO_2	442500, 401500	RDT14	13.1	10.4
PM_{10}			11.8	11.4
$PM_{2.5}$			7.8	7.5
NO_2	443500, 401500	RDT15	12.5	9.9
PM_{10}			11.5	11.2
$PM_{2.5}$			7.6	7.3

4.8 2018 and 2024 background concentrations are below the relevant annual mean air quality objectives for NO_2, PM_{10} and $PM_{2.5}$.

5. CONSTRUCTION PHASE ASSESSMENT

5.1 The construction phase of the proposed development will involve a number of activities which have the potential to impact on local air quality. These include emissions of dust generated through demolition, excavation, construction, earthworks and trackout activities, exhaust pollutant emissions from construction traffic on the local highways network, and exhaust emissions from non-road mobile machinery (NRMM) within the construction site itself.

5.2 The location of sensitive receptors in relation to construction activities will affect the potential for such construction activities to cause dust soiling, nuisance and local air quality impacts. Meteorological conditions and the use of control measures will also contribute to the effects experienced.

5.3 The assessment was undertaken in accordance with IAQM guidance[10] with reference to GLA guidance[11] as required in BMBC Low Emissions guidance[14].

Step 1: Screen the Need for a Detailed Assessment

5.4 Step 1 of the guidance involves a screening assessment to consider whether a more detailed construction phase dust assessment is required.

5.5 In accordance with the guidance, a detailed assessment is required if:

- Human receptors are located within 350m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances; or
- Ecological receptors are located within 50m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances.

5.6 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website[22], no ecological designations were identified within 50m of the proposed development and therefore the impact on ecological designations was not considered further. However human receptors are located within 350m of the Site boundary, with the closest of these receptors located approximately 20m south of the Site boundary. A construction phase assessment was therefore undertaken.

Step 2: Assess the Risk of Dust Impacts

Step 2A: Define the Potential Dust Emission Magnitude

5.7 The dust emission magnitudes for the construction activities were defined using the criteria detailed in the IAQM[10] and GLA[11] guidance. Demolition is not proposed as part of the development and therefore wasn't considered further in the assessment. The

[22] Defra, Multi Agency Geographic Information for the Countryside (MAGIC) [http://magic.defra.gov.uk/]

criteria and the dust emission magnitude defined for the proposed development are detailed in **Table 5.1**.

Table 5.1: Dust Emission Magnitude Criteria and Definition

Activity	Dust Emission Magnitude	Dust Emission Magnitude Criteria	Project Defined Dust Emission Magnitude
Earthworks	Large	Total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes.	Large: Site area >10,000m^2.
	Medium	Total site area 2,500m^2 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4m - 8m in height, total material moved 20,000 tonnes – 100,000 tonnes.	
	Small	Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <20,000 tonnes, earthworks during wetter months.	
Construction	Large	Total building volume >100,000m^3, on site concrete batching, sandblasting.	Large: Proposed building volume >100,000m^3.
	Medium	Total building volume 25,000m^3 – 100,000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.	
	Small	Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).	
Trackout	Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m.	Medium: 10-50 HDV movements anticipated.
	Medium	10 - 50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m.	
	Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.	

Step 2B: Define the Sensitivity of the Area

5.8 The sensitivity of the study area takes into account the specific receptors in the vicinity of the Site, the proximity and number of those receptors, the local background concentration of PM_{10} and site-specific factors. The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling, human health and ecological impacts and these are presented in **Table 5.2**. A plan showing the key distance buffers detailed in the IAQM guidance[10] is included in **Figure 5.1.**

Figure 5.1: Construction Phase Dust Buffers

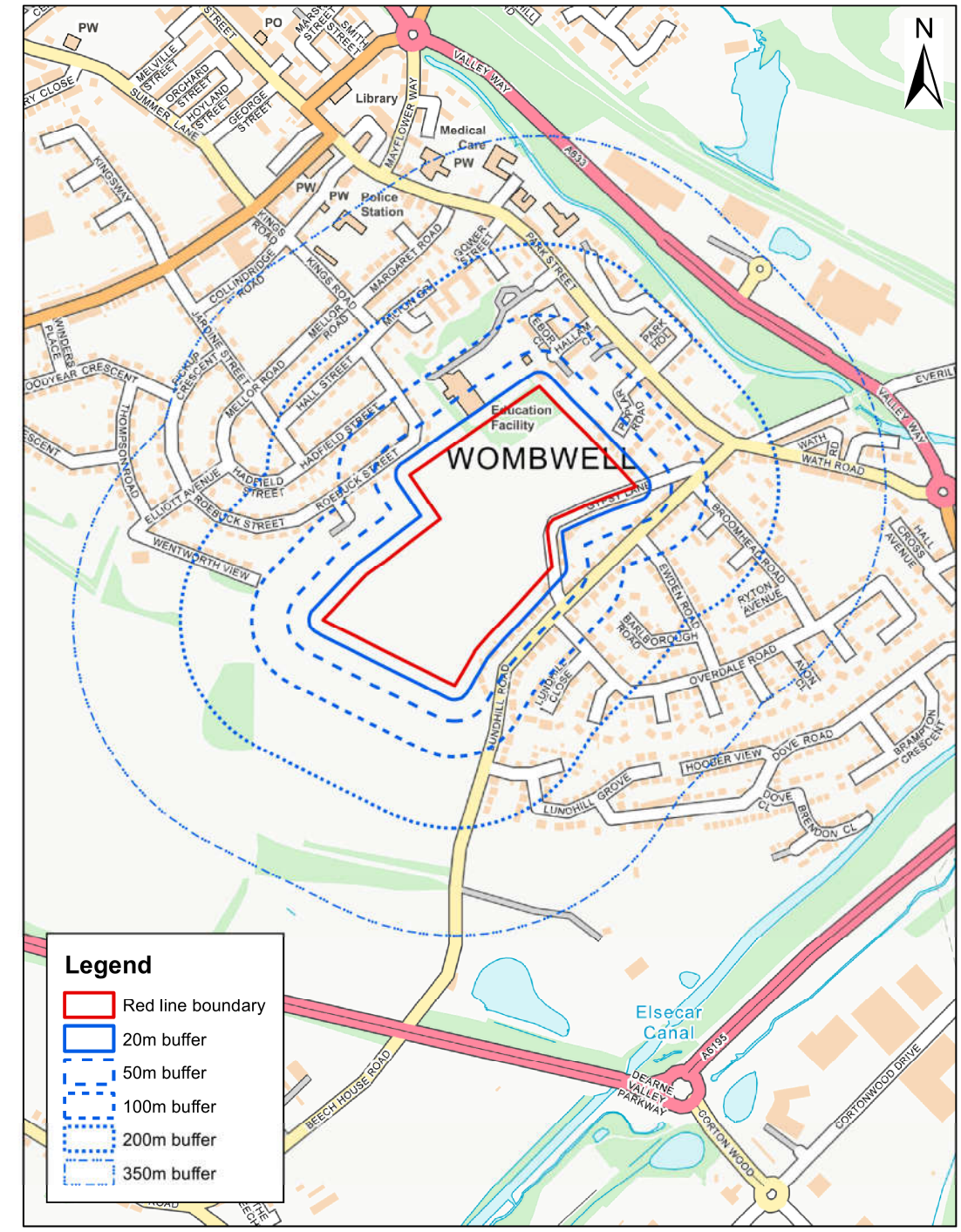

Figure 5.1 Construction Phase Dust Buffers

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Table 5.2: Determination of the Sensitivity of the Area

Potential Impact	Justification	Sensitivity		
		Earthworks	Construction	Trackout
Dust Soiling	There are anticipated to be 10 - 100 highly sensitive receptors within 20m of the proposed development.	High	High	High
Human Health	There are 10 - 100 highly sensitive receptors within 20m of the proposed development. The 2018 background concentration of PM_{10} is less than 24µg.m^{-3}.	Low	Low	Low

Step 2C: Define the Risk of Impacts

5.9 The dust emission magnitude determined in Step 2A is then combined with the sensitivity of the area determined in Step 2B to define the risk of dust impacts with no mitigation applied. The results of this assessment are detailed in **Table 5.3.**

Table 5.3: Summary Dust Risk Table to Define Site Specific Risk

Activity	Step 2A: Dust Emission Magnitude	Step 2B: Sensitivity of the Area	Step 2C: Risk of Dust Impacts
Dust Soiling Effects on People and Property			
Earthworks	Large	High	High Risk
Construction	Large	High	High Risk
Trackout	Medium	High	Medium Risk
Human Health Impacts			
Earthworks	Large	Low	Low Risk
Construction	Large	Low	Low Risk
Trackout	Medium	Low	Low Risk

Step 3: Site-Specific Mitigation

5.10 The risk of dust impacts defined in Step 2C is used to determine the measures required to mitigate construction phase dust impacts. The mitigation measures are detailed in **Section 7** of this report.

Step 4: Determine Significant Effects

5.11 In accordance with IAQM guidance[10], with the implementation of the mitigation measures detailed in **Section 7**, the residual impacts from the construction phase are considered to be 'not significant'.

6. OPERATIONAL PHASE ROAD TRAFFIC EMISSIONS ASSESSMENT

Existing Receptor Locations

6.1 Existing receptor locations were identified within close proximity of the road links detailed in paragraph 3.8, with agreement obtained from BMBC[9], and considered in the operational phase road traffic emissions assessment. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the identified existing receptor locations for the assessment scenarios detailed in paragraph 3.7. Where possible the closest receptors to those road links were considered, as these receptors are likely to experience the greatest change in pollutant concentrations as a result of the proposed development. Receptors heights were modelled at 1.5m.

6.2 The existing receptor locations are detailed in **Table 6.1** and **Figure 6.1.**

Table 6.1: Existing Sensitive Receptor Locations

Receptor	Grid Reference		Details
	X	Y	
R1	440285	402047	Residential receptor on Lundhill Road
R2	440283	402163	Residential receptor on Lundhill Road
R3	440314	402176	Residential receptor on Lundhill Road
R4	440364	402285	Residential receptor on Lundhill Road
R5	440395	402275	Residential receptor on Lundhill Road
R6	440391	402302	Residential receptor on Lundhill Road
R7	440447	402357	Residential receptor on Lundhill Road
R8	440524	402403	Residential receptor on Lundhill Road
R9	440535	402441	Residential receptor on Lundhill Road
R10	440607	402511	Residential receptor at junction of Lundhill Road and Wath Road
R11	440633	402502	Residential receptor at junction of Lundhill Road and Wath Road
R12	440639	402523	Residential receptor at junction of Lundhill Road and Wath Road
R13	440754	402497	Residential receptor on Wath Road

Receptor	Grid Reference		Details
	X	Y	
R14	440757	402475	Residential receptor on Wath Road
R15	440839	402454	Residential receptor on Wath Road
R16	440963	402351	Residential receptor on Brampton Road
R17	440944	402335	Residential receptor on Brampton Road
R18	441039	402254	Residential receptor on Brampton Road
R19	440438	402670	Residential receptor on Park Street
R20	440483	402652	Residential receptor on Park Street
R21	438979	402120	Residential receptor on Hemingfield Road
R22	439090	401825	Residential receptor on Hemingfield Road
R23	439192	401709	Residential receptor on Hemingfield Road
R24	441087	402430	Residential receptor on Wath Road east
R25	439074	401974	Residential receptor near Hemingfield Road Roundabout
R26	440887	402411	Residential receptor near Wath Road Roundabout

Figure 6.1: Existing Receptor Locations

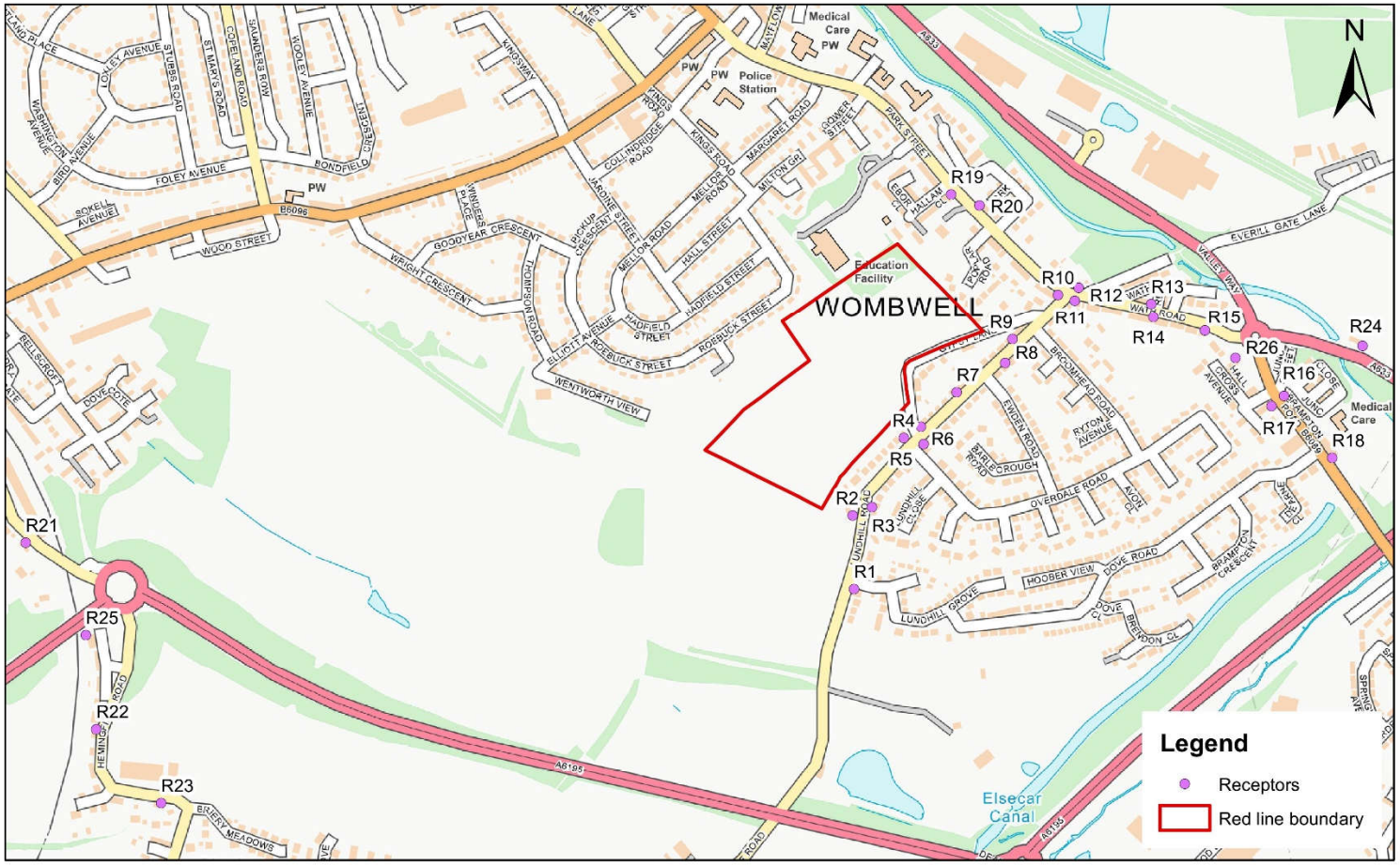

Figure 6.1 Existing Receptors

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Proposed Receptor Locations

6.3 Pollutant concentrations were predicted across the proposed development Site to consider exposure of future residents of the proposed development to air quality. Proposed receptor locations were selected to represent the worst-case exposure locations of future residents i.e. at the redline boundary closest to existing road sources. Pollutant concentrations were predicted at the proposed development Site for Scenario 3: 2024 Opening Year With Development at those locations detailed in **Table 6.2** and shown in **Figure 6.2**.

Table 6.2: Proposed Sensitive Receptor Locations

Proposed Receptor	Grid Reference	
	X	Y
PR1	440237	402188
PR2	440340	402312
PR3	440280	402349
PR4	440373	402413

Figure 6.2: Proposed Receptor Locations

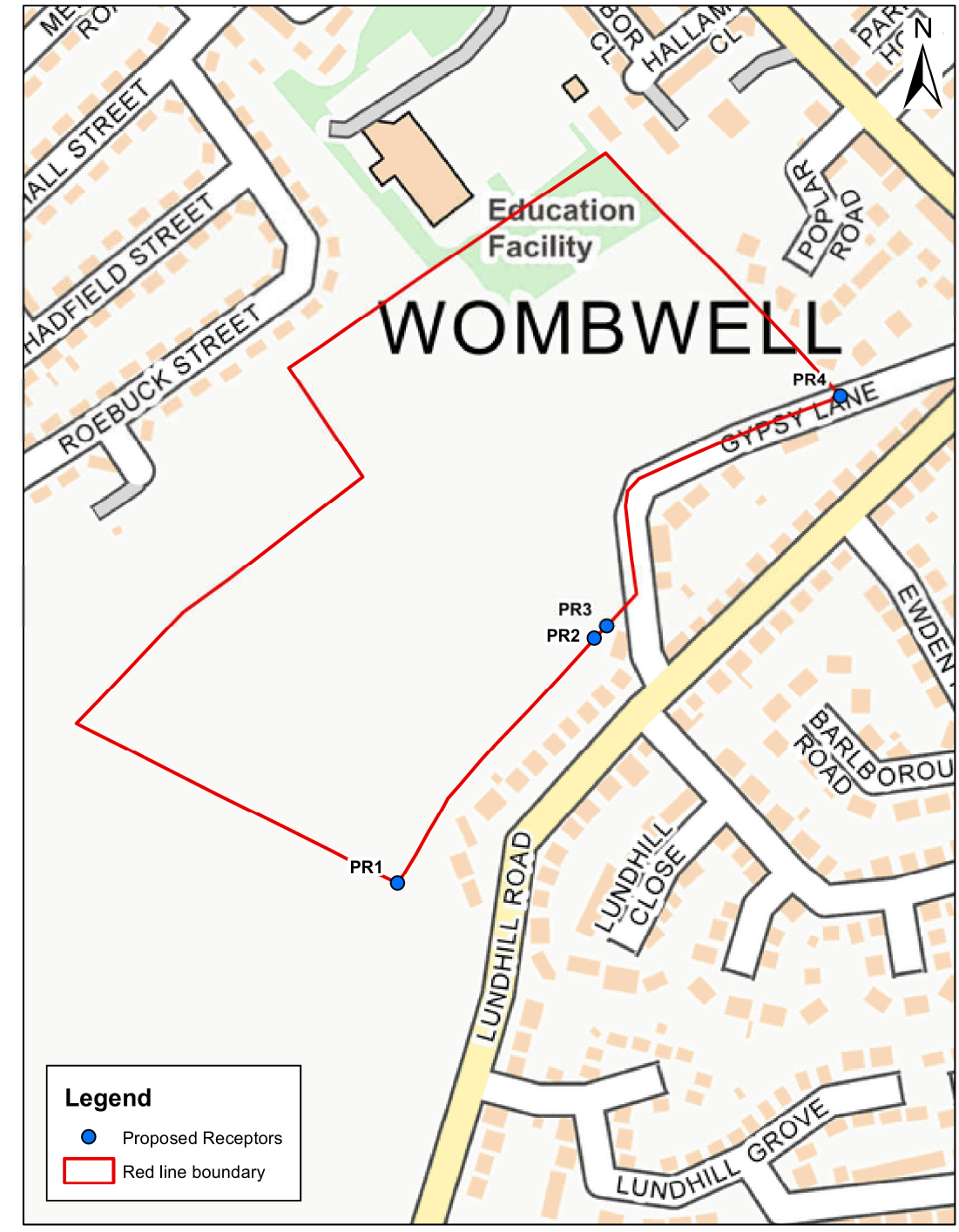

Figure 6.2 Proposed Receptors

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Baseline Assessment

6.4 Pollutant concentrations were predicted at the identified existing sensitive receptor locations using the dispersion model ADMS-Roads. Predicted pollutant concentrations for Scenario 1: 2018 Base Year and Scenario 2: 2024 Opening Year Without Development are detailed in **Table 6.3.**

Table 6.3: Predicted Annual Mean Pollutant Concentrations for Scenario 1: 2018 Base Year and Scenario 2: 2024 Opening Year Without Development at Existing Receptor Locations

Receptor	Scenario 1: 2018 Base Year (µg.m^{-3})			Scenario 2: 2024 Opening Year Without Development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R1	19.3	12.9	8.4	14.7	12.7	8.1
R2	17.3	12.5	8.2	13.2	12.2	7.9
R3	19.0	12.8	8.4	14.5	12.6	8.1
R4	17.2	12.5	8.2	13.2	12.2	7.9
R5	19.1	12.9	8.4	14.6	12.6	8.1
R6	18.3	12.7	8.3	14.0	12.5	8.0
R7	18.5	12.7	8.3	14.1	12.5	8.0
R8	20.8	13.2	8.6	15.7	13.0	8.3
R9	19.1	12.9	8.4	14.5	12.6	8.1
R10	27.8	14.4	9.3	19.9	14.2	8.9
R11	29.4	14.7	9.5	21.1	14.5	9.1
R12	30.0	14.8	9.5	21.3	14.6	9.2
R13	29.8	14.9	9.6	21.2	14.7	9.2
R14	28.0	14.6	9.4	20.0	14.3	9.0
R15	30.3	15.0	9.7	21.5	14.8	9.3
R16	34.8	15.9	10.2	23.9	15.6	9.7

Receptor	Scenario 1: 2018 Base Year (µg.m^{-3})			Scenario 2: 2024 Opening Year Without Development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R17	25.7	14.1	9.1	18.1	13.8	8.7
R18	34.8	16.3	10.4	24.4	16.0	10.0
R19	25.0	14.0	9.0	17.8	13.7	8.7
R20	30.0	14.9	9.6	21.1	14.7	9.2
R21	20.6	13.3	8.6	14.4	13.0	8.2
R22	21.0	13.6	8.8	15.1	13.4	8.4
R23	20.1	13.4	8.6	14.6	13.2	8.3
R24	33.0	16.2	10.4	23.9	16.0	10.0
R25	35.8	16.7	10.5	24.0	16.4	10.1
R26	25.5	14.1	9.1	18.2	13.8	8.7

6.5 The baseline assessment for Scenario 1 and Scenario 2 indicates that predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are below the respective annual mean air quality objectives at receptors considered.

6.6 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[12] it may be assumed that exceedance of the 1-hour mean objective are unlikely. The calculation detailed in paragraph 3.12 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Impact Assessment

BMBC Air Quality and Emissions Good Practice Planning Guidance

6.7 The three stage process detailed in the BMBC guidance[14] was undertaken and the classifications for each stage were agreed with BMBC during the consultation process.

Stage 1: Development Type Classification

6.8 The proposed development comprises 229 residential dwellings which exceeds the 50 dwellings threshold detailed in Table 1 of the BMBC guidance[14]. However, the traffic data showed a below-5% increase on all roads with >10,000AADT and therefore the

development is classified as a 'medium' development in accordance with this guidance[14].

6.9 A detailed air quality assessment was required in accordance with the criteria detailed in the BMBC guidance[14] and it was therefore necessary to proceed to Stage 2.

Stage 2: Air Quality Impact Assessment

Detailed Operational Phase Road Traffic Emissions Assessment

6.10 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor locations for Scenario 3: 2024 Opening Year With Development, to consider the impact of development-generated vehicles on local air quality.

6.11 Predicted pollutant concentrations are detailed in **Tables 6.4**, **6.5** and **6.6** for NO_2, PM_{10} and $PM_{2.5}$ respectively together with Scenario 2: 2024 Opening Year Without Development concentrations for comparison purposes. The predicted change in pollutant concentrations resulting from development-generated traffic, and the associated impact, are also provided.

Table 6.4: Predicted Annual Mean NO_2 Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted NO_2 Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R1	14.7	15.1	+0.4	Negligible
R2	13.2	13.5	+0.3	Negligible
R3	14.5	14.9	+0.4	Negligible
R4	13.2	13.8	+0.6	Negligible
R5	14.6	15.3	+0.7	Negligible
R6	14.0	15.0	+1.0	Negligible
R7	14.1	14.5	+0.4	Negligible
R8	15.7	16.3	+0.5	Negligible
R9	14.5	14.8	+0.3	Negligible
R10	19.9	20.3	+0.4	Negligible

Receptor	Predicted NO_2 Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R11	21.1	21.5	+0.5	Negligible
R12	21.3	21.7	+0.4	Negligible
R13	21.2	21.6	+0.4	Negligible
R14	20.0	20.3	+0.3	Negligible
R15	21.5	21.8	+0.3	Negligible
R16	23.9	23.9	+0.1	Negligible
R17	18.1	18.2	+0.1	Negligible
R18	24.4	24.5	+0.1	Negligible
R19	17.8	17.9	0.0	Negligible
R20	21.1	21.1	+0.1	Negligible
R21	14.4	14.5	+0.1	Negligible
R22	15.1	15.3	+0.2	Negligible
R23	14.6	14.9	+0.3	Negligible
R24	23.9	24.0	+0.1	Negligible
R25	24.0	24.1	+0.2	Negligible
R26	18.2	18.3	+0.1	Negligible

**Discrepancies in change calculations are a result of rounding effects*

Table 6.5: Predicted Annual Mean PM_{10} Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted PM_{10} Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R1	12.7	12.8	+0.1	Negligible
R2	12.2	12.3	+0.1	Negligible
R3	12.6	12.7	+0.1	Negligible
R4	12.2	12.4	+0.2	Negligible
R5	12.6	12.8	+0.2	Negligible
R6	12.5	12.7	+0.3	Negligible
R7	12.5	12.6	+0.1	Negligible
R8	13.0	13.1	+0.1	Negligible
R9	12.6	12.7	+0.1	Negligible
R10	14.2	14.3	+0.1	Negligible
R11	14.5	14.6	+0.1	Negligible
R12	14.6	14.7	+0.1	Negligible
R13	14.7	14.8	+0.1	Negligible
R14	14.3	14.4	+0.1	Negligible
R15	14.8	14.9	+0.1	Negligible
R16	15.6	15.7	0.0	Negligible
R17	13.8	13.8	0.0	Negligible
R18	16.0	16.0	0.0	Negligible
R19	13.7	13.7	0.0	Negligible
R20	14.7	14.7	0.0	Negligible

Receptor	Predicted PM_{10} Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R21	13.0	13.0	0.0	Negligible
R22	13.4	13.4	+0.1	Negligible
R23	13.2	13.3	+0.1	Negligible
R24	16.0	16.0	0.0	Negligible
R25	16.4	16.4	0.0	Negligible
R26	13.8	13.8	0.0	Negligible

**Discrepancies in change calculations are a result of rounding effects*

Table 6.6: Predicted Annual Mean $PM_{2.5}$ Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted $PM_{2.5}$ Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R1	8.1	8.2	+0.1	Negligible
R2	7.9	7.9	0.0	Negligible
R3	8.1	8.2	+0.1	Negligible
R4	7.9	8.0	+0.1	Negligible
R5	8.1	8.2	+0.1	Negligible
R6	8.0	8.2	+0.1	Negligible
R7	8.0	8.1	+0.1	Negligible
R8	8.3	8.4	+0.1	Negligible
R9	8.1	8.1	+0.1	Negligible
R10	8.9	9.0	+0.1	Negligible

Receptor	Predicted $PM_{2.5}$ Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R11	9.1	9.2	+0.1	Negligible
R12	9.2	9.2	+0.1	Negligible
R13	9.2	9.3	+0.1	Negligible
R14	9.0	9.1	+0.1	Negligible
R15	9.3	9.4	+0.1	Negligible
R16	9.7	9.8	0.0	Negligible
R17	8.7	8.7	0.0	Negligible
R18	10.0	10.0	0.0	Negligible
R19	8.7	8.7	0.0	Negligible
R20	9.2	9.2	0.0	Negligible
R21	8.2	8.2	0.0	Negligible
R22	8.4	8.5	0.0	Negligible
R23	8.3	8.4	0.0	Negligible
R24	10.0	10.0	0.0	Negligible
R25	10.1	10.1	0.0	Negligible
R26	8.7	8.8	0.0	Negligible

**Discrepancies in change calculations are a result of rounding effects*

6.12 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 2: 2024 Opening Year Without Development and Scenario 3: 2024 Opening Year With Development are below the relevant annual mean air quality objectives for all receptors.

6.13 The proposed development does not lead to any exceedances of the annual mean air quality objectives.

6.14 Predicted changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations are less than 2% of the relevant annual mean air quality objectives and are all considered to be negligible in accordance with IAQM and EPUK guidance[13].

6.15 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[12] it may be assumed that exceedance of the 1-hour mean objective are unlikely. The calculation detailed in paragraph 3.12 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Impact Significance Summary

6.16 Relevant guidance and legislation and professional judgement was utilised to determine the significance of impacts for the air quality assessment. The air quality assessment was supervised by a full member of the Institute of Air Quality Management. A summary of the impact significance and justification of this are provided below.

6.17 The impact of the proposed development on air quality is considered to be 'Negligible':

- Consideration was given to local planning policy[8] and the development proposals are considered to be in accordance with this policy with regard to air quality.
- Existing concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the study area are predicted to be below the relevant air quality objectives.
- The air quality assessment undertaken utilised robust model inputs including slowing traffic sections at junctions, appropriate meteorological data and surface roughness and cumulative traffic flows.
- The impact of development-generated road traffic on local air quality is defined as negligible in accordance with IAQM and EPUK guidance[13].
- In addition, a sensitivity analysis was undertaken and provided in **Appendix F** considering the conservative scenario of NOx concentrations not decreasing from baseline levels in line with projected emission factors. The findings of this sensitivity analysis predict the impact of development-generated road traffic on local air quality as negligible at the majority of receptors, with a slight adverse impact at one receptor in accordance with IAQM and EPUK guidance[13]. This is a result of the receptor being close to the A6195 and therefore having elevated baseline concentrations of the NO_2. No exceedances of the air quality objectives are predicted.

Site Suitability Assessment

6.18 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the proposed residential dwellings within the development Site for Scenario 3: 2024 Opening Year With Development. Predicted pollutant concentrations are detailed in **Table 6.7**.

Table 6.7: Predicted Annual Mean NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Proposed Receptor Locations

Receptor	Scenario 3: 2024 Opening Year With Development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$
PR1	12.0	11.7	7.9
PR2	12.9	11.8	8.1
PR3	12.1	11.7	7.9
PR4	11.9	11.7	7.9

6.19 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 3: 2024 Opening Year With Development, indicate that pollutant concentrations at the proposed residential development will be below the respective air quality objectives in 2024 with the development in place.

6.20 With regard to short term air quality objectives for NO_2 and PM_{10} at the residential development, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[12] it may be assumed that exceedance of the 1-hour mean NO_2 objective are unlikely. The calculation detailed in paragraph 3.12 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

7. MITIGATION

Construction Phase Assessment

Step 3: Site-specific Mitigation

7.1 The risk of dust impacts, defined in Step 2C of the assessment, are used to determine the mitigation measures required to minimise the emission of dust during construction phase activities. The IAQM guidance[10], along with the GLA guidance[11], provides details of highly recommended and desirable mitigation measures which are commensurate with the risk of dust impacts defined in Step 2C for construction, earthworks and track out activities. Where the mitigation measures are general in nature, the highest risk category was applied in accordance with the guidance[10]. The highest risk category identified was 'High Risk' and the recommended mitigation taken from the IAQM guidance[10] is detailed in **Table 7.1** and **Table 7.2**.

Table 7.1: Mitigation Measures for a High Risk Site

Category	Mitigation Measures	
	Highly Recommended	Desirable
Communication	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	None
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager.	
	Display the head or regional office contact information.	
	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. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.	
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.	None
	Make the complaints log available to the local authority when asked.	

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
	Record any exceptional incidents that cause and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	
	Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	
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 100m of the site boundary, with cleaning to be provided as necessary.	None
	Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	
Preparing and maintaining the site	Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	None
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extended period.	
	Avoid site runoff of water or mud.	
	Keep site fencing, barriers and scaffolding clean using wet methods.	
	Remove materials that have a potential to produce dust from site as soon as possible. Unless being re-used on site. If they are being re-used on-site cover as described below.	

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
	Cover, seed or fence stockpiles to prevent wind whipping.	
Operating vehicle/ machinery and sustainable travel	Ensure all vehicles switch off engines when stationary – no idling vehicles.	None
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	
	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable control measures provided, subject to the approval of the nominated undertaker with the agreement of the local authority, where appropriate).	
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	
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.	None
	Ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-portable water where possible and appropriate.	
	Use enclose chutes and conveyors and covered skips.	
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	
	Ensure equipment is readily available on site to clean and dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	
Waste Management	Avoid bonfires and burning of waste materials.	None

Table 7.2: Mitigation Measures Specific to Earthworks, Construction and Trackout

Category	Mitigation Measures	
	Highly Recommended	Desirable
Earthworks (High Risk Site)	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	None
	Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	
	Only remove the cover in small areas during work and not all at once.	
Construction (High Risk Site)	Avoid Scabbling (roughening of concrete surfaces) if possible.	For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
	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.	
	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	
Trackout (Medium Risk Site)	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any materials tracked out of the site. This may require the sweeper being continuously in use.	None
	Avoid dry sweeping of large areas.	
	Ensure vehicles entering and leaving the sites are covered to prevent escape of materials during transport.	
	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	
	Record all inspections of haul routes and any subsequent action in a site log book.	
	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	
	Access gates to be located at least 10m from receptors where possible.	

Road Traffic Emissions

BMBC Air Quality and Emissions Good Practice Planning Guidance

Stage 3: Mitigation

7.2 No significant effects on local air quality are anticipated with the development in place. However, the BMBC guidance[14] recommends the inclusion of a number of 'default' mitigation measures in addition to any mitigation requirements arising from a dispersion modelling assessment. For developments classified as 'medium', these include:

- For residential developments, the inclusion of one electric vehicle (EV) charging point per unit with dedicated parking or one charging point per 10 spaces for unallocated parking;
- A Travel Plan including agreed mechanisms for discouraging high emission vehicle use and encouraging modal shift, such as:
  - Improved pedestrian links to public transport stops;
  - Provision of new bus stop infrastructure including shelters, raised kerbing, information displays;
  - Provision of subsidised or free public transport ticketing;
  - Site layout to include improved pedestrian pathways to encourage walking; and
  - Improved convenient and segregated cycle paths to link to local cycle network.

7.3 The project's Framework Travel Plan[23] suggests a number of potential measures that correspond with, or complement, the above. These include:

- Provision of a Travel Welcome Pack to provide information to new residents on safe cycle and pedestrian routes;
- Appointment of a Travel Plan Co-ordinator to organised a programme of personalised journey travel planning;
- Provision of cycle parking infrastructure and work with local cycle shops to negotiate a discount for residents;
- Promotion of car sharing websites; and
- Residential travel survey and ongoing monitoring to ascertain the effectiveness of the implemented measures.

[23] AECOM (2019) Former Wombwell School Site – Framework Travel Plan

8. CONCLUSIONS

8.1 An air quality impact assessment was undertaken for the proposed residential development at land west of Gypsy Lane in Wombwell.

8.2 A qualitative construction phase assessment was undertaken and measures were recommended for inclusion in a DMP to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions is considered to be 'not significant' in accordance with IAQM guidance[10].

8.3 A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance[12]. The development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the development on local air quality was predicted to be 'not significant' in accordance with IAQM and EPUK guidance[13].

8.4 Pollutant concentrations were also predicted across the proposed development Site. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were all predicted to be below the relevant air quality objectives and therefore the Site was considered to be suitable for the proposed residential use with regard to air quality.

8.5 Consideration was also given to the BMBC Air Quality and Emissions Good Practice Planning Guidance[14] and the development was categorised and mitigation recommended in accordance with the guidance. Mitigation measures comprise the provision of a Travel Plan and Electric Vehicle charging points.

APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Term	Definition
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between two years, which is useful for pollutants that have higher concentrations during the winter months.
AQAP	Air Quality Action Plan.
AQMA	Air Quality Management Area.
AQS	Air Quality Strategy.
Defra	Department for Environment, Food and Rural Affairs.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV	Heavy Duty Vehicles, (HGVs + buses)
HGV	Heavy Goods Vehicles.
IAQM	Institute of Air Quality Management.
LAQM	Local Air Quality Management.
LDV	Light Duty Vehicles (motorbikes, cars, vans and small trucks)
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
O_3	Ozone.
Percentile	The percentage of results below a given value.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
micrograms per cubic metre ($\mu g.m^{-3}$)	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu g.m^{-3}$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UK-AIR	UK Air Information Resource – A source of air quality information provided by Defra.
UKAQS	United Kingdom Air Quality Strategy.

APPENDIX B: PROPOSED DEVELOPMENT PLANNING LAYOUT

BWB


Gypsy Lane, Wombwell
ACCOMMODATION SCHEDULE
STEN ARCHITECTURE
Reference
Code
Floor Area (SqM)
Beds
Storeys
Total
Total SqM
% of Mix
Private
Type A
Type B
Type P
Type F
Type S
Type T
Type C
Type G
Type D
Type J
Type R
Type E
Sub-Total
Affordable
Type A
Type B
Type P
Sub-Total
Grand Total
Notes.
PLANNING LAYOUT KEY
Boundary treatments
1.8 brick wall & fence piers
1.8 Close boarded timber fence
1.8 Hit & Miss fence
1.2 Metal railings
Knee rail
General
Affordable unit
Bin collection point
Site boundary
New rigione Block paving
Retained tree
N
Scale@ 1:500
0
10m
20m
50m
STEN ARCHITECTURE
Premier construction northern
Wombwell
Planning Layout
1876
1876.01
A

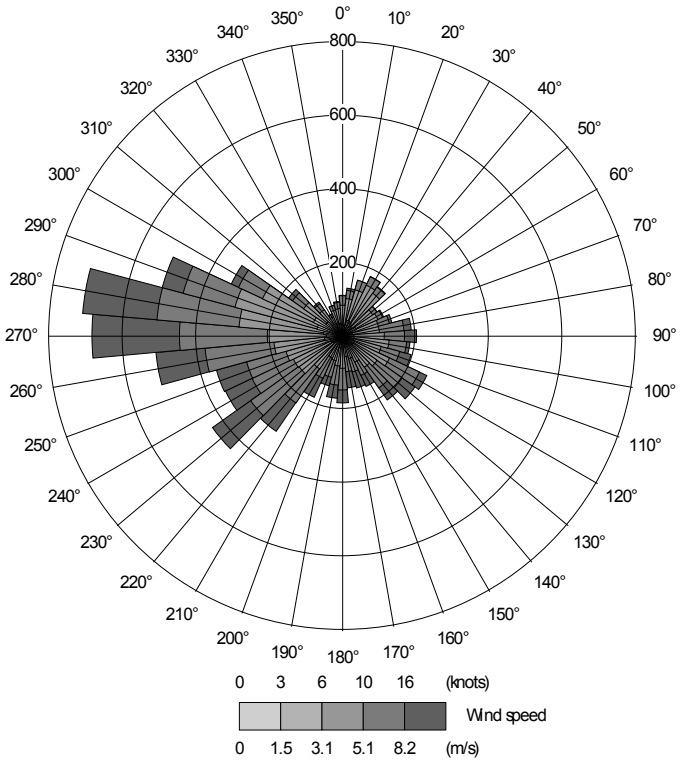
APPENDIX C: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT

Traffic Data Utilised in the Air Dispersion Modelling Assessment

Road Link	Speed	Scenario 1: 2018 Base/Verification Year		Scenario 2: 2024 Opening Year Without Development		Scenario 3: 2024 Opening Year Without Development	
	kph	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
A6195 East	60	29919	1496	32794	1640	32794	1640
Hemingfield Road North	30	5475	383	5968	418	6027	418
A6195 West	60	26633	2397	29121	2621	29426	2621
Hemingfield Road South	30	3574	179	4169	208	4532	208
Lundhill Road (north of Site access)	30	3699	74	4488	90	5050	90
Lundhill Road (south of Site access)	30	3699	74	4488	90	5110	90
Park Street West	30	9587	479	10632	532	10656	532
Wath Road East	30	9794	392	10948	438	11488	438
A633 North	50	20266	811	22181	887	22356	887
A633 East	40	19787	791	21750	870	22066	870
B6089 South	30	11916	715	12989	779	13036	779

APPENDIX D: WIND ROSE FOR 2018 FOR EMLEY MOOR METEOROLOGICAL RECORDING STATION

Meteorological data for 2018 Base Year scenario for the Emley Moor recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2018 is detailed below and illustrates a predominant wind direction from the west.



APPENDIX E: MODEL VERIFICATION

Whilst ADMS-Roads is widely validated for use in this type of assessment, model verification for the area around the Site will not have been included. To determine model performance at a local level, a comparison of modelled results with monitored results in the study area was done in accordance with the methodology provided by Defra[12]. This process of verification aims to minimise modelling uncertainty by correcting modelled results by an adjustment factor to give greater confidence to the results.

The model was run for Scenario 1: 2018 Verification Year to predict the 2018 annual mean road contribution of NOx at the monitoring locations in the study area. The model NOx output at this location was compared to the 2018 monitored concentration to provide an adjustment factor. **Tables E1** presents the verification process for NOx.

Please note NO_2 diffusion tube monitoring location DT46 Wombwell Lane was excluded from the verification process due to it being a kerbside location. Diffusion tubes (RDT14 and RDT15 Manvers Way) from the neighbouring Rotherham Metropolitan Borough Council were considered to be the most representative of conditions at the Site.

No monitoring of PM_{10} or $PM_{2.5}$ is undertaken within the study area. Therefore the adjustment factor calculated during the NO2 verification process was utilised to adjust predicted concentrations of PM_{10} and $PM_{2.5}$.

Table E1: NOx Verification Process

Model Verification Steps	RDT14 LP 130 Manvers Way	RDT15 A633 Manvers Way Holiday Inn
2018 monitored total NO_2 ($\mu g.m^{-3}$)	30.0	27.0
2018 background NO_2 concentration ($\mu g.m^{-3}$)	13.1	12.5
Monitored road contribution NOx ($\mu g.m^{-3}$)	33.9	28.7
Modelled road contribution NOx ($\mu g.m^{-3}$)	4.8	5.8
Ratio of monitored road NOx to modelled road NOx	7.1	4.9
Adjustment factor for modelled road contribution NOx	**5.7891**	
Adjusted modelled road contribution NOx ($\mu g.m^{-3}$)	27.6	33.8
Modelled total NO_2 concentration ($\mu g.m^{-3}$)	27.1	29.4
Monitored total NO_2 concentration ($\mu g.m^{-3}$)	30.0	27.0
% difference between modelled and monitored total NO_2 concentration	-10.9	8.2

** Road-NOx component, determined from NOx to NO_2 calculator. Rotherham monitoring data assumed to be bias adjusted.*

A road-NOx factor of **5.7891** was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero. This factor was then applied to the modelled road-NOx concentration at each receptor,

before conversion to NO_2 concentrations using the NO_x to NO_2 calculator[17] provided by Defra and the adjusted NO_2 background concentration.

APPENDIX F: SENSITIVITY ANALYSIS

SENSITIVITY ANALYSIS

A sensitivity analysis was undertaken to consider a scenario where pollutant background concentrations do not decrease with future years. Therefore base year (2018) background concentrations, NOx to NO_2 calculator inputs and emission factors were utilised for the 2024 Opening Year With Development scenario. The results of the assessment for the existing receptor locations and proposed receptor locations identified are provided in **Tables F1 – F4**.

Table F1: Predicted Annual Mean NO_2 Concentrations and Development Impact at Existing Receptor Locations

Existing Receptor	Predicted NO_2 Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R1	20.4	21.0	+0.6	Negligible
R2	18.0	18.4	+0.4	Negligible
R3	20.0	20.7	+0.7	Negligible
R4	17.9	18.8	+0.9	Negligible
R5	20.2	21.3	+1.1	Negligible
R6	19.2	20.7	+1.5	Negligible
R7	19.4	20.0	+0.6	Negligible
R8	22.1	22.9	+0.8	Negligible
R9	20.1	20.6	+0.5	Negligible
R10	29.5	30.0	+0.5	Negligible
R11	31.3	32.0	+0.7	Negligible
R12	31.8	32.3	+0.5	Negligible
R13	31.5	32.1	+0.6	Negligible
R14	29.5	30.0	+0.5	Negligible
R15	31.9	32.5	+0.5	Negligible
R16	36.4	36.6	+0.1	Negligible

Existing Receptor	Predicted NO_2 Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R17	26.8	26.9	+0.1	Negligible
R18	36.2	36.3	+0.1	Negligible
R19	26.1	26.2	+0.1	Negligible
R20	31.6	31.6	+0.1	Negligible
R21	21.3	21.4	+0.1	Negligible
R22	22.1	22.5	+0.3	Negligible
R23	21.3	21.7	+0.4	Negligible
R24	34.5	34.7	+0.2	Negligible
R25	37.7	37.9	+0.2	Slight Adverse
R26	26.6	26.9	+0.2	Negligible

**Discrepancies in change calculations are a result of rounding effects*

Table F2: Predicted Annual Mean PM_{10} Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted PM_{10} Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R1	13.1	13.2	+0.1	Negligible
R2	12.6	12.7	+0.1	Negligible
R3	13.0	13.2	+0.1	Negligible
R4	12.6	12.8	+0.2	Negligible
R5	13.1	13.3	+0.2	Negligible
R6	12.9	13.1	+0.3	Negligible
R7	12.9	13.0	+0.1	Negligible
R8	13.4	13.6	+0.2	Negligible
R9	13.0	13.1	+0.1	Negligible
R10	14.7	14.8	+0.1	Negligible
R11	15.0	15.2	+0.1	Negligible
R12	15.2	15.3	+0.1	Negligible
R13	15.3	15.4	+0.1	Negligible
R14	14.9	15.0	+0.1	Negligible
R15	15.4	15.5	+0.1	Negligible
R16	16.3	16.3	0.0	Negligible
R17	14.3	14.3	0.0	Negligible
R18	16.6	16.6	0.0	Negligible
R19	14.2	14.2	0.0	Negligible
R20	15.3	15.3	0.0	Negligible

Receptor	Predicted PM_{10} Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R21	13.4	13.4	0.0	Negligible
R22	13.8	13.9	+0.1	Negligible
R23	13.6	13.7	+0.1	Negligible
R24	16.5	16.6	+0.1	Negligible
R25	17.1	17.2	0.0	Negligible
R26	14.3	14.3	0.0	Negligible

**Discrepancies in change calculations are a result of rounding effects*

Table F3: Predicted Annual Mean $PM_{2.5}$ Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted $PM_{2.5}$ Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R1	8.5	8.6	+0.1	Negligible
R2	8.3	8.3	0.0	Negligible
R3	8.5	8.6	+0.1	Negligible
R4	8.3	8.4	+0.1	Negligible
R5	8.5	8.6	+0.1	Negligible
R6	8.4	8.6	+0.2	Negligible
R7	8.4	8.5	+0.1	Negligible
R8	8.7	8.8	+0.1	Negligible
R9	8.5	8.6	+0.1	Negligible
R10	9.5	9.5	+0.1	Negligible

Receptor	Predicted $PM_{2.5}$ Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2024 Without Development	Scenario 3: 2024 With Development	Change*	
R11	9.7	9.8	+0.1	Negligible
R12	9.7	9.8	+0.1	Negligible
R13	9.8	9.9	+0.1	Negligible
R14	9.6	9.6	+0.1	Negligible
R15	9.9	9.9	+0.1	Negligible
R16	10.4	10.4	0.0	Negligible
R17	9.2	9.2	0.0	Negligible
R18	10.6	10.6	0.0	Negligible
R19	9.2	9.2	0.0	Negligible
R20	9.8	9.8	0.0	Negligible
R21	8.7	8.7	0.0	Negligible
R22	8.9	8.9	0.0	Negligible
R23	8.8	8.8	0.0	Negligible
R24	10.6	10.6	0.0	Negligible
R25	10.8	10.8	0.0	Negligible
R26	9.2	9.3	0.0	Negligible

**Discrepancies in change calculations are a result of rounding effects*

Table F4: Predicted Annual Mean NO_2 , PM_{10} and $PM_{2.5}$ Concentrations at Existing Receptor Locations

Proposed Receptor	Scenario 3: 2024 Opening Year With Development ($\mu g.m^{-3}$)		
	NO_2	PM_{10}	$PM_{2.5}$
PR1	15.9	12.3	8.1

Proposed Receptor	Scenario 3: 2024 Opening Year With Development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$
PR2	17.4	12.5	8.2
PR3	16.0	12.3	8.1
PR4	15.7	12.2	8.0

The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 2: 2024 Opening Year With Development are below the relevant annual mean air quality objectives at all receptors.

A 'negligible' change in pollutant concentrations is predicted at all receptors except R25 for NO_2, where a 'slight adverse' impact is predicted in accordance with IAQM and EPUK guidance.

With regard to short term air quality objectives for NO_2 and PM_{10} at the residential development, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[12] it may be assumed that exceedances of the 1-hour mean objective are unlikely. The calculation detailed in paragraph 3.12 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

No mitigation is therefore required to minimise road traffic emissions from the development and the Site is considered to be suitable for the proposed residential use with regard to air quality.

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