



Air Quality Assessment: Land at Pheasant Oak Farm, Balsall Common, Solihull

September 2023



Experts in air quality
management & assessment



Document Control

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Executive Summary

The air quality impacts associated with the proposed residential development of Pheasant Oak Farm, near Balsall Common have been assessed.

During the construction works, a range of best practice mitigation measures will be implemented to reduce dust emissions and the overall effect will be 'not significant'; appropriate measures have been set out in this report, to be included in the Dust Management Plan for the works.

The assessment has demonstrated that future residents of the proposed development will experience acceptable air quality, with pollutant concentrations well below the air quality objectives.

The proposed development will generate additional traffic on the local road network, but the assessment has shown that there will be no significant effects at any existing, sensitive receptor.

The air quality damage costs have also been calculated, in accordance with the West Midlands Good Practice Air Quality Planning Guidance.

Overall, the construction and operational air quality effects of the proposed development are judged to be 'not significant'.

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1 Introduction

- 1.1 This report describes the potential air quality impacts associated with the proposed residential development of Pheasant Oak Farm, near Balsall Common, in Solihull. The proposed development is described as:

“Outline Application for Residential Development (up to 250 homes, including 40% affordable) with vehicular access off Waste Lane; demolition of existing buildings/structures; associated landscaping and new public open spaces; community growing area/orchard; and enhancements to Millennium Way through the Site.”

- 1.2 The proposed development will generate additional traffic on local roads, which may impact on air quality at existing residential properties along the local road network. It will also introduce new residential exposure. An air quality assessment is required to determine the potential impacts of the proposed development on existing local air quality and to consider the suitability of the site for its proposed use. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}).
- 1.3 The location and setting of the proposed development are shown in Figure 1.
- 1.4 The new homes within the proposed development will be provided with heat and hot water by individual boilers within each unit; there will be no centralised energy plant (boiler plant or Combined Heat and Power (CHP)) and thus no significant point sources of emissions within the proposed development.
- 1.5 There is also the potential for the construction activities to impact upon existing properties. The main pollutants of concern related to construction activities are dust and PM₁₀.
- 1.6 This report describes existing local air quality conditions (base year 2019; 2020 was not used due to the impacts of the Covid-19 pandemic, discussed further in Paragraphs 4.18 and 4.19) and the predicted air quality in the future assuming that the proposed development does, or does not proceed. The assessment of traffic-related impacts focuses on 2024, which is the anticipated year of first occupation of any of the new homes. The assessment of construction dust impacts focuses on the anticipated duration of the works.
- 1.7 This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology discussed with SMBC. Damage cost calculations have been provided as requested by SMBC and as required by the West Midlands’ Good Practice Air Quality Planning Guidance (West Midlands Low Emissions Towns and Cities Programme, 2014).

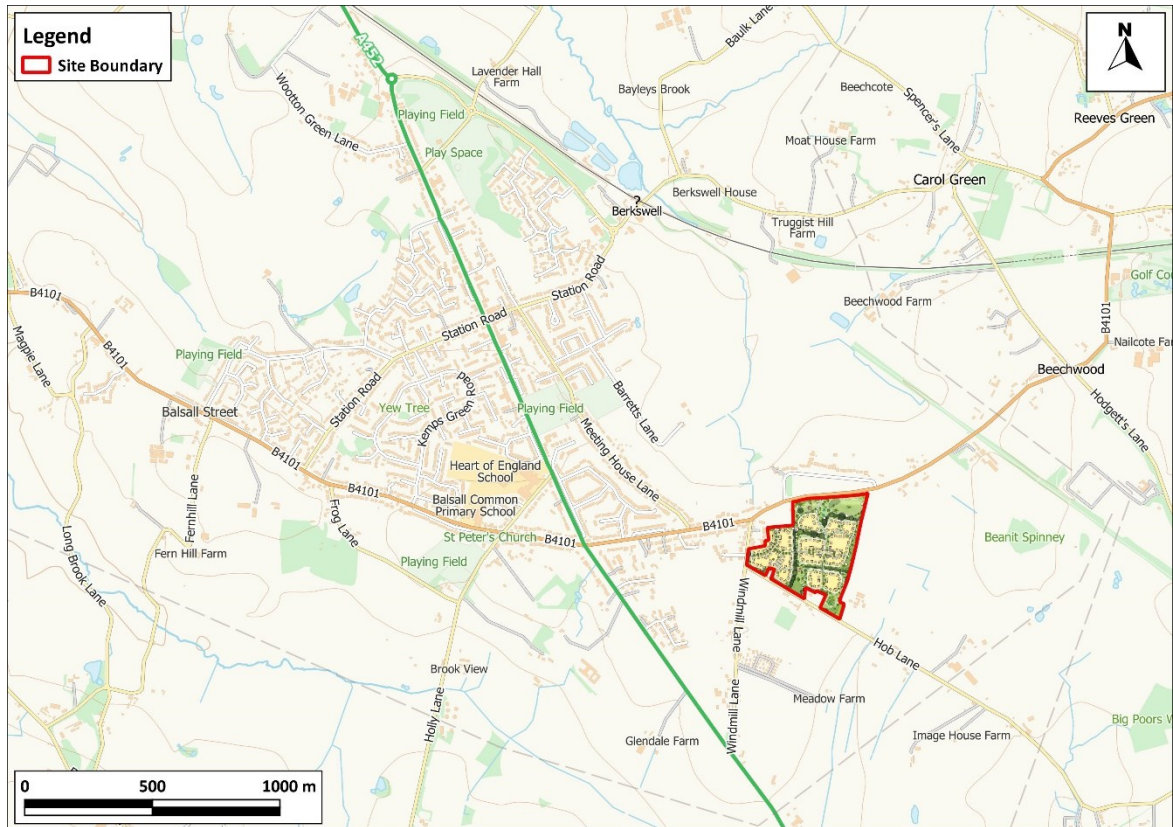


Figure 1: Proposed Development Setting

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2 Policy Context

2.1 All European legislation referred to in this report is written into UK law and remains in place.

Air Quality Strategy 2007

2.2 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Air Quality Strategy 2023

2.3 The Air Quality Strategy: Framework for Local Authority Delivery 2023 (Defra, 2023a) sets out the strategic air quality framework for local authorities and other Air Quality Partners in England. It sets out their powers and responsibilities, and actions the government expects them to take. It does not replace other air quality guidance documents relevant to local authorities.

Clean Air Strategy 2019

2.4 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

Reducing Emissions from Road Transport: Road to Zero Strategy

2.5 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) in July 2018 outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero

tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

- 2.6 The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. The Government has since announced that the phase-out date for the sale of new petrol and diesel cars and vans will be brought forward to 2030 and that all new cars and vans must be fully zero emission at the tailpipe from 2035. If these ambitions are realised then road traffic-related NO_x emissions can be expected to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Environment Act 2021

- 2.7 The UK's new legal framework for protection of the natural environment, the Environment Act (2021) passed into UK law in November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets. It also establishes an Office for Environmental Protection (OEP), responsible for holding the government to account and ensuring compliance with these targets.
- 2.8 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023 No. 96) sets two new targets for future concentrations of PM_{2.5}. These targets are described in Paragraph 3.5.

Environmental Improvement Plan 2023

- 2.9 Defra published its 25 Year Environment Plan in 2018 (Defra, 2018b). The Environment Act (2021) requires Defra to review this Plan at least every five years. The Environmental Improvement Plan 2023 (Defra, 2023b) is the first revision. This outlines the progress made since 2018 and adds detail to the goals defined in the 2018 Plan, including that of achieving clean air.
- 2.10 The Environmental Improvement Plan 2023 sets out the new air quality targets which have been set for concentrations of PM_{2.5}. These targets, which are described in more detail in Paragraph 3.5, include the long-term targets in the Statutory Instrument described in Paragraph 2.8, and interim targets to be achieved by 2028.
- 2.11 The 2023 Plan outlines the role of local authorities in helping it meet both its targets and existing commitments. It also outlines the respective roles of industry, agricultural sectors, and the Department for Transport in providing the coordinated action required to meet both its new, and pre-existing targets and commitments.

Planning Policy

National Policies

- 2.12 The National Planning Policy Framework (NPPF) (2021) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

“to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy”.

- 2.13 To prevent unacceptable risks from air pollution, Paragraph 174 of the NPPF states that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by...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 quality”.

- 2.14 Paragraph 185 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”.

- 2.15 More specifically on air quality, Paragraph 186 makes clear that:

“Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan”.

- 2.16 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that:

“Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with Limit Values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified”.

2.17 Regarding plan-making, the PPG states:

“It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality”.

2.18 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority Air Quality Action Plan *“identifies measures that will be introduced in pursuit of the objectives and can have implications for planning”*. In addition, the PPG makes clear that *“Odour and dust can also be a planning concern, for example, because of the effect on local amenity”*.

2.19 Regarding the need for an air quality assessment, the PPG states that:

“Whether 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 have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity”.

2.20 The PPG sets out the information that may be required in an air quality assessment, making clear that:

“Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific”.

2.21 The PPG also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that:

“Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented”.

Local Policies

- 2.22 The Solihull Local Plan (Solihull Metropolitan Borough Council, 2013) sets out how and where Solihull will develop in the future; it was adopted in December 2013. It includes policy P14 Amenity, which includes air quality and states:

“The Council will seek to protect and enhance the amenity of existing and potential occupiers of houses, businesses and other uses in considering proposals for new development, and will:... v) Encourage better air quality in and around the Borough through the adoption of low emission zone initiatives such as those involving the use of electric vehicles for freight and public transport. Development that would contribute to air pollution, either directly or indirectly will be permitted only if it would not hinder or significantly harm the achievement of air quality objectives or any relevant Air Quality Management Plan, and it incorporates appropriate attenuation, mitigation or compensatory measures...”

- 2.23 SMBC have reviewed their Local Plan and prepared a Draft Submission Plan which was submitted to the Secretary of State in May 2021 (Solihull Metropolitan Borough Council, 2021). This includes Policy P10 Natural Environment, which states:

“The Council recognises the importance of a healthy natural environment in its own right, and for the natural capital benefits it provides to the people, places and economy of the Borough. The Council will seek to protect, enhance, restore, increase and connect the natural environment and secure measurable net gains in biodiversity. The full value and benefits of the natural environment will be taken into account in considering all development proposals, including the contribution to the green economy, the health and wellbeing of residents, and the role of green infrastructure in reducing the impacts of climate change and improving air quality. Joint working with neighbouring authorities and partners will be supported, recognising the need for a landscape-scale approach to the natural environment and conservation of biodiversity and geodiversity.”

- 2.24 It also includes Policy P14 Amenity, which, in relation to air quality, states:

“Proposals for new development, extensions and changes of use will be expected to safeguard the amenities of existing and future occupiers of homes, businesses and other uses. When determining planning applications, the Council will:... Ensure development does not have a significant adverse impact on local air quality, either directly or indirectly resulting in unacceptable effects on human health, local amenity and the natural environment. Where appropriate, development should incorporate appropriate attenuation, mitigation or compensatory measures where necessary. Where this cannot be achieved, ensure that impacts can be off-set by funding alternative measures or initiatives that will help reduce air pollution burdens within the Borough.”

- 2.25 Solihull has a Clean Air Strategy (Solihull Metropolitan Borough Council, 2019) which sets out SMBC's commitment to improving air quality and the specific actions that the Council will take to achieve our ambition for cleaner air across the borough.

Building Standards

- 2.26 Part F(1) of the Building Regulations 2010 (Ministry of Housing, Communities & Local Government, 2022) places a duty on building owners, or those responsible for relevant building work¹, to ensure adequate ventilation is provided to building occupants.
- 2.27 Approved Document F (HM Government, 2021a), which accompanies the Building Regulations, explains that care should be taken to minimise entry of external air pollutants. Specific steps should be taken to manage ventilation intakes where the building is near to a significant source of emissions, or if local ambient concentrations exceed values set in the Air Quality Standards Regulations 2010 (see Paragraph 3.9, later). These steps include maximising the distance between emission source and air intake, considering likely dispersion patterns, and considering the timing of pollution releases when designing the ventilation system.
- 2.28 Part S(1) of Schedule 1, and Regulation 44D, of the Building Regulations 2010 (Ministry of Housing, Communities & Local Government, 2022) define a requirement for the provision of infrastructure for charging electric vehicles. Precise requirements are explained further within Approved Document S (HM Government, 2021b) and depend on the overall number of parking spaces provided and the average financial cost of installation.
- 2.29 Compliance with the Building Regulations is not required for planning approval, but it is assumed that the Regulations will be complied with in the completed development.

National Air Quality Action Plan

- 2.30 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018a) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities (or the GLA in the case of London Authorities) to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a CAZ. There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement in the modelling undertaken for this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the proposed

¹ Building work is a legal term for work covered by the Building Regulations. With limited exemptions, the Regulations apply to all significant building work, including erecting or extending a building.

development. This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.

3 Assessment Criteria

- 3.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002).
- 3.2 The UK-wide objectives for nitrogen dioxide and PM₁₀ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m³ (Defra, 2022). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour mean PM₁₀ objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m³ (Defra, 2022). The predicted annual mean PM₁₀ concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM₁₀ objective. Where predicted annual mean concentrations are below 32 µg/m³ it is unlikely that the 24-hour mean objective will be exceeded.
- 3.3 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2022). The annual mean objectives for nitrogen dioxide and PM₁₀ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.
- 3.4 For PM_{2.5}, the objective set by Defra for local authorities is to work toward reducing concentrations without setting any specific numerical value. In the absence of a numerical objective, it is convention to assess local air quality impacts against the limit value (see Paragraph 3.9), originally set at 25 µg/m³ and currently set at 20 µg/m³.
- 3.5 Defra has also recently set two new targets, and two new interim targets, for PM_{2.5} concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean PM_{2.5} concentration of 10 µg/m³ by the end of 2040, with the interim target being a

value of 12 $\mu\text{g}/\text{m}^3$ by the start of 2028². The second set of targets relate to reducing overall population exposure to $\text{PM}_{2.5}$. By the end of 2040, overall population exposure to $\text{PM}_{2.5}$ should be reduced by 35% compared with 2018 levels, with the interim target being a reduction of 22% by the start of 2028.

3.6 Defra will assess compliance with the population exposure targets by averaging concentrations measured at its own background monitoring stations. This will not consider small changes over time to precisely where people are exposed (such as would relate to exposure introduced by a new development). Furthermore, as explained in Paragraph 2.10, all four new targets provide metrics against which central Government can assess its own progress. While local authorities have an important role delivering the required improvements, these are expected to relate to controlling emissions and not to directly assessing $\text{PM}_{2.5}$ concentrations against the targets.

3.7 In March 2023, the Department for Levelling Up, Housing and Communities (DLUHC, 2023) explained that the new $\text{PM}_{2.5}$ targets will:

“need to be integrated into the planning system, and in setting out planning guidance for local authorities and businesses, we will consider the specific characteristics of $\text{PM}_{2.5}$. The guidance will be forthcoming in due course, until then we expect local authorities to continue to assess local air quality impacts in accordance with existing guidance.”

3.8 For the time being, therefore, no assessment is required, and indeed no robust assessment is possible, in relation to the new $\text{PM}_{2.5}$ targets and they are not considered further.

3.9 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM_{10} and $\text{PM}_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations (2010)³. The limit values for nitrogen dioxide and PM_{10} are the same numerical concentrations as the UK objectives, but achievement of the limit values is a national obligation rather than a local one. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT’s Joint Air Quality Unit (JAQU).

3.10 The relevant air quality criteria for this assessment are provided in Table 1.

² Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 $\mu\text{g}/\text{m}^3$ would not exceed the 10 $\mu\text{g}/\text{m}^3$ target.

³ As amended through The Air Quality Standards (Amendment) Regulations 2016 and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m ³ not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m ³
PM ₁₀	24-hour Mean	50 µg/m ³ not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³ ^a
PM _{2.5}	Annual Mean	20 µg/m ³ ^b

^a A proxy value of 32 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM₁₀ objective are possible (Defra, 2022).

^b There is no numerical PM_{2.5} objective for local authorities (see Paragraph 3.4). Convention is to assess against the UK limit value which is currently 20 µg/m³.

Construction Dust Criteria

3.11 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)⁴ (2016) has been used. Full details of this approach are provided in Appendix A1.

Road Traffic Screening Criteria

3.12 Environmental Protection UK (EPUK) and the IAQM recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix A2, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m² of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.

3.13 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A2 inside an AQMA) are a change in flows of more than 25 heavy duty vehicles (HDVs) or 100 light duty vehicles (LDVs) per day; outside of an AQMA the thresholds are 100 HDVs or 500 LDVs. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance advises that *“the criteria provided are precautionary and should be treated as indicative”*, and *“it may be appropriate to amend them on the basis of professional judgement”*.

3.14 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also sometimes be used to identify the extent of the road network that requires assessment. Where the change in traffic on a given road link is less than the relevant screening threshold, it is

⁴ The IAQM is the professional body for air quality practitioners in the UK.

unlikely that a significant impact would occur, and these links can be disregarded unless there are additional development-related emissions affecting receptors along the link.

4 Assessment Approach

Consultation

4.1 The assessment follows a methodology discussed with SMBC via email correspondence between Suzanne Hodgson (AQC) and the environmental health team at SMBC. The methodology followed takes account of a pre-application response from Paul Samms (Public Protection Officer at SMBC). Specifically, the following key points were discussed:

- a construction dust risk assessment should be provided;
- traffic generated by the proposed development will be sufficiently great that dispersion modelling should be carried out;
- the site suitability should be assessed; and
- the air quality assessment should include a damage cost calculation.

Study Area

4.2 The study area for the assessment has been identified using professional judgement, focussing on the areas where impacts are anticipated to be greatest. It includes the application site itself and all of the roads along which the development will lead to a potentially significant change in traffic flows. The modelled road network is identified in Figure 2.

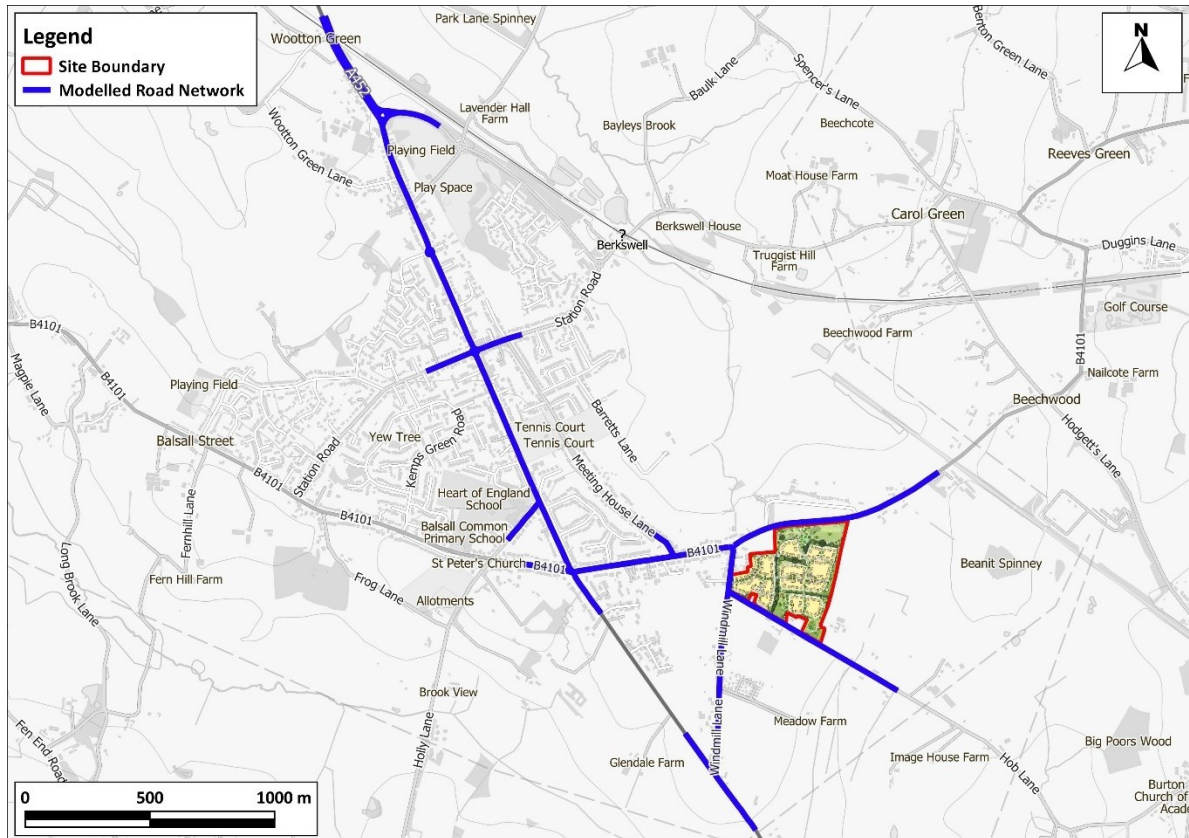


Figure 2: Study Area

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- 4.3 The construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles within 500 m of the site. The specific areas considered are detailed in Section 6.

Receptors

- 4.4 Concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been predicted at a number of locations both within, and close to, the proposed development. Receptors have been identified to represent a range of exposure, including worst-case locations (these being at the façades of the residential properties and schools closest to the sources). When selecting receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested and where there is a combined effect of several road links, and close to those roads where the traffic increases as a result of the proposed development will be greatest.
- 4.5 Twenty existing residential properties and Capellas Nursery have been identified as receptors for the assessment. Five additional receptor locations have been identified within the new development,

which represent exposure to existing sources. These locations are described in Table 2 and shown in Figure 3.

Table 2: Description of Receptor Locations

Receptor	Type	X coordinate	Y coordinate	Heights Modelled (m) ^a
Existing properties				
E1	Residential	425012.2	276152.5	1.5
E2	Residential	425082.2	276073.2	1.5
E3	Residential	424943.2	276353.9	1.5
E4	Residential	424924.0	276347.0	1.5
E5	Residential	424938.6	276339.0	1.5
E6	Residential	424700.1	276331.5	1.5
E7	Residential	424293.8	276269.5	1.5
E8	Residential	424253.8	276293.1	1.5
E9	Nursery	424158.4	276492.6	1.5
E10	Residential	423955.5	276980.5	1.5
E11	Residential	424118.5	276648.2	1.5
E12	Residential	423891.9	277121.2	4.5
E13	Residential	423920.7	277134.8	4.5
E14	Residential	423908.6	277156.8	4.5
E15	Residential	423742.0	277539.9	1.5
E16	Residential	423540.0	278021.0	1.5
E17	Residential	424889.0	275431.6	1.5
E18	Residential	425576.0	276557.2	1.5
E19	Residential	423361.7	278294.3	1.5
E20	Residential	424873.3	275488.1	1.5
New properties				
P1	Residential	424941.9	276190.2	1.5
P2	Residential	424944.8	276239.6	1.5
P3	Residential	425052.5	276124.6	1.5
P4 ^b	Residential	425270.5	276433.0	1.5
P5 ^b	Residential	425193.7	276414.6	1.5

^a Height of 1.5 m and 4.5 m are used to represent ground- and first-floor level exposure respectively.

^b The proposed layout was revised after modelling was undertaken and therefore Receptors P4 and P5 represent worst-case exposure to emissions from road traffic using Waste Lane (B4101), as the proposed properties are now further from Waste Lane.

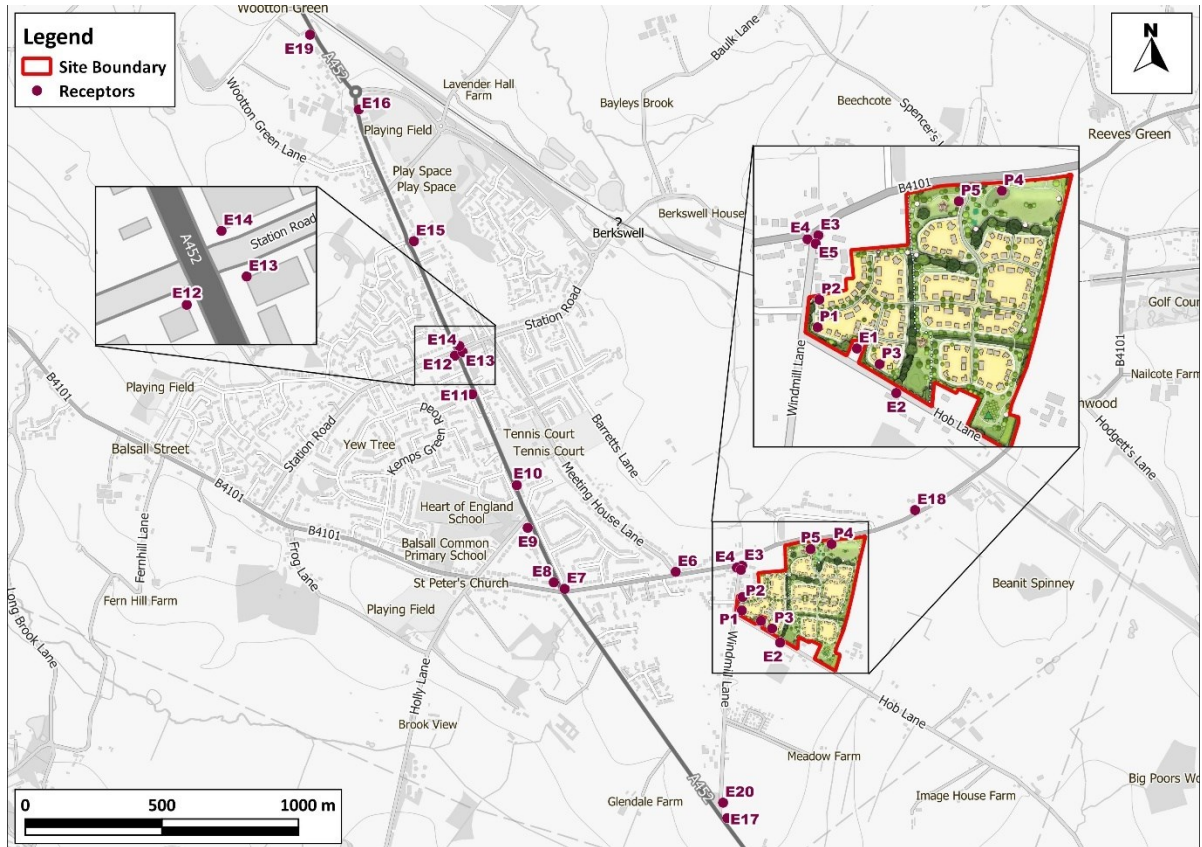


Figure 3: Receptor Locations

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- 4.6 Selected receptors may be representative of air quality conditions at a number of properties; consideration has been given to how many sensitive locations each modelled receptor represents when considering the impacts of the proposed development and the overall significance of effects.
- 4.7 The construction dust risk assessment approach does not require specific receptors to be identified; instead, the numbers of different types of receptors within given distance bands are counted. These receptor counts are provided in Section 6.

Existing Conditions

- 4.8 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:
 - industrial and waste management sources that may affect the area have been identified using Defra’s Pollutant Release and Transfer Register (Defra, 2023e);

- local sources have been identified through examination of the Council's Air Quality Review and Assessment reports;
- information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority;
- background concentrations have been defined using Defra's 2018-based background maps (Defra, 2023d). These cover the whole of the UK on a 1x1 km grid. The background annual mean nitrogen oxides and nitrogen dioxide maps for 2019 have been calibrated against concurrent measurements from national monitoring sites (AQC, 2020a). The calibration factor calculated has also been applied to future year backgrounds. Mapped background concentrations of PM₁₀ and PM_{2.5} have not been adjusted; and
- whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations published by Defra (2020) (2023f). These are the maps used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to the required data quality standards, to identify and report exceedances of the limit value. The national maps of roadside PM₁₀ and PM_{2.5} concentrations (Defra, 2023f), which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.

Construction Impacts

- 4.9 The construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles. The assessment methodology is based on that provided by IAQM (2016). This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix A1 explains the approach in more detail.

Road Traffic Impacts

Screening

- 4.10 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 3.12 and detailed further in Appendix A2. Where impacts can be screened out there is no need to progress to a more detailed

assessment. The following sections describe the approach to dispersion modelling of road traffic emissions, which has been required for this project.

Modelling Methodology

- 4.11 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v11.0) (Defra, 2023d). Details of the model inputs and the model verification are provided in Appendix A4.

Assessment Scenarios

- 4.12 Nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations have been predicted for the following scenarios:

- base year 2019;
- the proposed year of first occupation of the proposed development (2024) without the development; and
- 2024 with the development.

- 4.13 Predictions for 2024 are based on a return to 'typical' activity levels and assume no impact as a result of the Covid-19 pandemic in this year, to ensure a worst-case assessment (as the influence of the pandemic has generally been to reduce concentrations of the pollutants considered in this assessment); see Paragraphs 4.18 and 4.19.

Impact Description

- 4.14 The approach developed jointly by Environmental Protection UK (EPUK) and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. Table 3 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 3: Air Quality Impact Descriptors for Individual Receptors for All Pollutants ^a

Long-Term Average Concentration At Receptor In Assessment Year ^b	Change in concentration relative to AQAL ^c				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

^a Values are rounded to the nearest whole number.

^b This is the “Without Scheme” concentration where there is a decrease in pollutant concentration and the “With Scheme” concentration where there is an increase.

^c AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, GLA target or an Environment Agency ‘Environmental Assessment Level (EAL)’.

Uncertainty

- 4.15 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.
- 4.16 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A4).
- 4.17 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions. Historic versions of Defra’s EFT tended to over-state emissions reductions into the future. However, analyses of the most recent versions of Defra’s EFT carried out by AQC (2020b) (2020c) suggest that, on balance, these versions are unlikely to over-state the rate at which NO_x emissions decline in the future at an ‘average’ site in the UK. In practice, the balance of evidence suggests that NO_x concentrations are most likely to decline more quickly in the future, on average, than predicted by the current EFT, especially against a base year of 2016 or later. Using EFT v11.0 for future-year forecasts in this report thus provides a robust assessment, given that the model has been verified against measurements made in 2019.
- 4.18 Forecasts of future-year concentrations are usually based on measurements made during a recent year. They then take account of projected changes over time to factors such as the composition of the vehicle fleet and the uptake of other new technologies, as well as population increases etc.. In early 2020, activity in the UK was disrupted by the Covid-19 pandemic. As a result, concentrations

of traffic-related air pollutants fell appreciably (Defra Air Quality Expert Group, 2020). While the pandemic may cause long-lasting changes to travel activity patterns, it is reasonable to expect a return to more typical activity levels in the future. 2020 is thus likely to present as an atypically low pollution year for roadside pollutant concentrations, as is 2021.

- 4.19 It is not currently possible to make robust predictions of the rate at which travel activity patterns will return to historically-normal levels; or the extent of any long-lasting changes to travel behaviour. The most robust approach to making future-year projections is thus to base these on measurements made during 2019, and to use activity forecasts made before the impact of the pandemic was understood, which is the approach that has been taken in this assessment.

Assumptions

- 4.20 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:
- the assumption that the proposed development is complete and fully operational in 2024; and
 - that the Coleshill meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix A4).

Assessment of Significance

Construction Dust Significance

- 4.21 Guidance from IAQM (2016) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be 'not significant'.

Operational Significance

- 4.22 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors; the experience of the consultants preparing the report is set out in Appendix A3. Full details of the EPUK/IAQM approach are provided in Appendix A2.

Damage Cost Calculations

4.23 The calculation of damage costs has utilised the most recent EFT (Defra, 2023d), used to determine the development's transport emissions, alongside Defra's damage cost toolkit (Defra, 2023g), used to determine the associated damage costs for those emissions.

4.24 The calculation process includes:

- identifying the additional trips or vehicle numbers generated by the proposed development;
- calculating the emissions from these trips for the pollutants of concern (NO_x and PM_{2.5}) using the EFT, for each of the five years assessed, starting with the year of opening. This calculation has assumed a 10 km trip length and a 48 kph average speed;
- calculating the damage costs for the specific pollutant emissions using the damage cost toolkit, based on the costs for road transport in a rural⁵ area. The toolkit allows for reductions in emissions over time, applies a discount in line with HM Treasury's Green Book and also adjusts for inflation; and
- extracting the 'Central' total value for each pollutant and summing these for use as the damage cost total for the scheme.

⁵ Balsall Common is considered to be a large rural village by Visit Solihull (Visit Solihull, 2022).

5 Baseline Conditions

Relevant Features

- 5.1 The proposed development is located in the east of Solihull borough, approximately 1.5 km southeast of the centre of Balsall Common and approximately 8 km west of Coventry city centre. The application site is bounded by Waste Lane (B4101) to the north, Windmill Lane to the west and Hob Lane to the south. It currently consists of agricultural land and numerous farm buildings plus extensive areas of hardstanding/caravan storage, and some commercial properties. There are existing residential properties on Hob Lane and Windmill Lane, with further residential properties situated to the west off the B4101.

Industrial sources

- 5.2 No significant industrial or waste management sources have been identified that are likely to affect the proposed development, in terms of air quality.

Local Air Quality Monitoring

- 5.3 SMBC do not currently operate any Defra approved automatic monitoring sites. The Council do, however, operate a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Gradko International Ltd (using the 50% TEA in acetone method). These include three within Balsall Common, within approximately 1.5 km of the proposed development. Available annual mean results, for the years 2019 to 2021, are summarised in Table 4. The monitoring locations are shown in Figure 4. The monitoring data have been taken from SMBC's 2022 Air Quality Annual Status Report (ASR) (SMBC, 2022). All recorded annual mean concentrations have been well below the objective.
- 5.4 While 2020 and 2021 results have been presented in this Section for completeness, they are not relied upon in any way as they will not be representative of 'typical' air quality conditions due to the impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations.

Table 4: Summary of Annual Mean NO₂ Monitoring (2019-2021) (µg/m³)

Site No.	Site Type	Location	2019	2020	2021
AC2	Roadside	Kenilworth Road/Centre	-	12.1	12.3
AC3	Roadside	Kelsey Lane	-	10.1	10.9
AB21	Roadside	Kenilworth Road by Kelsey Lane	17.8	10.3	10.6
Objective			40		

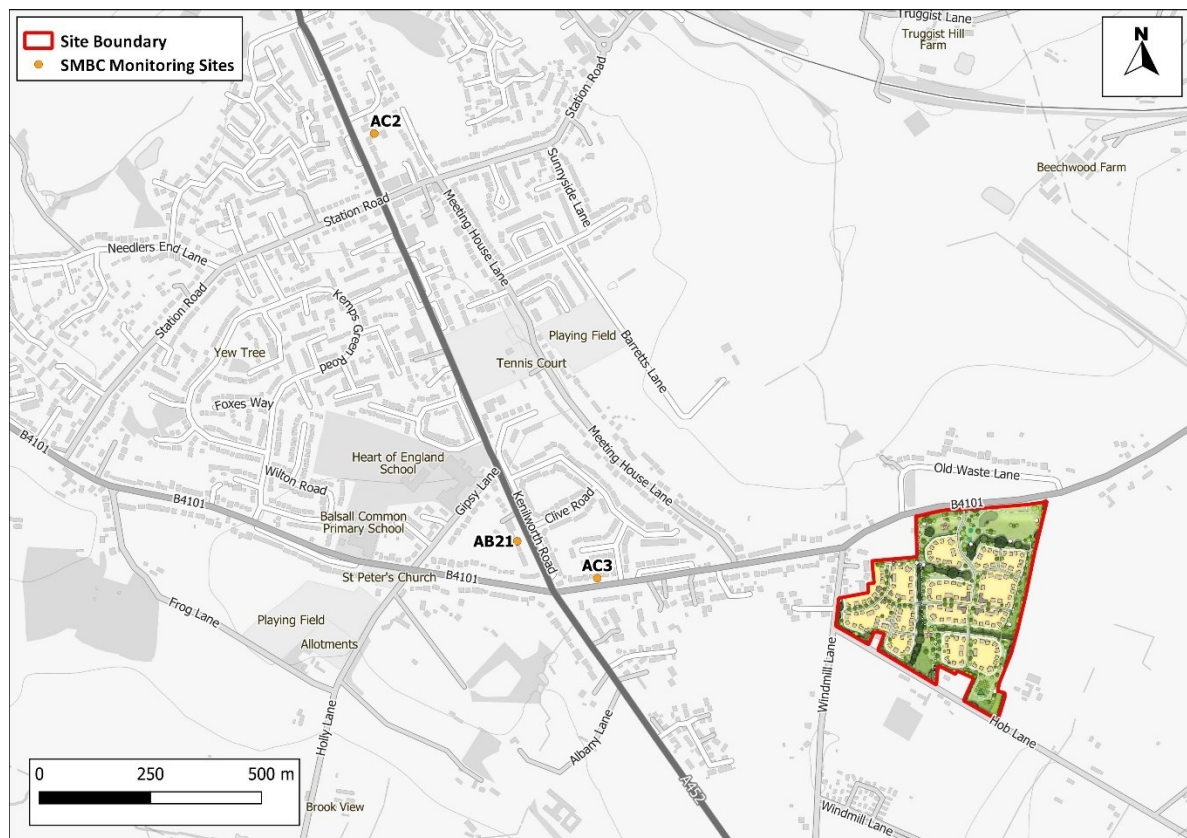


Figure 4: Monitoring Locations

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5.5 Although monitoring of PM₁₀ or PM_{2.5} concentrations is undertaken by SMBC, the equipment is not Defra approved and the data have not been published in the ASR (SMBC, 2022).

Exceedances of Limit Value

- 5.6 There are no AURN (Defra, 2023c) monitoring sites within 1 km of the application site with which to identify exceedances of the annual mean nitrogen dioxide limit value. Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2023f), which are used to identify and report exceedances of the limit value, do not identify any exceedances within the study area. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

Background Concentrations

- 5.7 Estimated background concentrations in the study area are set out in Table 5 and are all well below the objectives. A range of values is presented as the study area covers multiple 1x1 km grid squares.

Table 5: Estimated Annual Mean Background Pollutant Concentrations in 2019 and 2024 ($\mu\text{g}/\text{m}^3$)

Year	NO ₂	PM ₁₀	PM _{2.5}
2019	10.4 – 11.6	12.3 – 13.2	8.2 - 8.5
2024	8.7 – 9.6	11.5 – 12.4	7.6 – 7.8
Objective	40	40	25 ^a

^a The 25 $\mu\text{g}/\text{m}^3$ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Baseline Dispersion Model Results

- 5.8 Baseline concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been modelled at each of the existing receptor locations (see Figure 3 and Table 2 for receptor locations). The results, which cover both the existing (2019) and future year (2024) baseline (Without Scheme), are set out in Table 6 for nitrogen dioxide and Table 7 for PM₁₀ and PM_{2.5}. The modelled road components of nitrogen oxides have been increased from those predicted by the model (see Appendix A4 for the verification methodology).

Table 6: Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$) at Existing Receptors ^a

Receptor	2019	2024 Without Scheme
E1	11.6	9.5
E2	11.3	9.3
E3	19.7	15.0
E4	19.0	14.5
E5	19.4	14.8
E6	15.8	12.4
E7	25.4	18.9
E8	18.3	14.0
E9	16.9	13.1
E10	18.9	14.4
E11	23.3	17.4
E12	15.8	12.4
E13	17.2	13.3
E14	17.5	13.5
E15	22.7	17.1
E16	29.5	21.7
E17	20.6	15.5
E18	14.7	11.5
E19	17.5	13.4
E20	18.9	14.3
Objective	40	

^a Exceedances of the objective are shown in bold.

Table 7: Modelled Annual Mean Baseline Concentrations of PM₁₀ and PM_{2.5} at Existing Receptors (µg/m³)

Receptor	PM ₁₀ ^a		PM _{2.5}	
	2019	2024 Without Scheme	2019	2024 Without Scheme
E1	12.9	12.1	8.5	7.8
E2	12.9	12.1	8.5	7.8
E3	13.1	12.3	8.6	8.0
E4	13.0	12.3	8.6	7.9
E5	13.1	12.3	8.6	7.9
E6	12.8	12.0	8.4	7.8
E7	13.5	12.7	8.8	8.2
E8	13.0	12.2	8.5	7.9
E9	12.9	12.1	8.5	7.9
E10	12.9	12.1	8.6	7.9
E11	13.5	12.7	8.8	8.2
E12	13.1	12.4	8.5	7.9
E13	13.2	12.5	8.6	8.0
E14	13.3	12.5	8.6	8.0
E15	13.6	12.8	8.8	8.2
E16	14.4	13.7	9.1	8.4
E17	13.4	12.7	8.6	8.0
E18	13.2	12.4	8.7	8.0
E19	13.7	12.9	8.6	8.0
E20	13.3	12.5	8.5	7.9
Assessment Criterion	32^a		20^b	

^a While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG (Defra, 2022). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

^b The 20 µg/m³ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

5.9 The predicted annual mean concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} are well below the objectives at all receptors in 2019 and 2024. The annual mean nitrogen dioxide concentrations are also well below 60 µg/m³ at every receptor in both 2019 and 2024; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded (see Paragraph 3.2). The annual mean PM₁₀ concentrations are well below 32 µg/m³ and it is, therefore, unlikely that the 24-hour mean PM₁₀ objective will be exceeded.

- 5.10 These results are consistent with the conclusions of SMBC in the outcome of its air quality review and assessment work in that they have concluded that there are no exceedances of the objectives.

6 Construction Phase Impact Assessment

Construction Traffic

- 6.1 Typical traffic volumes generated by the site during the construction works will be considerably lower than the relevant screening criteria of 100 AADT for heavy vehicles and 500 AADT for light vehicles recommended by EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). As such, it is judged that the relevant screening thresholds will not be exceeded and there is no requirement for a detailed assessment of road traffic impacts at existing receptors; it can be concluded that the proposed development will not have a significant impact on local roadside air quality as a result of construction traffic emissions.

On-Site Exhaust Emissions

- 6.2 The IAQM guidance (IAQM, 2016) states:

“Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur”.

- 6.3 The proposed development is large, and the majority of the site area is more than 50 m from any sensitive receptors. The areas in which NRMM and site traffic will typically operate are thus likely to be located more than 50 m away from any sensitive properties. It is judged that there no risk of significant effects at existing receptors as a result of on-site machinery emissions.

Construction Dust and Particulate Matter Emissions

- 6.4 The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix A1), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

- 6.5 There will be a requirement to demolish the existing buildings (around 15) on site, which consist of several brick buildings and several farm buildings, with an approximate total volume of 40,000 m³. The method of demolition has not yet been decided. A mobile crusher may be used on site before removal of the material, but this has not yet been decided; such crushing plant may require a valid

Environmental Permitting Regulations permit. Based on the example definitions set out in Table A1.1 in Appendix A1, the dust emission class for demolition is considered to be *medium*.

Earthworks

- 6.6 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2023), as set out in Table 8. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 8: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Mixed (Argillaceous ^a – Arenaceous ^b – Rudaceous ^c)
European Soil Bureau Description	Glacial Till
Soil Group	Light to Heavy
Soil Texture	Sand to Clayey Loam

^a grain size < 0.06 mm.

^b grain size 0.06 – 2.0 mm.

^c grain size > 2.0 mm.

- 6.7 The site covers approximately 125,000 m² and most of this will be subject to earthworks, involving removal of the foundations of the demolished buildings and breaking up of hardstanding. Dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). Based on the example definitions set out in Table A1.1 in Appendix A1, the dust emission class for earthworks is considered to be *large*.

Construction

- 6.8 The proposed development will involve the construction of up to 250 brick built residential properties, with an estimated total building volume greater than 100,000 m³. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. Based on the example definitions set out in Table A1.1 in Appendix A1, the dust emission class for construction is considered to be *large*.

Trackout

- 6.9 The number of heavy vehicles accessing the site, which may track out dust and dirt, is currently unknown, but taking account of the size of the site it is judged that there will be a maximum of between 10-50 outward heavy vehicle movements per day. Based on the example definitions set out in Table A1.1 in Appendix A1, the dust emission class for trackout is considered to be *medium*.
- 6.10 Table 9 summarises the dust emission magnitude for the proposed development.

Table 9: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Medium
Earthworks	Large
Construction	Large
Trackout	Medium

Sensitivity of the Area

- 6.11 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM₁₀ concentrations.
- 6.12 The IAQM guidance explains that residential properties are ‘high’ sensitivity receptors to dust soiling (Table A1.2 in Appendix A1). Residential properties are also classified as being of ‘high’ sensitivity to human health effects, while places of work are classified as being of ‘medium’ sensitivity. There are approximately 15 residential properties and Pool House Farm Livery and Riding School within 20 m of the site (see Figure 5).



Figure 5: 20 m and 50 m Distance Bands around the Site Boundary

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- 6.13 Table 9 shows that the dust emission magnitude for trackout is *medium* and Table A1.3 in Appendix A1 thus explains that there is a risk of material being tracked 200 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that all possible routes could be affected. There are approximately 30 residential properties within 20 m of the roads along which material could be tracked (see Figure 6).

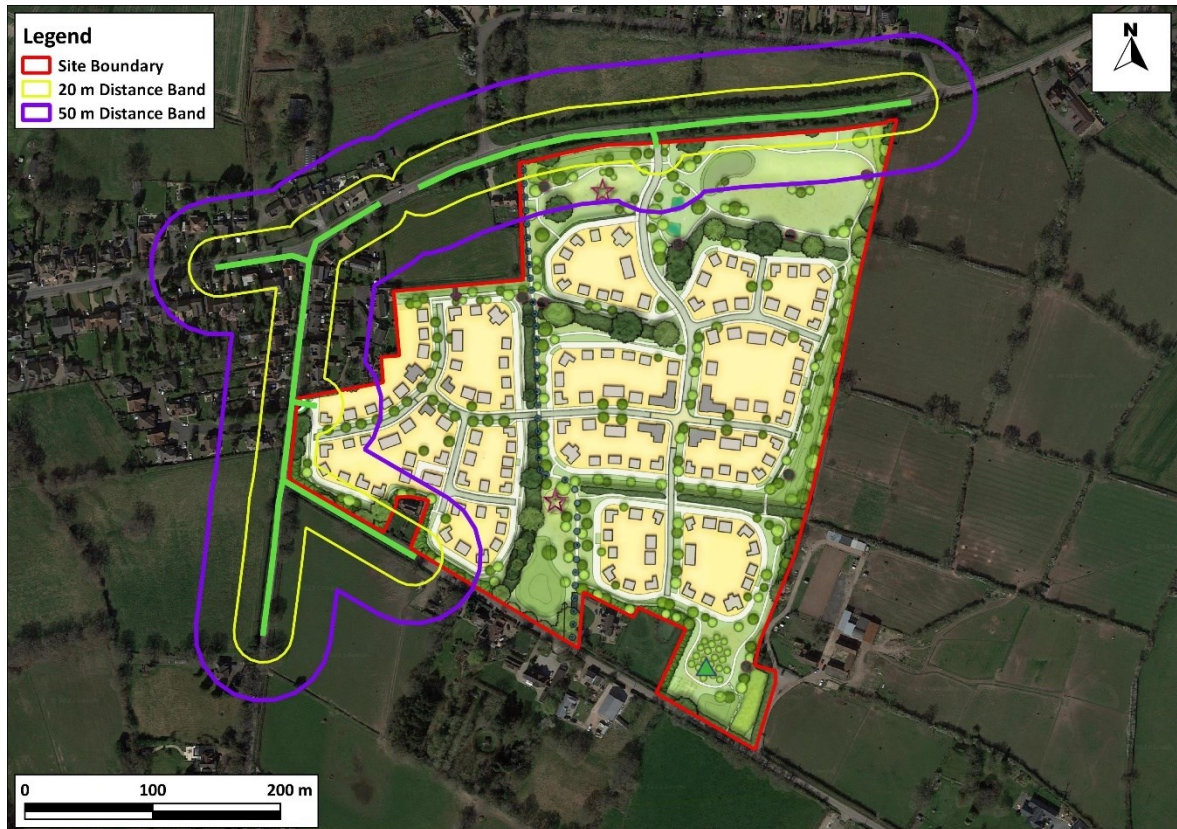


Figure 6: 20 m and 50 m Distance Bands around Roads Potentially Used by Construction Traffic Within 200 m of the Site Exits

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Sensitivity of the Area to Effects from Dust Soiling

- 6.14 Using the information set out in Paragraph 6.12 and Figure 5 alongside the matrix set out in Table A1.3 in Appendix A1, the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Using the information set out in Paragraph 6.13 and Figure 6 alongside the same matrix, the area is also of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

- 6.15 The matrix in Table A1.4 in Appendix A1 requires information on the baseline annual mean PM₁₀ concentration in the area. It is considered that the modelled baseline PM₁₀ concentration at Receptor E3 in Table 7 will best represent conditions near to the site, this being 13.1 µg/m³. Using the information set out in Paragraphs 6.12 and Figure 5 alongside the matrix in Table A1.4 in Appendix A1, the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information set out in Paragraph 6.13 and Figure 6 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is also of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

- 6.16 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

- 6.17 Table 10 summarises the sensitivity of the area around the proposed construction works.

Table 10: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	Low Sensitivity	Low Sensitivity

Risk and Significance

- 6.18 The dust emission magnitudes in Table 9 have been combined with the sensitivities of the area in Table 10 using the matrix in Table A1.6 in Appendix A1, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 11. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 9 (step 3 of the assessment procedure).

Table 11: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health
Demolition	Medium Risk	Low Risk
Earthworks	High Risk	Low Risk
Construction	High Risk	Low Risk
Trackout	Medium Risk	Low Risk

- 6.19 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2016).

7 Operational Phase Impact Assessment

Impacts at Existing Receptors

7.1 The proposed development will generate traffic volumes that exceed the EPUK/IAQM screening thresholds on a number of local roads, thus a detailed assessment is required.

Nitrogen Dioxide

7.2 Predicted annual mean concentrations of nitrogen dioxide in 2024 for existing receptors are set out in Table 12 for both the “Without Scheme” and “With Scheme” scenarios. The impact at each receptor is also described using the impact descriptors given in Table 3.

Table 12: Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2024 ($\mu\text{g}/\text{m}^3$)

Receptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
E1	9.5	9.6	0	Negligible
E2	9.3	9.3	0	Negligible
E3	15.0	15.9	2	Negligible
E4	14.5	15.3	2	Negligible
E5	14.8	15.6	2	Negligible
E6	12.4	12.8	1	Negligible
E7	18.9	19.5	1	Negligible
E8	14.0	14.2	1	Negligible
E9	13.1	13.3	1	Negligible
E10	14.4	14.8	1	Negligible
E11	17.4	17.9	1	Negligible
E12	12.4	12.5	0	Negligible
E13	13.3	13.5	0	Negligible
E14	13.5	13.7	1	Negligible
E15	17.1	17.4	1	Negligible
E16	21.7	22.3	1	Negligible
E17	15.5	15.8	1	Negligible
E18	11.5	11.8	1	Negligible
E19	13.4	13.6	0	Negligible
E20	14.3	14.8	1	Negligible
Objective	40		-	-

^a % changes are relative to the objective and have been rounded to the nearest whole number.

7.3 The annual mean nitrogen dioxide concentrations are well below the objective at all receptors. The changes in concentrations range from 0 - 2%, resulting in *negligible* impacts.

PM₁₀ and PM_{2.5}

7.4 Predicted annual mean concentrations of PM₁₀ and PM_{2.5} in 2024 for existing receptors are set out in Table 13 for both the “Without Scheme” and “With Scheme” scenarios. The impacts at each receptor are also described using the impact descriptors given in Table 3.

Table 13: Predicted Impacts on Annual Mean PM₁₀ and PM_{2.5} Concentrations in 2024

Receptor	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
E1	12.1	12.1	0	Negligible	7.8	7.9	0	Negligible
E2	12.1	12.1	0	Negligible	7.8	7.8	0	Negligible
E3	12.3	12.4	0	Negligible	8.0	8.0	0	Negligible
E4	12.3	12.3	0	Negligible	7.9	8.0	0	Negligible
E5	12.3	12.4	0	Negligible	7.9	8.0	0	Negligible
E6	12.0	12.1	0	Negligible	7.8	7.8	0	Negligible
E7	12.7	12.7	0	Negligible	8.2	8.2	0	Negligible
E8	12.2	12.3	0	Negligible	7.9	7.9	0	Negligible
E9	12.1	12.2	0	Negligible	7.9	7.9	0	Negligible
E10	12.1	12.2	0	Negligible	7.9	8.0	0	Negligible
E11	12.7	12.8	0	Negligible	8.2	8.2	0	Negligible
E12	12.4	12.4	0	Negligible	7.9	7.9	0	Negligible
E13	12.5	12.5	0	Negligible	8.0	8.0	0	Negligible
E14	12.5	12.5	0	Negligible	8.0	8.0	0	Negligible
E15	12.8	12.9	0	Negligible	8.2	8.2	0	Negligible
E16	13.7	13.7	0	Negligible	8.4	8.5	0	Negligible
E17	12.7	12.7	0	Negligible	8.0	8.0	0	Negligible
E18	12.4	12.4	0	Negligible	8.0	8.0	0	Negligible
E19	12.9	12.9	0	Negligible	8.0	8.0	0	Negligible
E20	12.5	12.6	0	Negligible	7.9	7.9	0	Negligible
Criterion	32 ^b		-	-	20 ^c		-	-

^a % changes are relative to the criterion and have been rounded to the nearest whole number.

- b While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG22 (Defra, 2022). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).
- c The PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

7.5 The annual mean PM₁₀ and PM_{2.5} concentrations are well below the relevant criteria at all receptors, with or without the proposed development. Furthermore, as the annual mean PM₁₀ concentrations are below 32 µg/m³, it is unlikely that the 24-hour mean PM₁₀ objective will be exceeded at any of the receptors. The changes in concentrations are all 0% (when rounded), resulting in *negligible* impacts.

Impacts of Existing Sources on Future Residents of the Development

7.6 Predicted air quality conditions for future residents of the proposed development, taking account of emissions from the adjacent road network, are set out in Table 14 for Receptors P1 to P5 (see Table 2 and Figure 3 for receptor locations). All of the values are well below the objectives. Air quality for future residents within the development will thus be acceptable.

Table 14: Predicted Annual Mean Concentrations of Nitrogen Dioxide (NO₂), PM₁₀ and PM_{2.5} in 2024 for New Receptors in the Proposed Development (µg/m³)

Receptor	NO ₂	PM ₁₀	PM _{2.5}
P1	11.2	11.9	7.7
P2	11.3	12.0	7.8
P3	9.4	12.1	7.8
P4	10.5	12.2	7.9
P5	10.2	12.2	7.9
Objective / Criterion	40	32^a	20^b

- a While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG22 (Defra, 2022). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).
- b The 20 µg/m³ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Significance of Operational Air Quality Effects

7.7 The operational air quality effects without mitigation are judged to be “not significant”. This professional judgement is made in accordance with the methodology set out in Appendix A2, and takes account of the assessment that:

- pollutant concentrations at worst-case locations within the proposed development will all be well below the objectives, thus future residents will experience acceptable air quality; and
- pollutant concentrations at all of the selected worst-case existing receptors along the local road network will be well below the air quality objectives, and all of the impacts are predicted to be *negligible*.

8 Damage Cost Calculations

Background

- 8.1 Defra developed the damage cost approach to enable proportionate analysis when assessing relatively small impacts on air quality. The damage costs are a set of impact values which were derived using the more detailed Impact Pathway Approach. These values estimate the societal costs associated with small changes in pollutant emissions. Combined with emission change estimates, they provide an approximate valuation of the aggregate societal impacts of a policy. Such impacts can then be set against the direct monetary costs of a scheme to provide a cost-benefit calculation. Thus, damage costs do not provide a figure for the abatement of emissions to a given level.
- 8.2 Abatement costs are usually derived from a marginal abatement cost curve (MACC) which gives the incremental cost of measures to achieve a certain outcome, such as the removal of an exceedance of the air quality objectives. However, the measures available and their associated costs are quite time-specific which means that they need to be updated on a regular basis. Defra's last MACC for NO₂ exceedances was produced several years ago and has now been withdrawn. There are therefore no Defra approved abatement costs for air quality currently available. Thus, while damage costs are not the same as abatement costs, they provide a current and available resource for assigning value to air pollution emissions.

Calculations

- 8.3 PJA, who have undertaken the Transport Assessment for the proposed development, have advised that the development will generate 1,690 additional vehicle trips per day, on average, on the local road network, all of which will be LDVs. The annual emissions from each of these trips in the five years from the year of opening have been calculated using the EFT and entered into Defra's damage cost toolkit. The calculations and results are presented in Table 15.

Table 15: Damage Cost Calculation

Year	2024	2025	2026	2027	2028
NOx					
Total Emissions (tonnes)	1.169	1.055	0.949	0.850	0.762
Central Damage Cost (£) ^a	5,095	5,095	5,095	5,095	5,095
Discounted Central Cost (£)	5,955	5,293	4,693	4,142	3,658
Total Central Present Value (£)	£23,741				
PM_{2.5}					
Total Emissions (tonnes)	0.109	0.108	0.107	0.107	0.107
Central Damage Cost (£) ^a	33,102	33,102	33,102	33,102	33,102
Discounted Central Cost (£)	3,593	3,516	3,446	3,382	3,322
Total Central Present Value (£)	£17,259				

^a Road transport rural

8.4 Summing the values for NOx and PM_{2.5} gives a total damage cost of **£41,000**.

9 Mitigation

Good Design and Best Practice

- 9.1 SMBC require that developments provide mitigation consistent with the West Midlands Good Practice Air Quality Planning Guidance (West Midlands Low Emissions Towns and Cities Programme, 2014). Within the guidance, the proposed development is classified as 'Major'.
- 9.2 Furthermore, the EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required. The EPUK/IAQM guidance predates the recent publication by Defra of long-term air quality targets for PM_{2.5}. While it is not appropriate to determine individual planning applications based on whether future PM_{2.5} concentrations in an area will be above or below the concentration target, it is nevertheless appropriate that new development contributes to meeting the national targets by ensuring that air quality is taken into account in development design.
- 9.3 The proposed development incorporates the following good design and best practice measures, which are consistent with the West Midlands Good Practice Air Quality Planning guidance for 'Major' developments:
- setting back of the development buildings from main roads by at least 18 m;
 - provision of infrastructure to enable an electric vehicle (EV) charging point;
 - provision of a framework travel plan setting out measures to encourage sustainable means of transport, including:
 - improved cycle infrastructure along Waste Lane and Meeting House Lane;
 - walking/cycling initiatives;
 - public transport initiatives;
 - car sharing initiatives;
 - marketing and promotion of the Travel Plan measures; and
 - provision of 'Welcome Packs' to new homeowners, which will include promotion of smartphone apps such as National Rail Enquiries, Network West Midlands, Cycle Streets, National Cycle Network, Map My Ride, Walk4Life and Moovit.
- 9.4 The proposed development is currently at the outline stage; the above list of measures is not exhaustive and as plans for the proposed development progress, additional measures may be identified, further details of which will be provided at the detailed design stage.

Recommended Mitigation

Construction Impacts

- 9.5 Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effects upon nearby sensitive receptors.
- 9.6 The site has been identified as a *High Risk* site during earthworks and construction, and *Medium Risk* during demolition and track out, as set out in Table 11. Comprehensive guidance has been published by IAQM (2016) that describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on monitoring during demolition and construction (IAQM, 2018). This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix A5.
- 9.7 The mitigation measures should be written into a dust management plan (DMP). The DMP will be integrated into the Construction Environmental Management Plan.
- 9.8 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Road Traffic Impacts

- 9.9 The assessment has demonstrated that the overall air quality effect of the proposed development will be 'not significant; it will not introduce any new exposure into areas of unacceptable air quality, nor will the development-generated traffic emissions have a significant impact on local air quality. It is, therefore, not considered necessary to propose further specific mitigation measures for this development.
- 9.10 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law), and the Government's Road to Zero policy.

10 Residual Impacts

Construction

- 10.1 The IAQM guidance is clear that, with appropriate mitigation in place, the residual effects will normally be 'not significant'. The mitigation measures set out in Section 9 and Appendix A5 are based on the IAQM guidance. With these measures in place and effectively implemented the residual effects are judged to be 'not significant'.
- 10.2 The IAQM guidance does, however, recognise that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be 'not significant'.

Road Traffic Impacts

- 10.3 The residual impacts will be the same as those identified in Section 7. The overall effects of the proposed development with the mitigation proposed will be 'not significant'.

11 Conclusions

- 11.1 The assessment has considered the impacts of the proposed development on local air quality in terms of dust and particulate matter emissions during construction and emissions from road traffic generated by the completed and occupied development. It has also identified the air quality conditions that future residents will experience. Damage cost calculations have been carried out at the request of SMBC.
- 11.2 The assessment has been based on measurements made during 2019, and pre-pandemic activity and emissions forecasts, to ensure a worst-case assessment that does not take into account temporary reductions in pollutant concentrations as a result of reduced activity levels during the Covid-19 pandemic.

Construction Impacts

- 11.3 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. Appropriate measures have been recommended and, with these measures in place, it is expected that any residual effects will be 'not significant'.

Operational Impacts

Impacts

- 11.4 Air quality conditions for future residents of the proposed development have been shown to be acceptable, with concentrations well below the air quality objectives throughout the site.
- 11.5 The assessment has demonstrated that pollutant concentrations will be well below the objectives at all existing receptors in 2024, with or without the proposed development, and that the emissions from the additional traffic generated by the proposed development will have a *negligible* impact on air quality conditions at all existing receptors along the local road network.

Mitigation

- 11.6 The assessment has shown that the proposed development will have a negligible impact on pollutant concentrations at existing properties, and that air quality for future residents will be acceptable, without the need for mitigation. However, a number of measures will be designed into the scheme to reduce emissions to air, including measures which encourage the use of sustainable and active travel.

Significance

- 11.7 The overall operational air quality effects of the proposed development are judged to be 'not significant'. This conclusion is based on the concentrations at existing receptors being well below the objectives and impacts all being *negligible*, while concentrations for future residents of the development will be well below the objectives.

Damage Cost Calculations

- 11.8 Damage cost calculations for NO_x and PM_{2.5}, carried out using Defra's damage cost toolkit, give a total damage cost of **£41,000**. It should be noted that the damage cost approach was not developed to provide a figure for the abatement of emissions to a given level (see Paragraphs 8.1 and 8.2).

Policy Implications

- 11.9 Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 185 of the NPPF, being appropriate for its location both in terms of its effects on the local air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 186, as it will not affect compliance with relevant limit values or national objectives. The proposed development is also consistent with Policy P14 of SMBC Local Plan, as it will not "*significantly harm the achievement of air quality objectives*". It is also consistent with Policy P14 of the Draft Submission Plan as it will not have a significant adverse impact on local air quality.

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13 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AQAL	Air Quality Assessment Level
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
CEMP	Construction Environmental Management Plan
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HGV	Heavy Goods Vehicle
HMSO	Her Majesty's Stationery Office
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
kph	Kilometres Per hour
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
LGV	Light Goods Vehicle
µg/m³	Microgrammes per cubic metre

MACC	Marginal Abatement Cost Curve
NO	Nitric oxide
NO₂	Nitrogen dioxide
NO_x	Nitrogen oxides (taken to be NO ₂ + NO)
NPPF	National Planning Policy Framework
NRMM	Non-road Mobile Machinery
OEP	Office for Environmental Protection
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PM₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM_{2.5}	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
RDE	Real Driving Emissions
SMBC	Solihull Metropolitan Borough Council
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide

14 Appendices

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A1 Construction Dust Assessment Procedure

A1.1 The criteria developed by IAQM (2016) divide the activities on construction sites into four types to reflect their different potential impacts. These are:

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

A1.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

A1.3 An assessment is required where there is a human receptor within 350 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

A1.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A1.5 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

A1.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

A1.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table A1.1.

Table A1.1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >50,000 m ³ , potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level
Medium	Total building volume 20,000 m ³ – 50,000 m ³ , potentially dusty construction material, demolition activities 10-20 m above ground level
Small	Total building volume <20,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >10,000 m ² , potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due 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
Medium	Total site area 2,500 m ² – 10,000 m ² , moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes
Small	Total site area <2,500 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 m in height, total material moved <20,000 tonnes, earthworks during wetter months
Construction	
Large	Total building volume >100,000 m ³ , piling, on site concrete batching; sandblasting
Medium	Total building volume 25,000 m ³ – 100,000 m ³ , potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	Total building volume <25,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout ^a	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

^a These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

A1.8 The sensitivity of the area is defined taking account of a number of 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 to reduce the risk of wind-blown dust.

A1.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in Table A1.2. These receptor sensitivities are then used in the matrices set out in Table A1.3, Table A1.4 and Table A1.5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

A1.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the *risk* of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table A1.6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A1.11 The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Appendix A5.

STEP 4: Determine Significant Effects

A1.12 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

A1.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table A1.2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or 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	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or 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	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or 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	playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM₁₀		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM ₁₀
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species	Special Areas of Conservation with dust sensitive features
Medium	locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table A1.3: Sensitivity of the Area to Dust Soiling Effects on People and Property ⁶

Receptor Sensitivity	Number of Receptors	Distance 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

⁶ For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from sites with a *large* dust emission magnitude for trackout, 200 m from sites with a *medium* dust emission magnitude and 50 m from sites with a *small* dust emission magnitude, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Table A1.4: Sensitivity of the Area to Human Health Effects ⁶

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

Table A1.5: Sensitivity of the Area to Ecological Effects ⁶

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

Table A1.6: Defining the Risk of Dust Impacts

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

A2 EPUK & IAQM Planning for Air Quality Guidance

A2.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

“Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations”.*

Recommended Best Practice

A2.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

“The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions”.

A2.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m² of commercial floorspace;
- are carried out on land of 1 ha or more.

A2.4 The good practice principles are that:

- New developments should not contravene the Council’s Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new “street canyon”, as this inhibits pollution dispersion;

- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) “rapid charge” point per 10 residential dwellings and/or 1000 m² of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNO_x/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
 - Spark ignition engine: 250 mgNO_x/Nm³;
 - Compression ignition engine: 400 mgNO_x/Nm³;
 - Gas turbine: 50 mgNO_x/Nm³.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNO_x/Nm³ and 25 mgPM/Nm³.

A2.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

“It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the “damage cost approach” used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential”.

A2.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

“There may be a requirement to carry out an air quality assessment for the impacts of the local area’s emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development”.*

Impacts of the Development on the Local Area

A2.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m² of floor space for all other uses or a site area greater than 1 ha.

A2.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

A2.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A2.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A2.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

“Typically, any combustion plant where the single or combined NO_x emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NO_x gas boiler or a 30kW CHP unit operating at <95mg/Nm³.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable”.

A2.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

“The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive ‘trigger’ for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality”.

A2.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

“The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer”.

A2.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A2.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

A2.16 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either ‘significant’ or ‘not significant’. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A2.17 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A2.18 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A3.

A3 Professional Experience

Dr Denise Evans, BSc (Hons) PhD MEnvSc MIAQM

Dr Evans is an Associate Director with AQC, with more than 23 years' relevant experience. She has prepared air quality review and assessment reports for local authorities, and has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has extensive modelling experience, completing air quality and odour assessments to support applications for a variety of development sectors including residential, mixed use, urban regeneration, energy, commercial, industrial, and road schemes, assessing the effects of a range of pollutants against relevant standards for human and ecological receptors. Denise has acted as an Expert Witness and is a Member of the Institute of Air Quality Management.

Suzanne Hodgson, BSc (Hons) MSc CSci MEnvSc MIAQM

Ms Hodgson is a Principal Consultant with AQC, with more than 16 years' experience in the field of air quality management and assessment. She has been responsible for a wide range of air quality projects covering impact assessments for new residential, commercial and industrial developments, local air quality management, ambient air quality monitoring of various pollutants, including data ratification, and the assessment of nuisance odours and construction dust. She has extensive modelling experience, including the modelling of road traffic, energy centres (including energy from waste) and odour sources, and is familiar with preparing stand-alone air quality reports as well as chapters for inclusion within an Environment Statement. Suzanne has worked with a variety of clients to provide expert air quality services and advice, including local authorities, planners, developers and process operators. She is a Member of the Institute of Air Quality Management and is a Chartered Scientist.

Will Wrench, BSc (Hons) AMEnvSc

Mr Wrench is an Assistant Consultant with AQC, having joined the company in February 2022. Prior to joining, he completed a BSc degree with Honours in Ecological and Environmental Sciences at the University of Edinburgh, where he undertook air quality modelling projects, screening assessments and gained extensive experience of data processing and report writing. He is an Associate Member of the Institute of Air Quality Management, Affiliate Member of the Institution of Environmental Sciences, and is gaining experience in the field of air quality monitoring and assessment.

A4 Modelling Methodology

Model Inputs

A4.1 Predictions have been carried out using the ADMS-Roads dispersion model (v5). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 11.0) published by Defra (2023d). Model input parameters are summarised in Table A4.1 and, where considered necessary, discussed further below.

Table A4.1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	No
Urban Canopy Flow Used?	No
Advanced Street Canyons Modelled?	No
Noise Barriers Modelled?	No
Meteorological Monitoring Site	Coleshill
Meteorological Data Year	2019
Dispersion Site Surface Roughness Length (m)	0.2
Dispersion Site Minimum MO Length (m)	10
Met Site Surface Roughness Length (m)	0.2
Met Site Minimum MO Length (m)	10
Gradients?	No

A4.2 2019 and 2024 AADT flows and proportions of HDVs have been provided by PJA, who have undertaken the transport assessment work for the proposed development. Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction. The traffic data used in this assessment are summarised in Table A4.2 and the location of the links with traffic data are shown in Figure A4.1. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2020).

Table A4.2: Summary of Traffic Data used in the Assessment

Road Link	2019		2024 (Without Scheme)		2024 (With Scheme) ^a	
	AADT	%HDV	AADT	%HDV	AADT	%HDV
1	5,766	3.3%	6,037	3.3%	6,600	3.0%
2	5,766	3.3%	6,037	3.3%	7,299	2.7%
3	5,766	3.3%	6,037	3.3%	7,299	2.7%
4	3,020	1.4%	3,162	1.4%	3,669	1.2%
5	0	0.0%	0	0.0%	0	0.0%
6	2,758	1.0%	2,887	1.0%	3,395	0.8%
7	10,805	4.1%	11,313	4.1%	11,820	3.9%
10	4,804	3.5%	5,030	3.5%	5,785	3.1%
11	0	0.0%	0	0.0%	0	0.0%
12	4,018	3.9%	4,206	3.9%	4,961	3.3%
13	8,687	5.0%	9,095	5.0%	9,095	5.0%
14	3,859	1.6%	4,040	1.6%	4,040	1.6%
15	8,703	5.9%	9,112	5.9%	9,866	5.4%
16	2,249	1.9%	2,355	1.9%	2,355	1.9%
17	11,357	4.7%	11,891	4.7%	12,646	4.4%
18a	4,276	1.0%	4,477	1.0%	4,617	1.0%
18b	11,437	4.4%	11,974	4.4%	12,588	4.2%
19	1,621	3.6%	1,698	3.6%	1,698	3.6%
20	11,238	5.1%	11,766	5.1%	12,380	4.8%

- ^a The 'With Scheme' traffic data are based on a development of up to 270 residential dwellings, which is a larger quantum of development than proposed, and therefore provides a conservative assessment of impacts of the 250 residential dwelling development for which consent is sought.

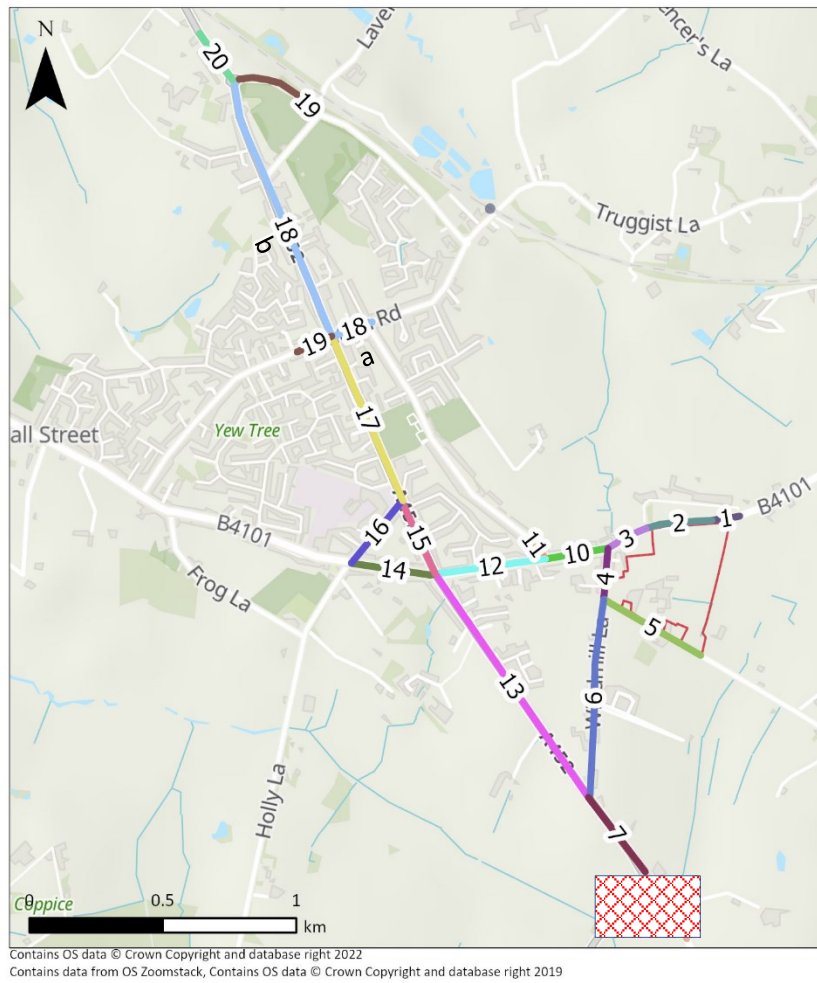


Figure A4.1: PJA Link Numbers

The hashed box indicates Links 8 and 9 have not been modelled as the traffic generation does not exceed the EPUK/IAQM screening criteria along these links. Note this does not depict the extent of the modelled network – that is shown in Figure A4.2.

A4.3 Figure A4.2 shows the road network included within the model, along with the speed at which each link was modelled.

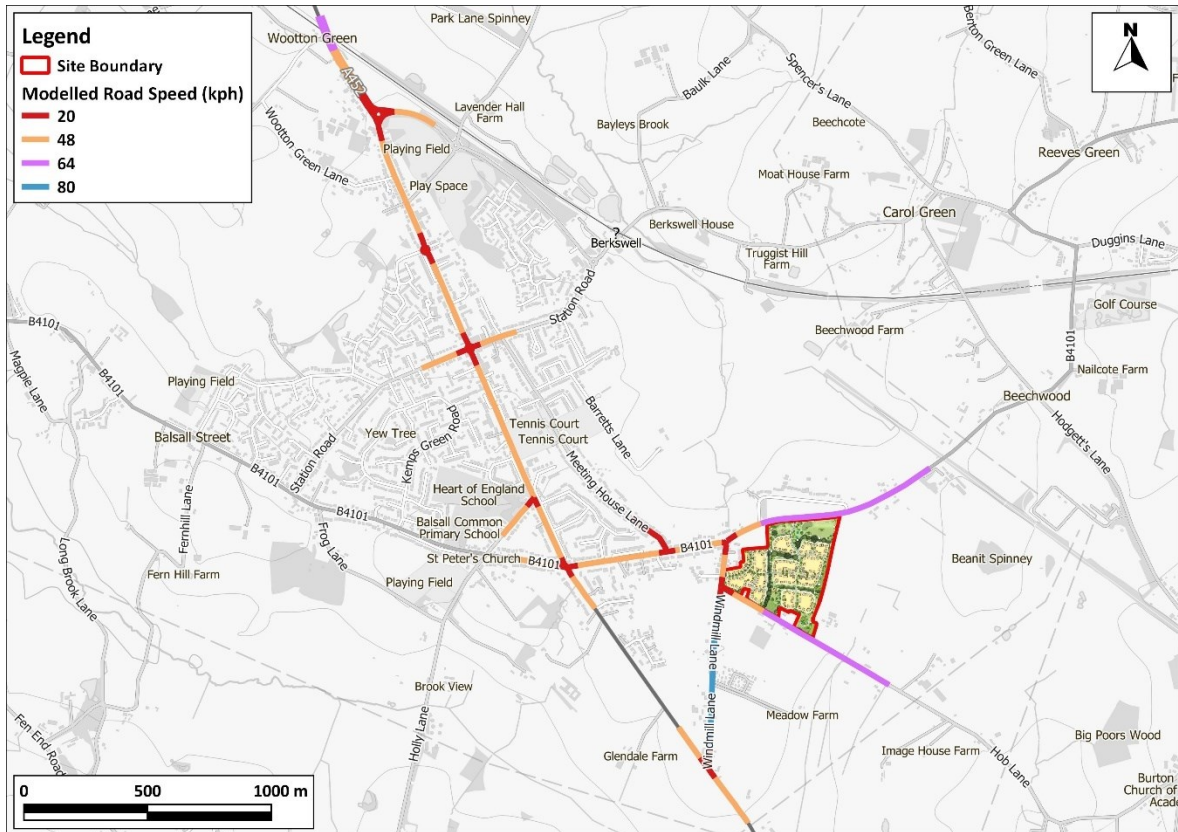


Figure A4.2: Modelled Road Network & Speed

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A4.4 Hourly sequential meteorological data in sectors of 10 degrees from Coleshill for 2019 have been used in the model. The Coleshill meteorological monitoring station is located approximately 12 km to the northwest of the proposed development. Both the application site and the Coleshill meteorological monitoring station are located in central England where they will be influenced by the effects of inland meteorology, over generally flat-lying topography. The topography of the model domain is similar to that around the meteorological monitoring station and measurements from this site are considered to provide the most robust basis to predict meteorology within the model domain. A wind rose for the site for the year 2019 is provided in Figure A4.3. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

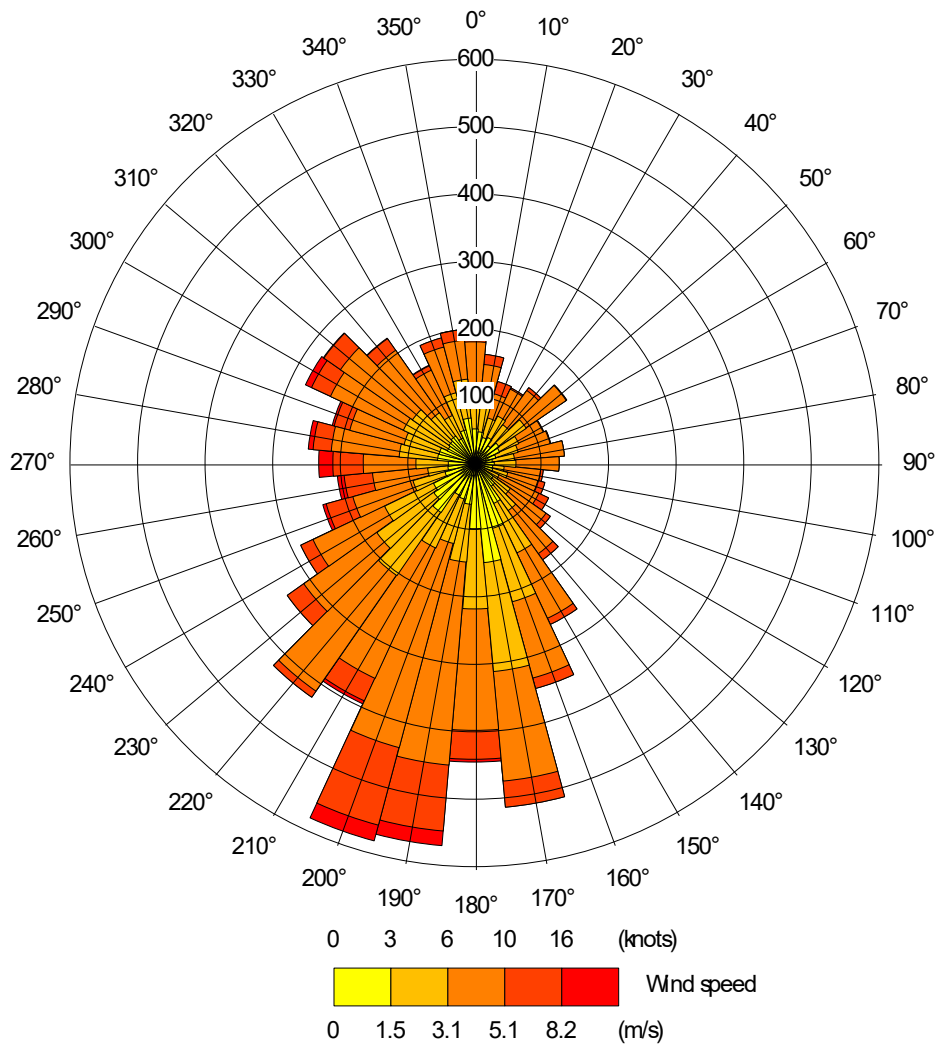


Figure A4.3: Wind Rose for Coleshill 2019

Model Verification

4.4.1 In order to ensure that ADMS-Roads accurately predicts local concentrations, it is necessary to verify the model against recent measurements. Guidance from Defra (Defra, 2022) is to use data from ‘roadside’ monitoring sites for the purpose of model verification. In 2019, SMBC had one diffusion tube monitoring site within the study area (AB21; Table 4) which the ASR classifies as ‘roadside’ (SMBC, 2022). It is, however, located 20.1 m from the kerb (SMBC, 2022). Defra (Defra, 2022) classifies a roadside monitoring site as being “A site sampling typically within one to five metres of the kerb of a busy road (although distance can be up to 15 m from the kerb in some cases)”. Therefore, there were no monitoring sites within the study area considered suitable for model verification purposes in 2019.

4.4.2 It has been considered more appropriate to apply an average factor, calculated based on a number of air quality impact assessments (21 studies) carried out by AQC for the annual period 2019. This

is considered to be a suitable alternative in the absence of a suitable local monitoring site for which modelling adjustment could be undertaken.

- 4.4.3 The magnitude of the average factor (2.5) is considered reasonable for this assessment, and the factor has been applied to the modelled road-NO_x concentration for each receptor to provide adjusted modelled road-NO_x concentrations.

PM₁₀ and PM_{2.5}

- A4.5 The approach described above for NO_x and nitrogen dioxide determines the road increment of concentrations by subtracting the predicted local background from the roadside measurements. This works well for NO_x because the differences between roadside and background concentrations typically represent a large proportion of the total measured value. The same is not true for PM₁₀ and PM_{2.5} concentrations, which are dominated by non-road emissions, even at the roadside. In practice, the influence of a local road on concentrations can often be smaller than the uncertainty in the mapped background concentration. As an example of this, 31% of all roadside and kerbside sites in London which measured PM_{2.5} in 2019 with >75% data capture, recorded an annual mean concentration lower than the equivalent Defra mapped background value. Using measured background concentrations does not provide any significant benefit, owing largely to the spatial resolution of available measurements, but also because of measurement uncertainty. For example, hourly-mean PM_{2.5} concentrations measured at roadside sites are often lower than those measured at nearby urban background sites, while concentrations at urban background sites are often lower than those measured at rural sites.
- A4.6 For these reasons, it is not appropriate to calculate the annual mean road-increment to PM₁₀ and PM_{2.5} concentrations by subtracting either the mapped background or a local measured background concentration. This, in turn, means that the approach to model adjustment which is described for NO_x and NO₂ is not appropriate for PM₁₀ and PM_{2.5}. Historically, many studies have derived a model adjustment factor for NO_x and applied this to PM₁₀ and PM_{2.5}. This is also not appropriate, since there is no reason to expect the same bias in emissions of NO_x, PM₁₀ and PM_{2.5}.
- A4.7 While there is very strong evidence that EFT-based models have consistently under-predicted road-NO_x concentrations in urban areas, there is no equivalent evidence for PM₁₀ and PM_{2.5}. There is currently no strong basis for applying any adjustment to the model outputs. Predicted concentrations of PM₁₀ and PM_{2.5} have thus not been adjusted.

Post-processing

- A4.8 The model predicts road-NO_x concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO₂, has been processed through the NO_x to NO₂ calculator available on the Defra LAQM Support website (Defra, 2023d). The traffic mix within the calculator has been set to “All other urban UK

traffic”, which is considered suitable for the study area. The calculator predicts the component of NO₂ based on the adjusted road-NO_x and the background NO₂.

A5 Construction Mitigation

A5.1 Table A5.1 sets out a list of best-practice measures from the IAQM guidance (IAQM, 2016) that should be incorporated into the specification for the works. These measures should ideally be written into a Dust Management Plan. Some of the measures may only be necessary during specific phases of work, or during activities with a high potential to produce dust, and the list should be refined and expanded upon in liaison with the construction contractor when producing the Dust Management Plan.

Table A5.1: Best-Practice Mitigation Measures Recommended for the Works

Measure	Desirable	Highly Recommended
Communications		
Develop and implement a stakeholder communications plan that includes community engagement before and during work on site		✓
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		✓
Dust Management Plan		
Develop and implement a Dust Management Plan (DMP) approved by the Local Authority which documents the mitigation measures to be applied, and the procedures for their implementation and management		✓
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		✓
Make the complaints log available to the local authority when asked		✓
Record any exceptional incidents that cause dust 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 500 m 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 inspections 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 the site boundary, with cleaning to be provided if necessary		✓

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		✓
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		✓
Agree dust deposition, dust flux, or real-time PM ₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction (IAQM, 2018)		✓
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		✓
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 extensive 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		✓
Cover, seed, or fence stockpiles to prevent wind whipping		✓
Operating Vehicle/Machinery and Sustainable Travel		
Ensure all vehicles switch off their engines when stationary – no idling vehicles		✓
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 additional control measures provided, subject to the approval of the nominated undertaker and 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 staff 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		✓
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate		✓

Use enclosed chutes, 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 any 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		✓
Measures Specific to Demolition		
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust)	✓	
Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground		✓
Avoid explosive blasting, using appropriate manual or mechanical alternatives		✓
Bag and remove any biological debris or damp down such material before demolition		✓
Measures Specific to Earthworks		
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable		✓
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable		✓
Only remove the cover from small areas during work, not all at once		✓
Measures Specific to Construction		
Avoid scabbling (roughening of concrete surfaces), if possible	✓	
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	✓	
For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust	✓	
Measures Specific to Trackout		
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use		✓
Avoid dry sweeping of large areas		✓
Ensure vehicles entering and leaving 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; and		✓
Access gates should be located at least 10 m from receptors, where possible		✓