

10. Air Quality

10.1. Introduction

- 10.1.1. This Chapter considers the likely significant effects associated with the Proposed Development in terms of air quality.
- 10.1.2. The Proposed Development will inevitably lead to an increase in traffic on the local roads, which may lead to air quality effects at existing residential properties adjacent to affected roads. New residential properties within the Proposed Developments may also be subject to the impact of road traffic emissions from the adjacent road network. The main air pollutants of concern related to traffic emissions are nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}).
- 10.1.3. The potential for the construction activities to affect both existing and new properties has also been assessed. The main pollutants of concern related to construction activities are dust and PM₁₀.
- 10.1.4. This Chapter describes local air quality conditions in the baseline year 2023 and the predicted air quality in the future assuming that the Proposed Development does or does not proceed. The assessment of traffic-related air quality effects focuses on 2028, which is the earliest possible year of occupation of any of the new homes within the Proposed Development. The assessment of construction dust effects focuses on the anticipated duration of the works
- 10.1.5. This Chapter is supported by the following appendices and/or figures:
- **Figure 10.1:** Study Area;
 - **Figure 10.2:** Receptor Locations;
 - **Figure 10.3:** Monitoring Locations;
 - **Figure 10.4:** 20m Distance Band around Site Boundary;
 - **Figure 10.5:** 20m Distance Band around Roads Used by Construction Traffic within 250m of Site Exits;
 - **Appendix 10.1:** Construction Dust Assessment Procedure;
 - **Appendix 10.2:** EPUK & IAQM Planning for Air Quality Guidance;
 - **Appendix 10.3:** Modelling Methodology;
 - **Appendix 10.4:** Professional Experience;
 - **Appendix 10.5:** Legislative and Policy Framework; and
 - **Appendix 10.6:** Construction Mitigation
- 10.1.6. This Chapter, and its associated appendices, is intended to be read as part of the wider Environmental Statement (ES) with particular reference to the introductory chapters (Chapter 1 to Chapter 4), Transport (Chapter 9) and Ecology (Chapter 7) Chapters and associated appendices.

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10.2. Assessment Approach

Methodology

Objectives and Targets

- 10.2.1. 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).
- 10.2.2. 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, 2025a). 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.
- 10.2.3. 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 9.2.6), originally set at 25 µg/m³ and currently set at 20 µg/m³.
- 10.2.4. EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM₁₀ and PM_{2.5}, and is implemented in UK law through the Air Quality Standards Regulations (2010)¹. The limit values for nitrogen dioxide and PM₁₀ are the same numerical concentrations as the UK objectives, but achievement of the limit values is a national obligation rather than a local one and concentrations are reported to the nearest whole number. 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).
- 10.2.5. The relevant air quality criteria for this assessment are provided below within Error! Reference source not found.10.1.

¹ As amended through The Air Quality Standards (Amendment) Regulations 2016 and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020.

Table 10.1: Air Quality Criteria for NO₂, PM₁₀ and PM_{2.5}

Pollutant	Target	Target Year
NO ₂	1-hour Mean	200 µg/m ³ not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m ³ ^a
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 ^b
PM _{2.5}	Annual Mean	20 µg/m ³ ^c

^a A proxy value of 60 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 1-hour mean NO₂ objective being exceeded (Defra, 2025a).

^b 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, 2025a).

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

10.2.6. 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, as shown in **Table 10.2**. The long-term target is to achieve an annual mean PM_{2.5} concentration of 10 µg/m³ by the end of 2040 (referred to as the annual mean concentration target or AMCT), with the interim target being a value of 12 µg/m³ by the start of 2028². The second set of targets relate to reducing overall population exposure to PM_{2.5}. By the end of 2040, overall population exposure to PM_{2.5} should be reduced by 35% compared with 2018 levels (referred to as the population exposure reduction target or PERT), with the interim target being a reduction of 22% by the start of 2028.

10.2.7. In late 2024, Defra published Interim Planning Guidance on the PM_{2.5} targets (Defra, 2024). This states that:

"The purpose of the targets is to improve air quality by reducing levels of PM_{2.5} across the country, therefore improving public health. While achievement of the targets will be assessed at relevant monitoring sites, the targets apply to ambient (outdoor) air throughout England. Applicants and Local Planning Authorities should therefore consider the impact of developments on air quality in all ambient air, whether a monitor is present or not".

10.2.8. In order to address the new targets, it is not sufficient to assess solely whether a scheme is likely to lead to an exceedance of a legal limit. Instead, developments need to implement appropriate mitigation measures from the design stage, ensuring the minimum amount of pollution is emitted and that exposure is minimised.

10.2.9. Pending publication of the new guidance, Defra advises applicants to provide evidence that they have identified key sources of air pollution within the scheme and taken appropriate action to minimise emissions of PM_{2.5} and its precursors as far as possible. More detailed assessment is expected for development closer to populations and / or having higher emissions. Defra has posed two questions to be used as prompts to support the interim assessment process:

"How has exposure to PM_{2.5} been considered when selecting the development site?; and

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 µg/m³ would not exceed the 10 µg/m³ target

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What actions and / or mitigations have been considered to reduce PM_{2.5} exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of PM_{2.5} and its precursors?"

Table 9.2: Environment Act PM_{2.5} Targets

Metric	Target	Target Year
AMCT	Interim target: 12 µg/m ³	2028
	Legally binding target: 10 µg/m ³	2040
PERT	Interim target: 22% reduction in exposure compared to 2018	2028
	Legally binding target: 35% reduction in exposure compared to 2018	2040

Existing Conditions

10.2.10. Existing sources of emissions and baseline air quality conditions 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, 2025b);
- 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 2021-based background maps (Defra, 2025c). These cover the whole of the UK on a 1x1 km grid. The background annual mean nitrogen dioxide maps have been calibrated against concurrent measurements (AQC, 2025). The calibration factor 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 NO₂, PM₁₀ and PM_{2.5} in the study area has been identified using Defra's Compliance data (2025d).

Construction Impacts

10.2.11. The construction dust assessment considers the potential for impacts within 250m of the Site boundary, or within 50m of roads used by construction vehicles. The assessment methodology is that provided by Institute of Air Quality Management (IAQM)³ (2024). 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

³ The IAQM is the professional body for air quality practitioners in the UK

determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Please refer to **Appendix 10.1** for more detail.

Road Traffic Impacts

Screening

- 10.2.12. 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 10.2**) first considers the size and parking provision of a development.
- 10.2.13. 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 9.2) inside an Air Quality Management Area (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”*.
- 10.2.14. 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 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. The following sections describe the approach to dispersion modelling of road traffic emissions, which has been required for this project.

Modelling Methodology

- 10.2.15. Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra’s Emission Factor Toolkit (EFT) (v13.1) (Defra, 2025c). Please refer to **Appendix 10.3** for further details of the model inputs and the model verification process.

Assessment Scenarios

- 10.2.16. Nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations have been predicted for the following scenarios:
- base year 2023;
 - the earliest year of first occupation of the Proposed Development (2028) without the development, but with committed developments; and
 - 2028 with committed development and with the Proposed Development.

Assessment of Significance

Construction Dust Significance

- 10.2.17. Guidance from IAQM (2024) 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’.

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Operational Significance*Impact Description*

- 10.2.18. The approach developed jointly by EPUK and 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 10.3** below 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. All residential receptors considered in this assessment are considered to be of 'high' sensitivity.

Table 10.3: 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 d}				
	0%	1%	2–5%	6–10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Minor (Slight)	Moderate
76–94% of AQAL	Negligible	Negligible	Minor (Slight)	Moderate	Moderate
95–102% of AQAL	Negligible	Minor (Slight)	Moderate	Moderate	Major (Substantial)
103–109% of AQAL	Negligible	Moderate	Moderate	Major (Substantial)	Major (Substantial)
110% or more of AQAL	Negligible	Moderate	Major (Substantial)	Major (Substantial)	Major (Substantial)

^a Values are rounded to the nearest whole number.

^b This is the "Without Development" concentration where there is a decrease in pollutant concentration and the "With Development" concentration where there is an increase.

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

^d Minor and Major are used as Standard EIA terminology and correspond to Slight and Substantial respectively in relevant guidance.

Overall Significance

- 10.2.19. 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 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 as outlined above within **Table 10.3**, as well as the experience of the consultants

preparing the Chapter (see **Appendix 10.4**). Full details of the EPUK / IAQM approach are provided within **Appendix 10.2**.

- 10.2.20. It is important to differentiate between the terms impact and effect with respect to the assessment of air quality. The term impact is used to describe a change in pollutant concentration at a specific location. The term effect is used to describe an environmental response resulting from an impact, or series of impacts. Within this Chapter, the air quality assessment has used published guidance and criteria described in the following sections to determine the likely air quality impacts at a number of sensitive locations. The potential significance of effects has then been determined by professional judgement, based on the frequency, duration and magnitude of predicted impacts and their relationship to appropriate air quality objectives.

Legislative and Policy Framework

- 10.2.21. All policy and legislation applied to this assessment is outlined within **Appendix 10.5**, this includes relevant air quality legislation, National and Local planning policy relevant to the Site and National air quality Plan.

EIA Scoping Process

- 10.2.22. As discussed in Chapter 2, a request for a Scoping Opinion was submitted on behalf of the Applicant to Knowsley Metropolitan Borough Council (KMBC) on 26th March 2025, which set out the proposed scope of assessment for the project (see **Appendix 2.1**). KMBC issued their Scoping Opinion on 21st May 2025 and is summarised in Chapter 2 and included in full at **Appendix 2.2**.
- 10.2.23. With regards to air quality matters, relevant responses were received from the consultees including KMBC's Environmental Health and Consumer Protection Service and Merseyside Environmental Advisory Service and comments have been addressed accordingly, as follows in **Table 10.4** below.

Table 10.4: Relevant EIA Scoping Consultation Comments

Consultee	Summary of Comment	Response or location within the ES where comments are addressed
KMBC Environmental Health and Consumer Protection Service	Following a review of the EIA Scoping Report for the proposed residential development of up to 730 dwellings, Environmental Health are satisfied with the content of the report. As part of the Environmental Statement (ES), the applicant will be submitting both an air quality assessment and a noise assessment.	No response required.
Merseyside Environmental Advisory Service	Air quality can impact on ancient woodland communities (irreplaceable habitat). Should detailed botanical survey confirm existing woodlands on and adjacent / near	While the Multi Agency Geographic Information for the Countryside (MAGIC) website did not identify any

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	to the site to be ancient semi-natural woodland then the air quality chapter should also assess impacts on these woodlands and they should be included as a receptor in air quality assessments. This will need to feed into assessment of impacts to ancient semi-natural woodlands (if confirmed) within the ecology and biodiversity chapter	woodlands within or immediately adjacent to the Site as Ancient Woodland, ecological surveys identified ancient woodland indicator species and with ancient woodland in England being defined as an area that has been continuously wooded since at least 1600 AD, due to the proximity of the woodlands to an historic estate which dates to the late 15th century, the recorded woodland has been assumed to be ancient for the purpose of assessment to take a robust approach. The impact of additional road traffic emissions on NO_x and ammonia concentrations, and nitrogen and acid deposition has therefore been predicted. The findings of the assessment are presented as an appendix to the ecology and biodiversity Chapter and inform the conclusions of the ecology and biodiversity Chapter.
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Limitations to the Assessment

Uncertainty / Limitations

- 10.2.24. 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.
- 10.2.25. An important stage in the process is model verification, which involves comparing the model output with measured concentrations (please see **Appendix 10.3** for more details). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2023) concentrations.
- 10.2.26. 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 more recent versions of Defra's EFT carried out by AQC (2020a; 2020b) 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 previous versions of the EFT, especially against a base year of 2016 or later. Whilst such an analysis has not been undertaken by AQC for EFT v13.1, it is considered that using EFT v13.1 for future-year forecasts in this report provides a robust assessment, given that the model has been verified against measurements made in 2023.

- 10.2.27. 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 in the short term (Defra Air Quality Expert Group, 2020). Forecasts in this assessment have been based on post-pandemic years and are therefore considered to be representative of the 'new normal'.

Assumptions

- 10.2.28. 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 traffic data used in the assessment is based on 750 homes, thereby overestimating the emissions associated with the Proposed Development, which will provide up to 700 homes, providing a conservative assessment of the air quality impacts;
 - the assumption that the Proposed Development is complete and fully occupied in 2028. This will have overestimated the traffic emissions and hence the 2028 "With Scheme" concentrations. In reality, the development is unlikely to be fully occupied before 2039, thus it will not be generating its full traffic volumes until this year; and
 - that the Liverpool Airport meteorological monitoring station appropriately represents conditions in the study area (this is discussed further within **Appendix 10.3**).

10.3. Baseline Conditions

Site Description and Context

- 10.3.1. A general description of the Site is presented in Chapter 3.

Study Area

- 10.3.2. 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 roads along which the development will lead to a potentially significant change in traffic flows as defined by EPUK / IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). The study area is shown in **Figure 10.1**.
- 10.3.3. The construction dust assessment considers the potential for impacts within 250 m of the Site boundary, or within 50 m of roads used by construction vehicles within 250 m of the Site. The specific areas considered are detailed below in Section 10.4 and are shown in **Figures 10.4 and 10.5**.

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Receptors

- 10.3.4. Concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been predicted at a number of locations both within, and close to, the Application Site. Receptors have been identified to represent a range of exposure, including worst-case locations (these being at the façades of the residential properties 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.
- 10.3.5. Twenty-four existing residential properties have been identified as receptors for the assessment. Four additional receptor locations have been identified within the new development, which represent exposure to existing sources. These locations are described within **Table 10.4** (see below) and as shown on **Figure 10.2**. In addition, concentrations have been modelled at three diffusion tube monitoring sites operated by KMBC, in order to verify the model outputs (please refer to **Appendix 10.3** for verification method).

Table 9.4: Description of Receptor Locations

Receptor ID	Receptor Type	X coordinate	Y coordinate	Heights Modelled (m) ^a
Existing Properties				
R1	Residential	343457.8	395928.5	1.5
R2	Residential	343463.9	395963.3	1.5
R3	Residential	343442.8	395983.1	1.5
R4	Residential	343361.7	395974.4	1.5
R5	Residential	343331.6	395990.3	1.5
R6	Residential	343366.9	395566.3	1.5
R7	Residential	343304.1	395110.5	1.5
R8	Residential	343317.1	395028.1	1.5
R9	Residential	343268.6	394996.5	1.5
R10	Residential	343289.5	394949.7	1.5
R11	Residential	343317.0	394304.1	1.5
R12	Residential	343291.4	394276.0	1.5
R13	Residential	343315.7	394016.5	1.5
R14	Residential	343378.3	393748.1	1.5
R15	Residential	343527.8	393137.1	1.5
R16	Residential	343743.8	392880.4	1.5
R17	Residential	343970.1	392746.2	1.5
R18	Residential	344137.9	392716.8	1.5
R19	Residential	344234.8	392726.6	1.5
R20	Residential	344207.3	392703.3	1.5
R21	Residential	340509.9	396507.7	1.5
R22	Residential	340476.0	396492.2	1.5
R23	Residential	343359.1	395999.6	1.5

R24	Care Home	343906.2	392762.1	1.5
New Properties				
A	Residential	343303.1	394744.3	1.5
B	Residential	343308.5	394605.9	1.5
C	Residential	343308.8	394589.6	1.5
D	Residential	343319.3	394423.4	1.5

^a A height of 1.5 m is used to represent ground-floor level exposure

10.3.6. 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.

10.3.7. 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 below within Section 10.4.

Industrial Sources

10.3.8. No significant industrial sources have been identified that are likely to affect the Proposed Development, in terms of air quality.

Local Air Quality Monitoring

10.3.9. KMBC operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by SOCOTEC Didcot (using the 50% TEA in acetone method). These include four locations within approximately 3 km of the Application Site. Annual mean results for the years 2019 to 2023 are summarised within **Table 10.5** (see below). The monitoring locations are shown in **Figure 10.3**. The monitoring data has been taken from KMBC's 2024 Air Quality Annual Status Report (KMBC, 2024).

Table 10.5: Summary of Annual Mean NO₂ Monitoring (2019–2023) (µg/m³)

Site	Site Type	Location	2019	2020	2021	2022	2023
K10a, K10b	Roadside	19 Moorgate Road	29.4	24.1	22.9	20.6	19.8
P1a, P1b	Roadside	Liverpool Road	26.8	22.6	25.1	21.9	21.5
P2a, P2b	Roadside	50 Derby Street	26.9	22.4	25.6	22.4	20.3
P3a, P3b	Roadside	2 Stanley Crescent	29.6	26.4	25.7	24.9	25.1
Objective			40				

10.3.10. **Table 10.5** shows that there were no exceedances of annual mean NO₂ objective at any of the nearby monitors during the 2019 – 2023 monitoring period. Concentrations were also well below 60 µg/m³, indicating that the 1-hour mean objective was unlikely to have been exceeded in any year. Measured concentrations have reduced at all sites between 2019 and 2023.

10.3.11. 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.

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- 10.3.12. Monitoring of PM₁₀ or PM_{2.5} is no longer undertaken by KMBC, with the last automatic monitor being decommissioned at the end of 2021. Historically concentrations of both PM₁₀ and PM_{2.5} have been below the objectives.

Exceedances of Limit Value

- 10.3.13. Defra has not identified any exceedances of the annual mean or 1-hour mean limit values in 2023 in KMBC's area (Defra, 2025d). As such, there is not considered to be a risk of a limit value exceedance in the vicinity of the Application Site by the time that it is operational.

Background Concentrations

- 10.3.14. Estimated background concentrations in the study area are set out below in **Table 10.6** and are all well below the objectives.

Table 10.6: Estimated Annual Mean Background Pollutant Concentrations in 2023 and 2028 (µg/m³)

Year	NO ₂	PM ₁₀	PM _{2.5}
2023	13.7 – 16.0	12.7 – 15.4	7.4 – 8.8
2028	10.2 – 11.4	12.3 – 15.0	7.0 – 8.4
Objective	40	40	20 ^a
AMCT ^b	–	–	10

^a 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.

^b To be met by 2040 and provided here for reference only.

Baseline Dispersion Model Results

- 10.3.15. Baseline concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been modelled at each of the existing receptor locations (see **Figure 10.2** and **Table 10.4** for details). The results, which cover both the existing (2023) and future year (2028) baseline (Without Scheme), are set out in **Table 10.7** (see below) for nitrogen dioxide, PM₁₀, and PM_{2.5}. The modelled road components of nitrogen oxides have been increased from those predicted by the model based on a comparison with local measurements (again see **Appendix 10.3** for the verification methodology).

Table 10.7: Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide, PM₁₀, and PM_{2.5} (µg/m³) at Existing Receptors ^a

Receptor	NO ₂		PM ₁₀		PM _{2.5}	
	2023	2028 Without Scheme	2023	2028 Without Scheme	2023	2028 Without Scheme
R1	19.0	13.3	13.2	12.8	7.6	7.3
R2	18.5	13.0	13.1	12.8	7.6	7.3
R3	17.6	12.5	13.0	12.7	7.6	7.2
R4	16.0	11.5	12.9	12.5	7.5	7.2

R5	16.1	11.6	12.9	12.6	7.5	7.2
R6	17.5	12.4	13.0	12.7	7.6	7.2
R7	17.5	12.4	13.0	12.7	7.6	7.2
R8	16.1	11.6	12.9	12.6	7.5	7.2
R9	19.9	13.8	14.4	14.0	7.7	7.4
R10	17.9	12.6	14.2	13.8	7.6	7.3
R11	17.9	12.7	14.1	13.8	7.6	7.3
R12	18.0	12.7	14.1	13.8	7.6	7.3
R13	18.5	13.0	14.2	13.8	7.6	7.3
R14	20.9	14.5	14.9	14.5	8.2	7.8
R15	20.5	14.1	14.8	14.5	8.2	7.8
R16	17.9	12.7	13.8	13.4	8.9	8.5
R17	19.1	13.4	14.0	13.5	9.0	8.5
R18	21.1	14.6	15.8	15.4	9.1	8.6
R19	21.8	15.0	15.9	15.5	9.1	8.7
R20	20.6	14.2	15.8	15.4	9.1	8.6
R21	19.2	13.6	13.4	13.1	8.0	7.6
R22	19.1	13.6	13.4	13.1	8.0	7.6
R23	15.6	11.3	12.8	12.5	7.5	7.1
R24	18.1	12.8	13.9	13.4	8.9	8.5
Objective	40		32 ^b		20 ^c	
AMCT	–		–		10 ^d	

^a Exceedances of the objective are shown in bold.

^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, 2025a). 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 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.

^d To be met by 2040, and provided here for reference only.

- 10.3.16. The predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} are well below the objectives in both 2023 and 2028 at all receptors. The annual mean nitrogen dioxide concentrations are below 60 µg/m³ at every receptor in both 2023 and 2028; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded. The annual mean PM₁₀ concentrations are below 32 µg/m³ and it is, therefore, unlikely that the 24-hour mean PM₁₀ objective will be exceeded.

10.4. Assessment of Likely Significant Effects

Construction Traffic

- 10.4.1. It is anticipated that no more than 24 heavy vehicles and 99 light vehicles, will access the site on any given day, thus the additional vehicle movements on local roads will be well below the 100 HDV and 500 LDV AADT screening criterion recommended by EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). It is, therefore, not considered necessary to assess the impacts of traffic emissions during the construction phase and it can be concluded that the

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proposed development will not have a significant impact on local roadside air quality as a result of construction traffic emissions.

Construction Dust and Particulate Matter Emissions

- 10.4.2. 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 as set out in the guidance (see **Appendix 10.1**), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

- 10.4.3. There is no requirement for demolition on site.

Earthworks

- 10.4.4. The characteristics of the indigenous soil on Site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2025), as set out in **Table 10.8** below. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 10.8: Summary of Soil Characteristics

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

^a grain size <0.06 mm.

^b grain size >2 mm.

^c a loam is composed mostly of sand and silt

- 10.4.9. The Site covers approximately 336,000 m² and most of this will be subject to earthworks to enable suitable development platforms to be formed, although large change in levels is not anticipated. 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 **Error! Reference source not found.10.1.1** within **Appendix 10.1**, the dust emission class for earthworks is considered to be large.

Construction

- 10.4.10. The Proposed Development involves the construction of up to 700 brick built residential properties. The total volume is unknown but estimated to be more than 75,000 m³. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials. The construction will take place over a 11-year period. Based on the example definitions as set

out in Table 10.1.1 within **Appendix 10.1**, the dust emission class for construction is considered to be large.

Trackout

10.4.11. There will be a maximum of 24 outward heavy vehicle movements per day. Based on the example definitions set out in Table 10.1.1 within **Appendix 10.1**, the dust emission class for trackout is considered to be medium.

10.4.12. **Table 10.9** below summarises the dust emission magnitude for the Proposed Development.

Table 10.9: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Earthworks	Large
Construction	Large
Trackout	Medium

Sensitivity of the Area

10.4.16. 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.

10.4.17. The IAQM guidance explains that residential properties are 'high' sensitivity receptors to dust soiling and human health effects (see Table 10.1.2 within **Appendix 10.1**). There are approximately 15 residential properties within 20 m of the Site (see **Figure 10.4**).

10.4.18. The IAQM guidance (IAQM, 2024) explains that there is a risk of material being tracked 250 m from the Site access. It is assumed construction vehicles will travel north and south on the B5194 (Knowsley Lane) from the proposed site accesses. There are 13 residential properties within 20 m of the roads along which material could be tracked (see **Figure 10.5**).

Sensitivity of the Area to Effects from Dust Soiling

10.4.19. Using the information set out in **Paragraph 10.4.17** and **Figure 10.4** (within **Appendix 10.1**) alongside the matrix set out in Table 10.1.3 (again see **Appendix 10.1**), the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Using the information set out in **Paragraph 10.4.18** and **Figure 10.5** (refer to **Appendix 10.1**) 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

10.4.20. The matrix within Table 10.1.4 within **Appendix 10.1** requires information on the baseline annual mean PM₁₀ concentration in the area. The maximum modelled baseline PM₁₀ concentration in the vicinity of the site (at Receptor R9) in **Table 10.7** is judged to best represent conditions near to the Site, this being 14.4 µg/m³. Using the information set out above in **Paragraph 10.4.17** and **Figure 10.4** alongside the matrix provided in Table 10.1.4 within **Appendix 10.1**, the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information

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set out in **Paragraph 10.4.18** and **Figure 10.5** 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

- 10.4.21. The guidance considers AWs with dust sensitive features to be of 'low' sensitivity. There are four Ancient Woodlands (AWs) within 20 m of the site and two AWs within 20 m of roads along which material may be tracked. Table 10.1.5 in Appendix 10.1 shows that the area is of 'low' sensitivity to ecological effects.

Summary of the Area Sensitivity

- 10.4.22. **Table 10.10** below summarises the sensitivity of the area around the proposed construction works.

Table 10.10: 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
Ecological	Low Sensitivity	Low Sensitivity

Risk and Significance

- 10.4.24. The dust emission magnitudes in **Table 10.9** have been combined with the sensitivities of the area in **Table 10.10** using the matrix provided in Table 10.1.6 within **Appendix 10.1**, in order to assign a risk category to each activity. The resulting risk categories for the three construction activities, without mitigation, are set out in **Table 10.11** below. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 10.5 (Step 3 of the assessment procedure).

Table 10.11: Summary of Risk of Impacts Without Mitigation

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

- 10.4.36. 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, 2024).

Operational Road Traffic

Impact at Existing Receptors

- 10.4.37. The Proposed Development will generate traffic volumes that exceed the EPUK / IAQM screening thresholds on a number of local roads.

Nitrogen Dioxide

- 10.4.38. Predicted annual mean concentrations of nitrogen dioxide in 2028 for existing receptors are set out in **Table 10.12** below for both the “Without Scheme” and “With Scheme” scenarios. The impact at each receptor is also described using the impact descriptors given previously within **Table 10.3**.

Table 10.12: Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2028 ($\mu\text{g}/\text{m}^3$)

Receptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
R1	13.3	13.7	1	Negligible
R2	13.0	13.3	1	Negligible
R3	12.5	12.8	1	Negligible
R4	11.5	11.8	1	Negligible
R5	11.6	11.9	1	Negligible
R6	12.4	12.7	1	Negligible
R7	12.4	12.7	1	Negligible
R8	11.6	11.8	0	Negligible
R9	13.8	14.3	1	Negligible
R10	12.6	12.9	1	Negligible
R11	12.7	12.9	0	Negligible
R12	12.7	12.9	0	Negligible
R13	13.0	13.2	1	Negligible
R14	14.5	14.7	1	Negligible
R15	14.1	14.2	0	Negligible
R16	12.7	12.8	0	Negligible
R17	13.4	13.6	0	Negligible
R18	14.6	14.7	0	Negligible
R19	15.0	15.1	0	Negligible
R20	14.2	14.4	0	Negligible
R21	13.6	13.6	0	Negligible
R22	13.6	13.6	0	Negligible
R23	11.3	11.5	1	Negligible
R24	12.8	12.9	0	Negligible
Objective	40			

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

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- 10.4.39. The annual mean nitrogen dioxide concentrations are well below the objective at all receptors. The percentage change in concentrations (when rounded) are between zero and 1% of the objective at all receptors. All impacts are described as negligible. Concentrations are also well below 60 µg/m³, indicating that an exceedance of the 1-hour mean objective is unlikely (see Paragraph 10.2.2).

PM₁₀ and PM_{2.5}

- 10.4.40. Predicted annual mean concentrations of PM₁₀ and PM_{2.5} in 2028 for existing receptors are set out in **Table 10.13** below for both the “Without Scheme” and “With Scheme” scenarios. The impacts at each receptor are also described using the impact descriptors given previously within **Table 10.3**.

Table 10.13: Predicted Impacts on Annual Mean PM₁₀ and PM_{2.5} Concentrations in 2028

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
R1	12.8	12.9	0	Negligible	7.3	7.3	0	Negligible
R2	12.8	12.8	0	Negligible	7.3	7.3	0	Negligible
R3	12.7	12.7	0	Negligible	7.2	7.2	0	Negligible
R4	12.5	12.6	0	Negligible	7.2	7.2	0	Negligible
R5	12.6	12.6	0	Negligible	7.2	7.2	0	Negligible
R6	12.7	12.7	0	Negligible	7.2	7.3	0	Negligible
R7	12.7	12.7	0	Negligible	7.2	7.3	0	Negligible
R8	12.6	12.6	0	Negligible	7.2	7.2	0	Negligible
R9	14.0	14.1	0	Negligible	7.4	7.4	0	Negligible
R10	13.8	13.9	0	Negligible	7.3	7.3	0	Negligible
R11	13.8	13.8	0	Negligible	7.3	7.3	0	Negligible
R12	13.8	13.8	0	Negligible	7.3	7.3	0	Negligible
R13	13.8	13.9	0	Negligible	7.3	7.3	0	Negligible
R14	14.5	14.6	0	Negligible	7.8	7.8	0	Negligible
R15	14.5	14.5	0	Negligible	7.8	7.8	0	Negligible
R16	13.4	13.4	0	Negligible	8.5	8.5	0	Negligible
R17	13.5	13.5	0	Negligible	8.5	8.5	0	Negligible
R18	15.4	15.4	0	Negligible	8.6	8.6	0	Negligible
R19	15.5	15.5	0	Negligible	8.7	8.7	0	Negligible
R20	15.4	15.4	0	Negligible	8.6	8.6	0	Negligible
R21	13.1	13.1	0	Negligible	7.6	7.6	0	Negligible
R22	13.1	13.1	0	Negligible	7.6	7.6	0	Negligible

R23	12.5	12.6	0	Negligible	7.1	7.2	0	Negligible
R24	13.4	13.4	0	Negligible	8.5	8.5	0	Negligible
Criterion	32 ^b		-	-	20 ^c		-	-
AMCT ^d					10 ^d			

^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, 2025a). 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.

^d To be met by 2040

10.4.41. The annual mean PM₁₀ and PM_{2.5} concentrations are well below the relevant criteria at all receptors, with or without the Proposed Development. The percentage change in concentrations (when rounded) are zero percent of the objective at all receptors. All impacts are described as negligible. 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.

10.4.42. As explained in Paragraph 10.2.9 (see above), a different assessment approach is required to determine whether the Proposed Development complies with the requirement to deliver achievement of the AMCT and PERT. This is considered below within Section 10.5.

Impact of Existing Sources on Future Residents of the Development

10.4.43. Predicted air quality conditions for future residents of the Proposed Development, taking account of emissions from the adjacent road network, are set out below within **Table 10.14** for Receptors within the Application Site (see **Table 10.4** and **Figure 10.2** for receptor locations). All of the values are well below the objectives. Air quality for future residents within the Proposed Development will thus be acceptable.

Table 10.14: Predicted Annual Mean Concentrations of Nitrogen Dioxide (NO₂), PM₁₀ and PM_{2.5} in 2028 for New Receptors in the Proposed Development (µg/m³)

Receptor	NO ₂	PM ₁₀	PM _{2.5}
A	12.6	13.8	7.3
B	12.7	13.8	7.3
C	12.7	13.8	7.3
D	12.3	13.7	7.3
Objective / Criterion	40	32 ^a	20 ^b
AMCT			10 ^c

^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, 2025a). 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.

^c To be met by 2040.

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Significance of Operational Air Quality Effects

- 10.4.44. 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 10.2**, 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.

10.5. Mitigation, Enhancement and Residual Effects

Mitigation by Design

- 10.5.1. The EPUK / IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required.
- 10.5.2. The Proposed Development incorporates the following good design and best practice measures, which have been accounted for in the assessment as far as is possible:
- preparation of a Travel Plan to encourage the use of sustainable transport options, and appointment of a Travel Plan Coordinator to promote the Travel Plan;
 - provision of pedestrian and cycle access to the new development, including a cycleway along Knowsley Lane;
 - provision of secure cycle parking for each dwelling;
 - provision of Bike Vouchers to assist residents in purchase of bicycles or equipment;
 - provision of bus 'taster' tickets to allow residents to trial local bus services;
 - use of all-electric heating to avoid the need for on-site combustion;
 - diversion of bus route to serve the Proposed Development;
 - electric vehicle charging points will be provided in accordance with Knowsley Council's New Residential Development Supplementary Planning Document (2018); and
 - preparation of a framework Travel Plan (Appendix 9.1).

Recommended Mitigation

Construction Impacts

- 10.5.3. Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effects upon nearby sensitive receptors.

- 10.5.4. The Site has been identified as a High Risk site during earthworks and construction and Low Risk for trackout, as set out previously above within **Table 10.11**. Comprehensive guidance has been published by IAQM (2024) 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 outlined within **Appendix 10.6**.
- 10.5.5. The mitigation measures should be written into a Dust Management Plan (DMP). For major sites the DMP may be integrated into a Code of Construction Practice or the Construction Environmental Management Plan and may require monitoring.
- 10.5.6. 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

- 10.5.7. 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 appropriate to propose further mitigation measures for this development.
- 10.5.8. 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).

Table 10.15: Mitigation

Ref	Measure to avoid, reduce or manage any adverse effects and / or to deliver beneficial effects	How measure would be secured		
		By Design	By S.106	By Condition
1	Provision of pedestrian and cycle access to the new development	X		
2	Use of all-electric heating to avoid the need for on-Site combustion		X	
3	Diversion of bus route to serve the Proposed Development		X	
4	Provision of electric vehicle charging points in accordance with relevant local policy	X		
5	Travel Plan			X
6	Dust measures within a Dust Management Plan (potentially part of CEMP)			X

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Enhancements

- 10.5.9. A number of measures which will provide enhancements, either through minimising road traffic emissions or limiting exposure of new residential properties are included within the design of the scheme as outlined above at paragraph 10.5.2. The effect of measures such as the Travel Plan, accessibility to public transport and electric vehicle charging, have not been specifically considered within the results presented in this Chapter, and therefore any benefits these provide in reducing vehicle movements, or encouraging the uptake of low emission vehicles will be an enhancement.

Residual EffectsConstruction

- 10.5.10. The IAQM guidance is clear that, with appropriate mitigation in place, the residual effects will normally be 'not significant'. The mitigation measures as set out above in Section 10.5 and **Appendix 9.6** are based on the IAQM guidance. With these measures in place and effectively implemented the residual effects are judged to be 'not significant'.
- 10.5.11. 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

- 10.5.12. The residual effects will be the same as those identified in Section 10.4. The overall effects of the Proposed Development will be '**not significant**'.

Achieving Compliance with the PM_{2.5} Targets

- 10.5.13. The predicted annual mean PM_{2.5} concentrations are below the AMCT to be met by 2040 at all receptors in 2028 (**Tables 10.13** and **10.14**), with or without the Proposed Development.
- 10.5.14. Defra have set out in their Interim Planning Guidance (Defra, 2024) two questions designed to consider whether a development supports the AMCT and PERT PM_{2.5} targets. The first question is "*How has exposure to PM_{2.5} been considered when selecting the development site?*", whilst the second question is "*What actions and / or mitigations have been considered to reduce PM_{2.5} exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of PM_{2.5} and its precursors?*".
- 10.5.15. As shown in Section 10.4, the Proposed Development is located in an area of good air quality, with concentrations of PM_{2.5} below the AMCT in 2028 (**Table 10.14**). The Proposed Development includes a number of measures which will minimise PM_{2.5} emissions and reduce exposure as outlined above (**Table 10.15**), such as setting back properties from Knowsley Lane by at least 15 m, and having an all-electric energy strategy.
- 10.5.16. It is considered that the Proposed Development complies with the requirements to deliver achievement of the AMCT and PERT by 2040 as appropriate action has been taken to minimise emissions of PM_{2.5} and its precursors as far as is reasonably practicable.

10.6. Cumulative and In-Combination Effects

Demolition and Construction

- 10.6.1. The IAQM guidance is clear that, with appropriate mitigation measures in place, any residual construction dust effects from an individual site will be 'not significant'. The guidance also suggests that cumulative construction dust impacts are only likely where sites are within 250 m of each other. Work would also have to be taking place in areas of both sites that are close to a receptor in order for cumulative effects to occur. There are no other sites within 250 m of the Site, and therefore the cumulative effect of construction activities is 'not significant'.

Completed Development

- 10.6.2. The traffic data used in the 2028 'Without Scheme' and 'With Scheme' scenarios incorporate traffic flows associated with all relevant cumulative schemes which would affect flows on the roads included in this assessment. As such, predictions of future pollutant concentrations presented in this Chapter take account of cumulative effects.
- 10.6.3. Operational impacts, which inherently include the cumulative schemes, have been shown to be '**not significant**' in relation to road traffic emissions.

10.7. Summary

Introduction

- 10.7.1. 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. The assessment has been based on measurements made during 2023.

Baseline Conditions

- 10.7.2. Baseline conditions have been derived from national pollution maps provided by Defra and monitoring undertaken by the local authority. Current and future baseline pollutant concentrations at existing receptors have also been predicted using dispersion modelling. This has identified that air quality is good in the vicinity of the Proposed Development, with predicted concentrations well below the relevant objectives.

Likely Significant Effects

Construction

- 10.7.3. The construction phase operations 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

- 10.7.4. The assessment has demonstrated that pollutant concentrations will be well below the objectives at all existing receptors in 2028, with or without the Proposed Development, and that

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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. The effects are therefore considered to be '**not significant**'.

- 10.7.5. The assessment has also demonstrated that proposed future residential properties within the Proposed Development will experience good air quality.

Mitigation and Enhancement

- 10.7.6. The assessment has concluded that the Proposed Development will be associated with non-significant air quality effects during operation. Additional mitigation is thus not required. Nevertheless, the Proposed Development seeks to include enhancements to pedestrian and cycle access to the Proposed Development, which will encourage sustainable travel and reduce road traffic pollution generated by the Proposed Development. The proposed diversion of existing bus routes to serve the Application Site will also help to support this sustainable shift in transportation. Overall, road traffic emissions do not provide any constraints to the Proposed Development.

Conclusion

- 10.7.7. The overall operational air quality effects of the Proposed Development are judged to be '**not significant**'.
- 10.7.8. Taking into account these conclusions, it is judged that the Proposed Development is consistent with Paragraph 198 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 199, as it will not affect compliance with relevant limit values or national objectives. The Proposed Development is also consistent with Policies CS2 and CS7 of the Knowsley Local Plan Core Strategy (KMBC, 2016), as it has minimised negative impacts on air quality and has been designed to include measures which improve air quality, and Policy ENV1 of the Knowsley Replacement Unitary Development Plan (KMBC, 2006), as the Proposed Development will not significantly harm air quality.
- 10.7.9. **Table 10.16** below provides a summary of effects, mitigation and residual effects.

Table 10.16: Summary of Effects, Mitigation and Residual Effects

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
Construction								
Existing and proposed residential properties	Changes to concentrations of nitrogen dioxide and particulate matter from construction traffic emissions	Temporary Direct	High	Negligible	Local	Not Significant	n/a	Not Significant
Existing and proposed residential properties	Dust Soiling	Temporary Direct	High	Not Applicable	Local	Not Applicable. Pre- mitigation significance not determined	Dust measures listed in Appendix 10.6	Not Significant
Operation								
Existing residential properties	Changes to concentrations of nitrogen dioxide and particulate matter from traffic emissions during operation	Permanent Direct	High	Negligible	Local	Not Significant	Transport measures within Transport Plan	Not Significant
Proposed residential properties	Annual mean nitrogen dioxide, PM ₁₀ and PM _{2.5} concentrations	Permanent Direct	High	Not Applicable	Local	Not Significant	n/a	Not Significant

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Cumulative and In-Combination								
Existing and proposed residential properties	Changes to concentrations of nitrogen dioxide and particulate matter from construction traffic emissions	Temporary Direct	High	Negligible	Local	Not Significant	n/a	Not Significant
Existing and proposed residential properties	Cumulative Dust Soiling from sites within 250 m of each other	Temporary Direct	High	Not Applicable	Local	Not Applicable. Pre-mitigation significance not determined	Dust measures listed in Appendix 10.6	Not Significant
Existing residential properties	Changes to concentrations of nitrogen dioxide and particulate matter from traffic emissions during operation	Permanent Direct	High	Negligible	Local	Not Significant	n/a	Not Significant