

KNOWSLEY BUSINESS PARK

Proposed Warehouse Buildings and Office Space

Air Quality Assessment

Prepared for: Caddick Developments Ltd

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CONTENTS

1.0 INTRODUCTION.....	1
1.1 Scope of Assessment.....	1
2.0 RELEVANT AIR QUALITY LEGISLATION AND GUIDANCE	2
2.1 Legislative Context	2
2.2 Local Air Quality Management.....	3
2.3 Clean Air Strategy.....	3
2.4 General Nuisance Legislation	3
2.5 Planning Policy	3
2.6 Assessment Guidance	5
3.0 ASSESSMENT METHODOLOGY	7
3.1 Construction Phase	7
3.2 Operational Phase – Human Receptors	7
4.0 BASELINE ENVIRONMENT	14
4.1 Baseline Air Quality	14
5.0 CONSTRUCTION PHASE ASSESSMENT.....	18
5.1 Construction Dust Assessment	18
6.0 OPERATIONAL PHASE ASSESSMENT	22
6.1 Human Receptors	22
7.0 MITIGATION MEASURES	25
7.1 Construction Dust	25
7.2 Operational Phase Road Traffic Emissions	27
8.0 CONCLUSIONS.....	28
8.1 Construction Phase	28
8.2 Operational Phase.....	28
APPENDIX A – ADVANCED MODEL INPUT AND VERIFICATION.....	29
Advanced Model Input Summary	29
Traffic Data	29
Model Verification	30

APPENDIX B – MASS BALANCE CALCULATION..... 33

DOCUMENT REFERENCES

TABLES

Table 2-1 Relevant Ambient AQALs.....	2
Table 2-2 Human Health Relevant Exposure.....	3
Table 3-1 Receptor Locations Considered.....	12
Table 3-2 Impact Descriptor Matrix for Receptors.....	13
Table 4-1 Local LAQM NO ₂ Passive Diffusion Tube Monitoring Sites: Details	14
Table 4-2 Local LAQM NO ₂ Passive Diffusion Tube Monitoring Sites: Results	15
Table 4-3 DEFRA Mapped Background Pollutant Concentrations	15
Table 5-1 Potential Dust Emission Magnitude	18
Table 5-2 Sensitivity of the Area	19
Table 5-3 Risk of Dust Impacts	19
Table 6-1 Predicted Annual Mean NO ₂ Concentrations – 2027 Development Opening Year: 100% B2 Scenario	22
Table 6-2 Predicted Annual Mean PM ₁₀ Concentrations – 2027 Development Opening Year: 100% B2 Scenario	23
Table 6-3 Predicted Annual Mean PM _{2.5} Concentrations – 2027 Development Opening Year: 100% B2 Scenario	23
Table 7-1 Construction Dust Mitigation Measures	25
Table A-1 Advanced Modelling Inputs	29
Table A-2 Traffic Data Used Within the Assessment.....	29
Table A-3 Local Monitoring Data Available for Model Verification	31
Table A-4 NO _x /NO ₂ Model Verification (2.599).....	31
Table B-1 Mass Balance Calculation – EFT Inputs	33
Table B-2 Mass Balance Calculation – EFT Outputs	33

FIGURES

Figure 3-1 Modelled Road Network and Receptors.....	10
Figure 3-2 Windrose for Liverpool Meteorological Station (2019)	11
Figure 4-1 Site Setting and Monitoring	17
Figure 5-1 Construction Dust Assessment Buffers	21
Figure A-1 Comparison of Modelled vs. Monitored Road NO _x Contribution (2.599)	32

1.0 INTRODUCTION

SLR Consulting Ltd (SLR) has been commissioned by Caddick Developments Ltd to undertake an Air Quality Assessment (AQA) in support of a planning application for a proposed Business Park, comprising three buildings totalling 150,000sqft (157,000sqft inclusive of office space), with associated infrastructure, landscaping and car parking (the 'Proposed Development'). The Proposed Development is located on land to the east of Ormskirk Road, Knowsley (the 'Site').

The Site is located at the approximate National Grid Reference (NGR): x343800, y396700 and is bounded by:

- the A580 immediately along the northern boundary, beyond which is open scrubland;
- open agricultural land to the immediate east and south;
- Ormskirk Road immediately along the western boundary, beyond which are various commercial and industrial buildings;
- a retained portion of land adjacent to the north-western boundary which contains a gas governor; and
- Tingle Peg Farmhouse which is encompassed within the Site boundary.

Primary vehicular access to the Site will be via Ormskirk Road located along the western boundary.

1.1 Scope of Assessment

Pre-assessment discussion¹ was undertaken with the Environmental Health Officer (EHO) at Knowsley Council (KC – the Council) in order to agree the extent and methodology of the Air Quality Assessment. The following scope of works have been undertaken as part of this Air Quality Assessment as proposed to and agreed with KMBC:

- Baseline Evaluation – Assessment of existing air quality in the local area;
- Construction Phase Assessment – Identification and assessment of potential air quality effects associated with the construction phase of the Proposed Development;
- Operational Phase Assessment – Identification of air quality effects and design constraints associated with the operational phase of the Proposed Development; and
- Mitigation Measures – as required.

¹ Email from SLR Consulting Ltd (20/01/22 & 24/03/22) to KMBC, response received from Helen Bradshawe (24/01/22 & 24/03/22).

2.0 RELEVANT AIR QUALITY LEGISLATION AND GUIDANCE

2.1 Legislative Context

2.1.1 Air Quality Standards

The Air Quality Standards Regulations 2010² (AQSR) transpose both the EU Ambient Air Quality Directive (2008/50/EC)³, and the Fourth Daughter Directive (2004/107/EC)⁴ within UK legislation, in order to align and bring together in one statutory instrument the Government's obligations. The AQSR includes Limit Values, Target Values, Objectives, Critical Levels and Exposure Reduction Targets for the protection of human health and the environment. Limit values are legally binding and are considered to apply everywhere with the exception of the carriageway and central reservation of roads and any location where the public do not have access (e.g. industrial sites). Compliance is regulated at a national level (based upon a series of zones and agglomerations).

In the interim period the UK has formally left the EU, however despite this, EU rules and regulations referred above have subsequently been written into UK law and are thus still of relevance.

2.1.2 Air Quality Strategy

Irrespective of the above, the UK Government and the devolved administrations are required under the Environment Act 1995 to produce a national air quality strategy to improve air quality. The latest Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland was published in 2007⁵. The AQS provides the over-arching strategic framework for air quality management in the UK and contains national air quality standards and objectives established by the UK Government and Devolved Administrations for the protection of public health and the environment. There is no legal requirement to meet these objectives except where they mirror an equivalent legally binding Limit Value as prescribed within EU legislation, however compliance is regulated at a local level by local planning authorities.

The AQS objectives apply at locations outside buildings or other natural or man-made structures above or below ground, where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period – herein referred to as 'relevant exposure'. Table 2-2 provides an indication of those locations.

The ambient air quality standards of relevance to human receptors in this assessment (collectively termed Air Quality Assessment Levels (AQALs) throughout this report) are provided in Table 2-1.

Table 2-1
Relevant Ambient AQALs

Pollutant	Standard (µg/m ³)	Measured As
Nitrogen dioxide (NO ₂)	40	Annual Mean
	200	1-hour Mean (18 permitted exceedences)
Particulate matter with an aerodynamic diameter of less than 10µm (PM ₁₀)	40	Annual Mean
	50	24-hour mean (35 permitted exceedences)
Particulate matter with an aerodynamic diameter of less than 2.5µm (PM _{2.5})	25	Annual Mean

² The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.

³ Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

⁴ Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004.

⁵ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA. July 2007.

Table 2-2
Human Health Relevant Exposure

AQAL Averaging Period	Relevant Locations	AQALs should apply at	AQALs should not apply at
Annual Mean	Where individuals are exposed for a cumulative period of 6-months in a year	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour mean	Where individuals may be exposed for eight hours or more in a day	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour mean	Where individuals might reasonably be expected to spend one hour or longer	As above together with kerbside sites of regular access, car parks, bus stations etc.	Kerbside sites where public would not be expected to have regular access

2.2 Local Air Quality Management

As reinforced within the AQS, Part IV of the Environment Act 1995 induces a statutory duty for local authorities to undergo a process of Local Air Quality Management (LAQM). This requires local authorities to Review and Assess air quality within their boundaries to determinedly the likeliness of compliance, regularly and systematically.

Where any of the prescribed AQS objectives are not likely to be achieved, the authority must designate an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to prepare an Air Quality Action Plan (AQAP), which details measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the objective. AQMAs can give rise to potential constraints to development, or at least a higher degree of scrutiny to air quality assessment work. Local authorities therefore have formal powers to control air quality through a combination of LAQM and through application of wider planning policies.

2.3 Clean Air Strategy

The Clean Air Strategy (CAS)⁶, published in 2019, sets out the Government's proposals aimed at delivering cleaner air in England, and also indicates how devolved administrations intend to make emissions reductions. It sets out the comprehensive action that is required from across all parts of government and society to deliver clean air.

2.4 General Nuisance Legislation

Part III of the Environmental Protection Act (EPA) 1990 (as amended) contains the main legislation on Statutory Nuisance and allows local authorities and individuals to take action to prevent a statutory nuisance. Section 79 of the EPA defines, amongst other things, smoke, fumes, dust and smells emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance, as a potential Statutory Nuisance.

Fractions of dust greater than 10µm (i.e. greater than PM₁₀) in diameter typically relate to nuisance effects as opposed to potential health effects and therefore are not covered within the UK AQS. In legislation there are currently no numerical limits in terms of what level of dust deposition constitutes a nuisance.

2.5 Planning Policy

The following planning policies have been taken into account within this assessment.

⁶ The Clean Air Strategy, DEFRA. January 2019.

2.5.1 National Policy

The 2021 update to the National Planning Policy Framework⁷ (NPPF) sets out planning policy for England. The NPPF states that the planning system should contribute to and enhance the natural and local environment, by preventing new development from contributing or being adversely affected by unacceptable concentrations of air pollution and development should, wherever possible, help to improve local environmental conditions such as air quality.

In specific relation to air quality policy, the document states:

“Chapter 15 - Conserving and Enhancing the Natural Environment

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.”

The NPPF is accompanied by web based supporting Planning Practice Guidance (PPG) which includes guiding principles on how planning can take account of the impacts of new development on air quality. In regard to air quality, the PPG states:

“Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU 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.”

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

The PPG sets out the information that may be required within the context of a supporting air quality assessment, stating that *“assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality [...] Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact”*.

2.5.2 Local Policy

The Knowsley Local Plan Core Strategy⁸ was adopted in January 2016 and aims to guide the development in the area until 2028. Within the Knowsley Local Plan Core Strategy, the following policy relates to air quality:

“Policy CS2: Development Principles

New development in Knowsley and the preparation of subsequent stages of the Local Plan will be expected to support the following development principles:

[...]

⁷ National Planning Policy Framework (2021). Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>.

⁸ Knowsley Metropolitan Borough Council, Knowsley Local Plan Core Strategy, January 2016.

Principle 4: Recognise environmental limits, protect and enhance environmental assets, enhance local character and promote quality of place by:

[...]

e) Mitigating potential negative impacts of traffic growth and road traffic on highway safety, air quality, noise and health;

[...]

j) Minimising negative impact upon flood risk, air quality, water quality, land quality, soil quality, and noise or vibration levels and ensuring any negative impacts are appropriately mitigated.

[...]”

“Policy CS7: Transport Networks

[...]

Location, Design and Management of New Development

New development will be required to be:

[...]

e) inclusive of measures that will mitigate carbon emissions and improve air quality where appropriate.

[...]”

2.5.3 Regional Policy

KMBC has adopted the *Liverpool City Region Spatial Planning Statement of Common Ground (October 2019)*, which was jointly prepared in response to the NPPF (February 2019) requirement for strategic policy-making authorities to document agreement and cooperation on cross boundary strategic planning matters. Within this document, the following policy relates to air quality:

“19.

The LCR [Liverpool City Region] authorities and other partners will work together to address cross-boundary air quality issues and to deliver mitigation and measures to deliver air quality improvements across the City Region.”

2.6 Assessment Guidance

The AQA has been carried out in accordance with the following principles contained within the guidance documents below.

2.6.1 DEFRA’s ‘LAQM.TG(16)’

The Department for Environment, Food and Rural Affairs (DEFRA’s) Local Air Quality Management Technical Guidance (LAQM.TG(16))⁹ was published for use by LAs in their LAQM review and assessment work. The document provides key guidance in aspects of air quality assessment, including screening, model verification, use of monitoring data, and use of background data that are applicable to all AQAs. Methodologies prescribed within LAQM.TG(16) have been employed throughout the assessment, in order to provide consistency with the Council’s own work on air quality.

⁹ Local Air Quality Management Technical Guidance 16, Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland. April 2021.

2.6.2 Environmental Protection UK and Institute of Air Quality Management Guidance

Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have together published guidance¹⁰ (termed the 'EPUK/IAQM guidance' herein) to help ensure that air quality is properly accounted for in the development control process. It clarifies when an AQA should be undertaken, what it should contain, and how impacts should be described and assessed including guidelines for assessing the significance of impacts.

The guidance also states that best-practice design and operational measures should be recommended and applied to all developments that require an AQA, to reduce emissions and human exposure to poor air quality. Additional measures are also suggested to off-set emissions, depending on the nature and scale of the development proposals.

2.6.3 Design Manual for Roads and Bridges

The Design Manual for Roads and Bridges (DMRB) LA 105¹¹ states receptors, including ecological designations, within 200m of an 'affected road' source, require further assessment of potential impacts.

2.6.4 Construction and Demolition Dust Guidance

Guidance on the assessment of dust from demolition and construction has been published by the IAQM¹². The guidance provides a series of matrices to determine the risk magnitude of potential dust sources associated with construction activities in order to identify appropriate mitigation measures that are defined within further IAQM guidance.

¹⁰ Environmental Protection UK and Institute of Air Quality Management, 'Land-Use Planning and Development Control: Planning for Air Quality', v1.2 2017.

¹¹ DMRB, LA 105-Air Quality, Highways England, 2019.

¹² Institute of Air Quality Management (IAQM), Guidance on the assessment dust from demolition and construction (2016).

3.0 ASSESSMENT METHODOLOGY

3.1 Construction Phase

A construction dust assessment has been undertaken with reference to IAQM guidance. The assessment of risk is determined by considering the risk of dust effects arising from four activities in the absence of mitigation:

- Demolition (demolition is not being undertaken as part of this development);
- earthworks;
- construction; and
- track-out.

The assessment methodology considers three separate dust impacts with account being taken of the sensitivity of the area that may experience these effects:

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

The first stage of the assessment involves a screening to determine if there are sensitive receptors within threshold distances of the site activities associated with the construction phase of the scheme. A detailed assessment is required where a:

- human receptor is located within 350m of the Site, and/or within 50m of routes used by construction vehicles, up to 500m from the site entrance(s); and/or
- ecological receptor is located within 50m of the Site, and/or within 50m of routes used by construction vehicles, up to 500m from the site entrance(s).

The dust emission class (or magnitude) for each activity is determined on the basis of the guidance, indicative thresholds and professional judgement. The risk of dust effects arising is based upon the relationship between the dust emission magnitude and the sensitivity of the area. The risk of impact is then used to determine the appropriate mitigation requirements, whereby through effective application, residual effects are considered to be 'not significant'.

Given the short-term nature of the construction phase and the comparatively low volume of vehicle movements that will likely arise (when compared to the operational phase, for which a full assessment has been undertaken), it is unlikely that significant air quality effects from development related road traffic emissions during the construction phase will arise. Such potential effects have therefore been scoped out from requiring detailed assessment based on their assumed insignificant effect following the EPUK/IAQM guidance. Notwithstanding this, a qualitative assessment will provide commentary on this phase of the development.

3.2 Operational Phase – Human Receptors

3.2.1 Screening Criteria

The EPUK/IAQM guidance provides a series of indicative screening criteria where, if exceeded, should require further assessment to consider corresponding potential impacts on air quality. If the Proposed Development is found not to exceed any of the relevant indicative criteria presented, then a detailed impact assessment is

consequently not required and effects are considered to be 'insignificant'.

The indicative screening criteria relevant for this assessment is as follows (specific to a development located outside of an AQMA):

- a change of Light-Duty Vehicle (LDV) flows of more than 500 annual average daily traffic (AADT); and/or
- a change of Heavy-Duty Vehicle (HDV) flows of more than 100 AADT.

3.2.2 Modelled Scenarios

In order to appropriately assess road traffic impacts associated with the operation of the Proposed Development based upon those links which are predicted to witness developmental traffic in excess of the screening criteria outline within Section 3.2.1, detailed dispersion modelling has been undertaken using the Cambridge Environmental Research Consultants (CERC) ADMS-Roads v5.0.0.1 dispersion model, focussing on concentrations of NO₂, PM₁₀ and PM_{2.5} for the following scenarios:

- 2019 Base Case (2019 BC) – Without development base flows for the year (2019);
- 2027 Do Minimum (2027 DM) – Without development flows, factors for the proposed year of opening (2027); and
- 2027 Do Something (2027 DS) – 'Do Minimum' flows, plus all trips associated with the Proposed Development flows for the proposed year of opening (2027).

For the above future year scenarios (2027), concurrent emission factors and background pollutant concentrations have been used. This year has also been utilised within the transport and noise assessments that support the planning application.

Details of model inputs are discussed in turn, below. Advanced inputs are discussed in Appendix A.

3.2.3 Traffic Inputs

The ADMS-Roads assessment incorporates numbers of road traffic vehicles, vehicle speeds on the local roads and the composition of the traffic fleet.

Traffic data was provided by Prime Transport Planning – the appointed transport consultant. This data has principally informed the spatial extent and inclusion of initial road links within the assessment. Supplementary traffic data was sourced from the Department for Transport (DfT) traffic counts for model verification purposes. Development-related traffic flows have been provided as 2027, the assumed development opening year.

Traffic speeds were modelled at the relevant posted speed limit for each road. However, where appropriate, the speeds have been reduced to simulate queues at junctions, traffic lights and other locations where queues or slower traffic are known to be an issue in accordance with LAQM.TG(16). Traffic speeds have been assumed to be consistent across all the modelled scenarios.

The Emissions Factors Toolkit (EFT) version 11.0 developed by DEFRA¹³ has been used to determine vehicle emission factors for input into the ADMS-Roads dispersion model.

Details of the traffic flows used in this assessment are provided in Appendix A, whilst the modelled roads in relation to the Site are presented in Figure 3-1.

A number of vehicular trip generation scenarios have been provided by Prime Transport Planning based upon different use-classes comprising the following:

¹³ DEFRA, EFT v11.0 (2021). <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>.

- 70%/30% B8/B2 use-class;
- 100% B2 use-class; and
- 100% B8 use-class.

An analysis of the vehicular trip generation associated with the above use classes has been undertaken in consideration of the screening criteria outline within Section 3.2.1, and to determine which scenario results in the greatest potential trip-generation and associated incremental vehicle emissions.

The traffic data as provided by Prime Transport Planning shows:

- the 70%/30% B8/B2 scenario is predicted to generate total vehicular trips below the EPUK/IAQM 'indicative criterion for assessment' for roads outside of an AQMA, and therefore this scenario was 'screened out', with effects on air quality associated with this scenario considered to be 'insignificant'; and
- both the 100% B2 use-class and 100% B8 use-class scenarios predict vehicular trip generation above the EPUK/IAQM 'indicative criterion for assessment' and, as such, warrant further assessment.

A mass balance calculation has been undertaken to assess which of these two scenarios present a greater incremental road traffic emission contribution, based upon the proportions of LDVs and HDVs in each. The outcome of this assessment shows the 100% B2 use-class scenario would present a greater emission contribution, given the overall greater volumes of traffic and predicted LDV:HDV mix. As such, this scenario has been taken forward in the impact assessment to provide a robust and worst-case assessment. Details of the mass balance calculation are provided in Appendix B.

In relation to the 100% B2 scenario, trip generation and distribution data as provided by Prime Transport Planning indicates development flows are only above the EPUK/IAQM 'indicative criterion for assessment' on the Site access road. Other links for which development flows were provided fall below the EPUK/IAQM 'indicative criterion for assessment' and as such, the assessment focusses primarily on the Site access road, only. Other links have been 'screened out' in accordance with EPUK/IAQM guidance with air quality effects considered to be 'insignificant' in accordance with the EPUK/IAQM guidance.

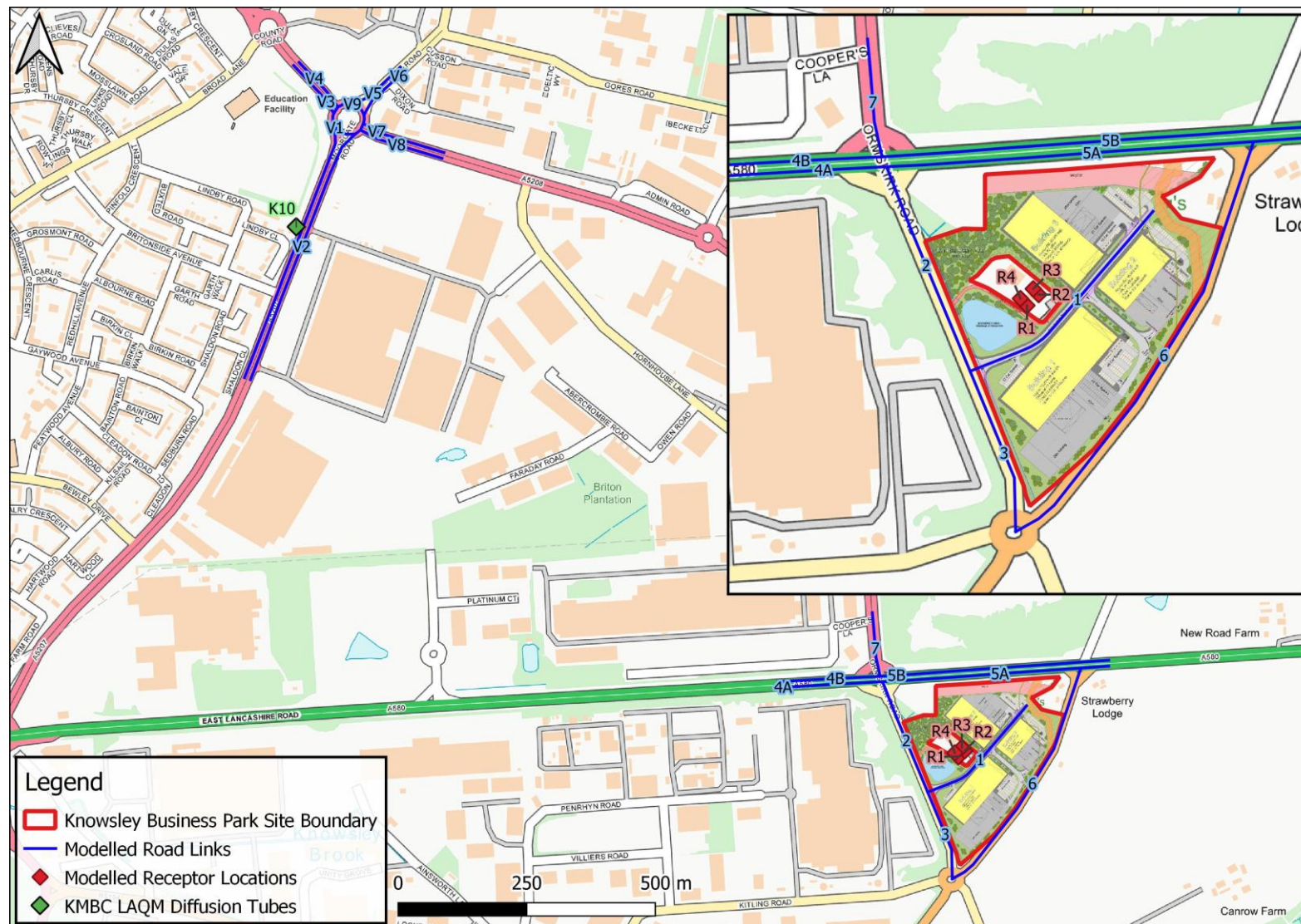


Figure 3-1
Modelled Road Network and Receptors

3.2.4 Meteorological Data

To calculate pollutant concentrations at identified sensitive receptor locations the dispersion model uses sequential hourly meteorological data, including wind direction, wind speed, temperature, cloud cover and stability, which exert significant influence over atmospheric dispersion.

The dispersion modelling has been undertaken using 2019 data from the Liverpool meteorological station, located approximately 14.3km to the south of the Site, as agreed through consultation with the KC EHO.

LAQM.TG(16) recommends that meteorological data should have a percentage of usable hours greater than 85%. 2019 meteorological data from Liverpool meteorological station includes 8,760 lines of usable hourly data for the year, i.e. 100% usable data. This is therefore suitable for the dispersion modelling exercise.

A windrose is presented in Figure 3-2.

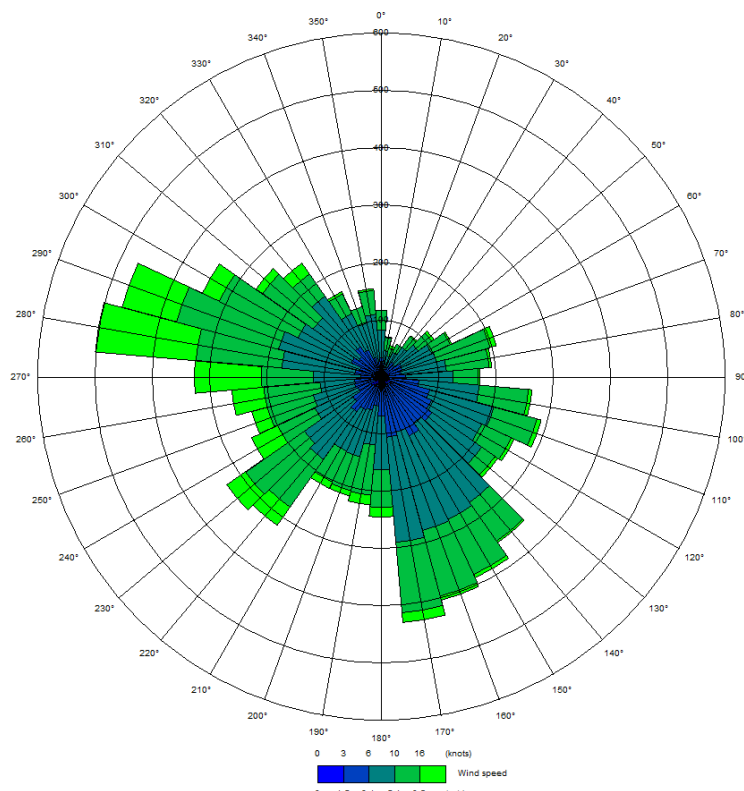


Figure 3-2
Windrose for Liverpool Meteorological Station (2019)

3.2.5 Background Concentrations

Annual mean background concentrations used for the purposes of the assessment have been obtained from the DEFRA supplied background maps (2018 reference year)¹⁴, based on the 1km grid squares which cover the modelled area. Further detail on these datasets can be found in Section 4.1.

To avoid double counting of potential source contributions already contained within the ADMS-Roads dispersion model, the 'Primary A Road in' sector was removed from each grid square, where relevant, as recommended in the DEFRA Background Maps User Guide¹⁵.

¹⁴ Defra Background Maps (2018-Reference) <http://uk-air.defra.gov.uk/data/laqm-background-home>.

¹⁵ Defra Background Concentration Maps User Guide. August 2020.

As the relationship between NO₂ and oxides of nitrogen (NO_x) is not linear, the NO₂ Adjustment for NO_x Sector Removal Tool¹⁶ has been used – in accordance with LAQM.TG(16). No adjustment for background concentration variability with height has been made.

3.2.6 Sensitive Human Receptors

Human receptors considered in the assessment of emissions from road traffic are shown Table 3-1, whilst their locations are illustrated in Figure 3-1.

One sensitive human receptor is located within 200m of the Site access road (see Section 2.6.3): Tingle Peg Farmhouse is encompassed within the redline boundary of the Proposed Development. Given that Tingle Peg Farmhouse is encompassed within the Proposed Development, four discrete receptor points were used to ensure the respective AQALs aren't exceeded at any location on the façade of the dwelling.

Receptor points were considered in relation to exposure at breathing height relative to the adjacent modelled road, and were considered in relation to exposure at ground level, i.e. 1.5m height. Receptor locations represent relevant exposure – in accordance with LAQM.TG(16) presented in Table 2-2.

Table 3-1
Receptor Locations Considered

Receptor		X	Y	Height (m)
R1_1	Southern corner of Tingle Peg Farmhouse	441845	434081	1.5
R1_2	Eastern corner of Tingle Peg Farmhouse	443097	432775	1.5
R1_3	Northern corner of Tingle Peg Farmhouse	442950	431713	1.5
R1_4	Western corner of Tingle Peg Farmhouse	443571	431694	1.5

3.2.7 Model Outputs

The background pollutant values discussed in Section 4.1 have been used in conjunction with the concentrations predicted by the ADMS-Roads model to calculate predicted total annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} for each respective scenario.

For the prediction of annual mean NO₂ concentrations for all modelled scenarios at receptor locations, the road NO_x contributions (adjusted as per Appendix A) have been converted to total NO₂ following the methodology in LAQM.TG(16) using the latest version of DEFRA's NO_x to NO₂ conversion tool (v8.1)¹⁷. The modelled NO₂ road contribution was then added to the appropriate NO₂ background concentration value to obtain an overall total annual mean NO₂ concentration.

For the prediction of short-term NO₂ impacts, LAQM.TG(16) advises that it is valid to assume that exceedences of the 1-hour mean NO₂ AQAL are unlikely to occur where the annual mean NO₂ concentration is <60µg/m³. This approach has thus been adopted for the purposes of this assessment, at relevant receptor locations with an applicable exposure period.

For the prediction of short-term PM₁₀, LAQM.TG(16) provides an empirical relationship between the annual mean and the number of exceedences of the 24-hour mean PM₁₀ AQAL that can be calculated as follows:

$$\text{No. 24-hour mean exceedences} = -18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$$

¹⁶ Defra NO₂ Adjustment for NO_x Sector Removal Tool (v8.0).

¹⁷ Defra NO_x to NO₂ Calculator v8.1 (2020), available at <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>.

This relationship has thus been adopted to determine whether exceedences of the short-term PM₁₀ AQAL are likely in this assessment.

Verification of the ADMS-Roads model has been undertaken, as per Appendix A. All results presented in the assessment are those calculated following the process of model verification.

3.2.8 Assessing Significance

Guidance for determining the significance of a development's impact on local air quality is provided by EPUK/IAQM.

When describing the developmental impact at a specific receptor, the resultant total concentration as well as the magnitude of change in relation to respective AQALs are both considered – using the approach detailed in Table 3-2.

Table 3-2
Impact Descriptor Matrix for Receptors

Long Term Average Concentration at Receptor in Assessment Year	Change in Concentration relative to AQAL			
	1% ^(A)	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial
Note: ^(A) Changes <0.5% will be described as 'Negligible'.				

Following derivation of impacts at all receptor locations assessed, the overall significance of the developmental 'effect' is determined based upon consideration, as necessary, of the following factors:

- the existing and future air quality in the absence of the Proposed Development;
- the extent of current and future population exposure to the impacts;
- the worst-case assumptions adopted when undertaking the prediction of impacts; and
- the extent to which the Proposed Development has adopted best practice to eliminate and minimise emissions.

4.0 BASELINE ENVIRONMENT

4.1 Baseline Air Quality

Monitoring data collected prior to the COVID-19 pandemic (i.e. pre-2020) has been used to characterise the baseline environment, as pollutant concentrations monitored during 2020 and 2021 are expected to be atypical, and not representative of the local environment and have therefore not been considered. This position is supported by DEFRA and IAQM¹⁸.

4.1.1 LAQM Review and Assessment

KMBC, in fulfilment of statutory requirements, has conducted an on-going exercise to review and assess air quality within their administrative area (Review and Assessment).

This process has indicated that the concentrations of pollutants are below the relevant AQALs across their administrative area. As such, KMBC does not have any current AQMAs.

4.1.2 Review of Air Quality Monitoring

Automatic Air Quality Monitoring

Automatic air quality monitoring is undertaken at three locations within the administrative boundary of KMBC. The closest automatic monitor to the Site is the Kirkby (new) monitor, at approximately 3.1km to the north-west of the Site (NGR: x341414, y398991). Given the separation distance between the Site and this automatic monitor, similar pollutant concentrations are not anticipated. As such, no further consideration has been given to this automatic monitor within this assessment.

The closest Automatic Urban and Rural Network (AURN) automatic monitor to the Site is the 'St Helens Linkway' (UKA00627) monitor, located approximately 7.1km to the east-south-east of the Site. Due to the separation distance between this monitor and the Site, comparable pollutant concentrations are not anticipated, and data from this monitor has not been considered within this assessment.

Passive Diffusion Tube Monitoring

Passive NO₂ diffusion tube monitoring is currently undertaken by KMBC within the development locale, at numerous locations, in fulfilment of their statutory LAQM obligations.

The details and results of the monitoring locations of relevance to the Site are presented in Table 4-1 and Table 4-2 respectively, whilst their locations are illustrated in Figure 4-1. All monitoring data presented has been ratified.

Table 4-1
Local LAQM NO₂ Passive Diffusion Tube Monitoring Sites: Details

Site ID	Site Type	NGR (m)		Height (m)	Within AQMA	Distance and Direction to Site (m)
		X	Y			
K10	Roadside ^(A)	342421	397755	2.4	No	1,530 NW

Note:

(A) Roadside site defined by LAQM.TG(16) as: "a site sampling typically within one to five metres of the kerb of a busy road".

¹⁸ Defra and the Greater London Authority, COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021. April 2021. This guidance considers the effects of the COVID-19 pandemic and implications on reductions to traffic flows and the associated reduction in monitored air pollutant concentrations in terms of compliance with the AQALs.

Table 4-2
Local LAQM NO₂ Passive Diffusion Tube Monitoring Sites: Results

Site ID	2019 Data Capture %	Annual Mean NO ₂ Concentration (µg/m ³)				
		2015	2016	2017	2018	2019
K10	100	-	-	-	-	29.4

As shown in Table 4-2 above, diffusion tube K10 was commissioned in 2019 and therefore trends in annual mean NO₂ concentrations are not discernible. In 2019, K10 recorded an annual mean NO₂ concentration of 29.4µg/m³ (i.e. 73.5% of the AQAL), and therefore 'well-below' the AQAL of 40µg/m³.

K10 is located adjacent to the Deacon Business Park and the various business parks further to the north. Concentrations recorded at K10 are therefore considered to capture the vehicular emissions from a fleet comparable to that generated by the Proposed Development.

The empirical relationship given in LAQM.TG(16) states that exceedences of the 1-hour mean NO₂ AQAL is unlikely to occur where annual mean concentrations are <60µg/m³. This indicates that an exceedence of the 1-hour mean AQAL is unlikely to have occurred at K10 in 2019.

4.1.3 DEFRA Mapped Background Concentrations

DEFRA maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution which is routinely used to support LAQM requirements and air quality assessments. The data sets include annual average concentration estimates for NO_x, NO₂, PM₁₀ and PM_{2.5} using a base year of 2018 (the year in which comparisons between modelled and monitoring are made).

Annual mean background concentrations of NO_x, NO₂, PM₁₀ and PM_{2.5} have been obtained from the DEFRA published background maps (2018 base year), based on the 1km grid squares which cover the modelled domain. The DEFRA mapped background concentrations for base year of 2019 and the year of the corresponding traffic data inputs relevant to the completed development opening year (2027) are presented in Table 4-3.

All of the mapped background concentrations presented are well below the respective annual mean AQALs.

Table 4-3
DEFRA Mapped Background Pollutant Concentrations

Grid Square (X,Y) (m)	Year	Annual Mean Concentration (µg/m ³)			
		NO _x	NO ₂	PM ₁₀	PM _{2.5}
343500, 396500	2019	23.4	16.7	12.7	8.3
	2027	17.3	12.8	11.9	7.7
AQAL		-	40	40	25

4.1.4 DEFRA's Pollutant Climate Mapping Model

DEFRA's Pollutant Climate Mapping (PCM) model is a collection of models designed to fulfil part of the UK's AQSR requirements to report on the concentrations of particular pollutions in the atmosphere. The latest PCM model data, released by DEFRA in 2020, has modelled concentrations incorporating DEFRA's 2018 action plan (2018 reference year), up until 2030 taking into account the anticipated uptake of cleaner vehicles, along with other policy interventions.

The nearest PCM link to the Site (Census ID 802017693) is located along Cooper's Lane, opposite the northern Site boundary. The 2019 roadside annual mean NO₂ concentration reported in relation to this PCM link is 19.1µg/m³,

and $12.7\mu\text{g}/\text{m}^3$ in 2027 (the predicted opening year) – both ‘well below’ the AQAL ($40\mu\text{g}/\text{m}^3$). Concentrations reported by the PCM assume roadside locations, typically at a 4m separation distance.

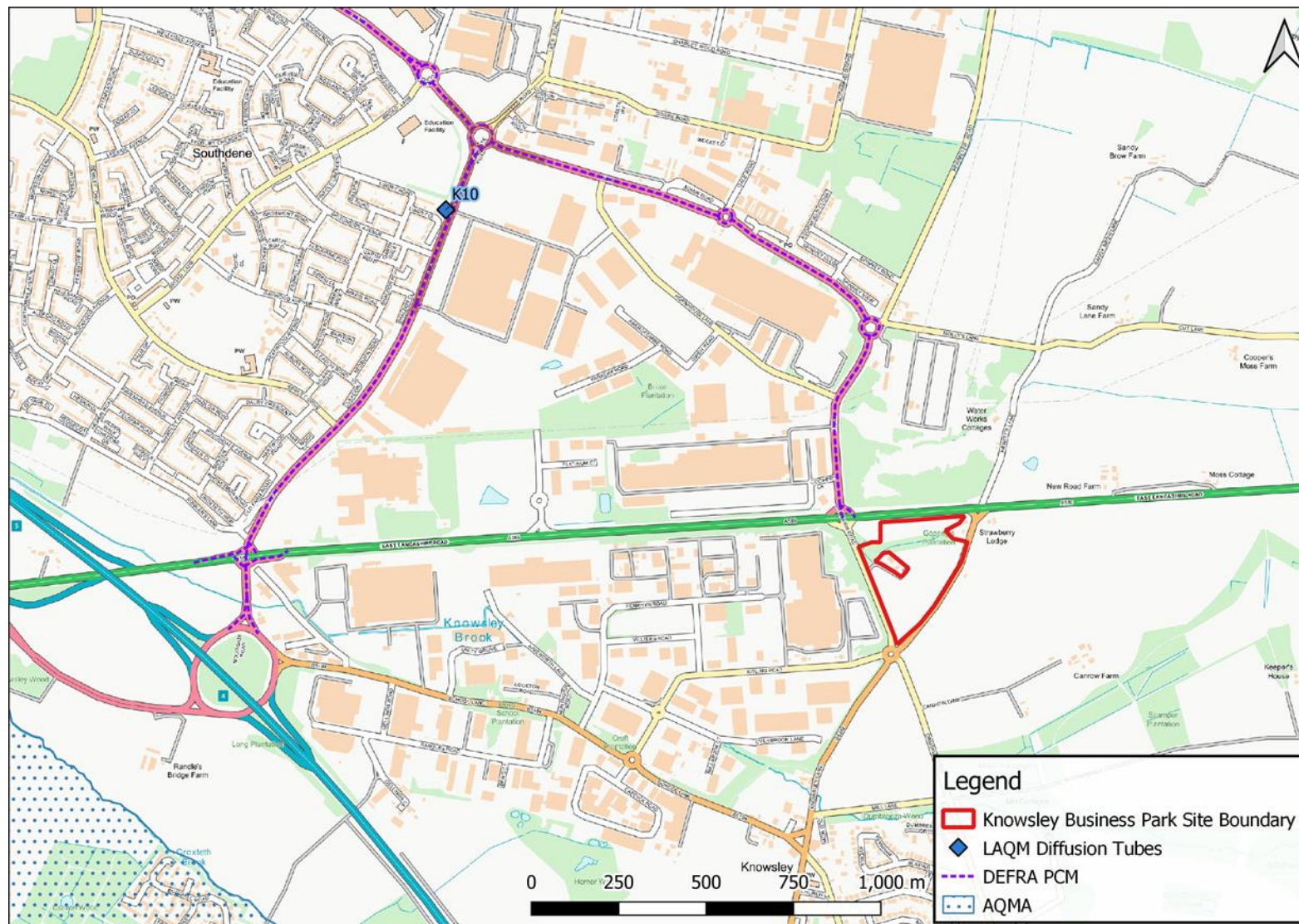


Figure 4-1
Site Setting and Monitoring

5.0 CONSTRUCTION PHASE ASSESSMENT

This section presents the potential air quality impacts and effects associated with the construction of the Proposed Development.

5.1 Construction Dust Assessment

Where figures relating to area and volume of the Site, approximate number of construction vehicles or distances to receptors are given, these relate to thresholds as defined in the IAQM guidance to guide the assessor to define the dust emissions magnitude and sensitivity of the area.

5.1.1 Assessment Screening

There are 'human receptors' within 350m of the Site but no designated habitat sites within 50m of the Site boundary or up to 500m of the Site entrance(s) / 50m of the roads anticipated to witness construction traffic movements. Therefore, an assessment of construction dust on human receptors, only, is required.

5.1.2 Potential Dust Emissions Magnitude

Demolition

The Site is currently vacant agricultural land with no existing buildings or structures that require demolition. As such, impacts associated with demolition have been screened out of this assessment.

Earthworks

The total site area is much greater than >10,000m². In preparation of the Site, it is assumed that >10 heavy earth moving vehicles could be active at any one time. According to the Magic website¹⁹, the Site is characterised by naturally wet and sandy soil types, which are considered to have a low dust potential.

Given the size of the site, the dust emission magnitude for earthworks is therefore initially considered to be 'large'.

Construction

The total building volume associated with the Proposed Development is predicted to be >100,000m³. However, given the nature of the scheme, construction materials are likely to consist of a steel framework and metal cladding, situated upon a concrete slab. In addition, it is considered that the duration of the build will be relatively short.

As such, the dust emission magnitude for construction is therefore initially considered to be 'medium'.

Trackout

Construction vehicles are expected to access the Site via a newly constructed entrance off Ormskirk Road. No details are available at the time of assessment on the number of additional HDV movements associated with construction works. However, given the scale and nature of works required, it is considered that between 10-50 HDV outward movements could occur in any worst-case day. In addition, the unpaved road length is likely to be <100m at any one given time as road surfaces are likely to be constructed early on in the scheme.

The dust emission magnitude for trackout is therefore initially considered to be 'medium'.

Table 5-1
Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	N/A

¹⁹ <https://magic.defra.gov.uk/>, accessed March 2022.

Activity	Dust Emission Magnitude
Earthworks	Large
Construction	Medium
Trackout	Medium

5.1.3 Sensitivity of the Area

Dust Soiling Impacts

Overall, there are anticipated to be 1-10 residential properties (highly sensitive receptors) within 20m of the Site, including Tingle Peg Farmhouse located within the Site boundary. In addition, there are calculated to be 1-10 medium sensitivity receptors (workplace car parks) within 50m of sections of Site accesses within 500m (commensurate of a large site²⁰) of the Site entrance.

The sensitivity of the area with respect to dust soiling effects on people and property in relation to earthworks and construction is therefore considered to be 'medium'. However, in recognition of Tingle Peg Farm which is located within the Site boundary and will experience impacts from earthworks and construction in every direction, the dust soiling effects on people and property in relation to earthworks and construction has been elevated to 'high'. The sensitivity of the area in relation to trackout is considered to be 'low'.

Human Health Impacts

The maximum 2019 mapped background PM₁₀ concentration (2018 base year) for the 1km² grid square centred on the Site is estimated to be 12.7µg/m³ (i.e. falls into the <24µg/m³ class). As discussed in Section 4.1, no local background PM₁₀ monitoring exists within the development locale.

Given the above information regarding the number of residential receptors within 50m of the Site and within 500m from the Site entrance on access roads, the sensitivity of the area with respect to human health impacts in relation to earthworks, construction and trackout is therefore considered to be 'low'.

Table 5-2
Sensitivity of the Area

Potential Impact	Sensitivity of Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling Impacts	High	High	Low
Human Health Impacts	Low	Low	Low

5.1.4 Risk of Impacts (Unmitigated)

The outcome of the assessment of the potential 'magnitude of dust emissions', and the 'sensitivity of the area' are combined in Table 5-3 below to determine the risk of impact which is used to inform the selection of appropriate mitigation.

Table 5-3
Risk of Dust Impacts

Potential Impact	Earthworks	Construction	Trackout
Dust Soiling Impacts	High Risk	Medium Risk	Low Risk

²⁰ As per the IAQM's 'Guidance on the Assessment of Dust from Demolition and Construction', without site-specific mitigation, trackout may occur along the public highway up to 500m from large sites, 200m from medium sites and 50m from small sites (determined by the calculated trackout dust emission magnitude), as measured from the site exit.

Potential Impact	Earthworks	Construction	Trackout
Human Health Impacts	Low Risk	Low Risk	Low Risk

5.1.5 Mitigation

Following the construction dust assessment, the Site is found to be at worst 'High Risk' in relation to dust soiling effects on people and property and 'Low Risk' in relation to human health impacts (Table 5-3). However, potential dust effects during the construction phase are considered to be temporary in nature and may only arise at particular times (i.e. certain activities and/or meteorological conditions).

Nonetheless, commensurate with the above designation of dust risk, best practice mitigation measures, as identified by IAQM guidance are required to ensure that any potential impacts arising from the construction phase of the Proposed Development are reduced and, where possible, completely removed. In accordance with IAQM guidance, providing effective mitigation measures are implemented, such as those outlined in Section 7.0, construction dust effects are considered to be 'not significant'.



Figure 5-1
Construction Dust Assessment Buffers

6.0 OPERATIONAL PHASE ASSESSMENT

This section presents the potential air quality impacts and effects associated with the operation of the Proposed Development. As discussed in Section 3.2.3, as a precautionary approach the operational phase assessment has been based upon trip generation associated with the 100% B2 use-class scenario as that which results in the greatest incremental emission rate from development trips.

6.1 Human Receptors

6.1.1 NO₂ Modelling Results

Table 6-1 presents the annual mean NO₂ concentrations predicted at all assessed receptor locations for the 2019 BC, 2027 DM and 2027 DS scenarios.

Table 6-1
Predicted Annual Mean NO₂ Concentrations – 2027 Development Opening Year: 100% B2 Scenario

Receptor	Predicted Annual Mean NO ₂ Concentration (µg/m ³)			% Change of AQAL	% of 2027 DS Relative to AQAL	EPUK/IAQM Impact Descriptor
	2019 BC	2027 DM	2027 DS			
R1_1	18.3	13.4	13.5	+0.3	33.8	Negligible
R1_2	18.1	13.4	13.5	+0.3	33.8	Negligible
R1_3	18.2	13.4	13.5	+0.2	33.8	Negligible
R1_4	18.4	13.5	13.6	+0.2	34.0	Negligible

The maximum predicted annual mean NO₂ concentration at all considered façades of Tingle Peg Farmhouse during the 2019 BC scenario was at receptor R1_4 with a predicted concentration of 18.4µg/m³; representing 46% of the AQAL.

The maximum predicted annual mean NO₂ concentration at all façades of Tingle Peg Farmhouse with the development in place (2027 DS) was at R1_4 with a predicted concentration of 13.6µg/m³, representing 34.0% of the AQAL. The change in the annual mean NO₂ concentration at this location, due to the Proposed Development (i.e. 2027 DM vs. 2027 DS) relative to the AQAL was +0.2%.

The greatest change in annual mean NO₂ concentration, due to the Proposed Development relative to the AQAL was at R1_1 and R1_2 with a change of +0.3% (i.e. +0.12µg/m³).

In accordance with the EPUK/IAQM guidance, the impact of the development on annual mean NO₂ concentrations at all of the assessed receptor locations is considered to be 'negligible'. Overall, unmitigated effects associated with annual mean NO₂ concentrations resultant of the Proposed Development are considered to be 'not significant'.

The empirical relationship given in LAQM.TG(16) states that exceedences of the 1-hour mean NO₂ AQAL are unlikely to occur where annual mean concentrations are <60µg/m³. Annual mean NO₂ concentrations predicted at all receptor locations are below this limit in the 2027 DS (100% B2) scenario. Therefore, it is unlikely that an exceedance of the 1-hour mean AQAL will occur. Effects associated with likely 1-hour mean NO₂ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

6.1.2 PM₁₀ Modelling Results

Table 6-2 presents the annual mean PM₁₀ concentrations predicted at all assessed receptor locations of relevant exposure for the 2019 BC, 2027 DM and 2027 DS scenarios.

Table 6-2
Predicted Annual Mean PM₁₀ Concentrations – 2027 Development Opening Year: 100% B2 Scenario

Receptor	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)			% Change of AQAL	% of 2027 DS Relative to AQAL	EPUK/IAQM Impact Descriptor
	2019 BC	2027 DM	2027 DS			
R1_1	13.1	12.3	12.4	+0.1	31.0	Negligible
R1_2	13.1	12.3	12.4	+0.1	31.0	Negligible
R1_3	13.1	12.3	12.4	+<0.1	31.0	Negligible
R1_4	13.2	12.4	12.4	+<0.1	31.0	Negligible

The maximum predicted annual mean PM₁₀ concentration at all considered façades of Tingle Peg Farmhouse during the 2019 BC scenario was at receptor R1_4 with a predicted concentration of 13.2µg/m³, representing 33% of the AQAL.

The maximum predicted annual mean PM₁₀ concentration at all façades of Tingle Peg Farmhouse with the development in place (2027 DS) was at R1_4 with a predicted concentration of 12.4µg/m³; this represents 31% of the AQAL. The change in the annual mean PM₁₀ concentration at this location, due to the Proposed Development (2027 DM vs. 2027 DS) relative to the AQAL was +<0.1%.

The greatest change in annual mean PM₁₀ concentration, due to the Proposed Development relative to the AQAL was at R1_1 and R1_2 with a change of +0.1% (i.e. +0.04µg/m³).

In accordance with EPUK/IAQM guidance, the impact of the development on annual mean PM₁₀ concentrations at all assessed receptor locations is considered to be 'negligible'. Given the marginal increase in annual mean PM₁₀ concentrations associated with the Proposed Development, and that there are no predicted exceedences of the annual mean PM₁₀ AQAL, unmitigated effects associated with annual mean PM₁₀ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

Based upon the maximum predicted annual mean PM₁₀ concentrations at all existing receptors, there are predicted to be no days where the 24-hour mean PM₁₀ concentrations are to be greater than 50µg/m³. Effects associated with likely 24-hour mean PM₁₀ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

6.1.3 PM_{2.5} Modelling Results

Table 6-3 presents the annual mean PM_{2.5} concentrations predicted at all assessed receptor locations of relevant exposure for the 2019 BC, 2027 DM and 2027 DS scenarios.

Table 6-3
Predicted Annual Mean PM_{2.5} Concentrations – 2027 Development Opening Year: 100% B2 Scenario

Receptor	Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)			% Change of AQAL	% of 2027 DS Relative to AQAL	EPUK/IAQM Impact Descriptor
	2019 BC	2027 DM	2027 DS			
R1_1	8.6	7.9	8.0	+0.1	32.0	Negligible
R1_2	8.5	7.9	7.9	+<0.1	31.6	Negligible
R1_3	8.5	7.9	7.9	+<0.1	31.6	Negligible
R1_4	8.6	7.9	8.0	+<0.1	32.0	Negligible

The maximum predicted annual mean PM_{2.5} concentration at all considered façades of Tingle Peg Farmhouse during the 2019 BC scenario was at R1_4 with a predicted concentration of 8.58µg/m³, representing 34.4% of the AQAL.

The maximum predicted annual mean PM_{2.5} concentration at all façades of Tingle Peg Farmhouse with the development in place (2027 DS) was at R1_4 with a predicted concentration of 7.97µg/m³; representing 32% of the AQAL. The change in annual mean PM_{2.5} concentration at R1_4, due to the Proposed Development (2027 DM vs. 2027 DS) relative to the AQAL was +<0.1%.

The greatest change in annual mean PM_{2.5} concentration, due to the Proposed Development relative to the AQAL was at R1_1 with a change of +0.1% (i.e. +0.03µg/m³).

In accordance with EPUK/IAQM guidance, the impact of the development on annual mean PM_{2.5} concentrations at all assessed receptor locations is considered to be 'negligible'. Given the marginal increase in annual mean PM_{2.5} concentrations associated with the Proposed Development, and that there are no predicted exceedences of the annual mean PM_{2.5} AQAL, unmitigated effects associated with annual mean PM_{2.5} concentrations at all assessed receptor locations are therefore considered to be a 'not significant' effect.

7.0 MITIGATION MEASURES

This section presents any proportionate mitigation measures required during the construction and operational phases of the Proposed Development.

7.1 Construction Dust

As discussed in Section 5.0, construction impacts associated to the Proposed Development would result in the generation of dust and PM₁₀.

IAQM guidance outlines a number of Site-specific mitigation measures based on a consideration of the nature of the development, the expected construction activities and the assessed risk. With the effective application of the dust mitigation measures, as detailed in Table 7-1, residual effects will be 'not significant'.

Table 7-1
Construction Dust Mitigation Measures

Site Application	Mitigation Measures
Highly Recommended	
Communications	Develop and implement a stakeholder communications plan that includes community engagement before work commences 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 environment manager/engineer or the site manager.
	Display the head or regional office contact information.
	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.
Construction	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.
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
	Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
	Only remove the cover in small areas during work and not all at once.
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of 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

Site Application	Mitigation Measures
	work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
Operating Vehicle / Machinery and Sustainable Travel	Ensure all vehicles switch off 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 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
	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 and conveyors and covered skips.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Preparing and Maintaining the Site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
	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.
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 offsite, and the action taken to resolve the situation in the log book.
	Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are

Site Application	Mitigation Measures
	minimised. It is important to understand the interactions of the off-site transport deliveries which might be using the same strategic road network routes.
Waste Management	Avoid bonfires and burning of waste materials.
Desirable	
Construction	Avoid scabbling (roughening of concrete surfaces) if possible.
	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 power materials ensure bags are sealed after use and stored appropriately to prevent dust.
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.
	Record all inspections of haul routes and any subsequent action in a site log book.
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

7.2 Operational Phase Road Traffic Emissions

An assessment of vehicle emissions associated with the operation of the scheme predicted the unmitigated impact on annual mean NO₂, PM₁₀ and PM_{2.5} concentrations to be 'negligible' at all considered receptors, resulting in an overall 'not significant' effect on air quality.

With reference to the Site Plan (Rev D), plans include the provision of electric vehicle charging spaces: five for building one, three for building two and four for building three.

Reference should be made to the Travel Plan, as provided by Prime Transport Planning, for mitigation measures which aim to reduce reliance on car use and promote sustainable modes of transportation.

8.0 CONCLUSIONS

SLR Consulting has been commissioned to undertake an assessment of potential air quality impacts of a proposed Business Park, comprising three buildings of a total 150,000sqft (157,000sqft inclusive of office space), with associated infrastructure, landscaping and car parking, located at land to the east of Ormskirk Road, Knowsley.

8.1 Construction Phase

A qualitative assessment of the potential dust impacts during the construction of the Proposed Development has been undertaken following IAQM guidance.

Following the construction dust assessment, the Site is found to be at worst 'High Risk' in relation to dust soiling effects on people and property, and 'Low Risk' human health impacts. Providing effective mitigation measures are implemented, such as those outlined in Section 7.1 of this report, residual impacts from dust emissions during the construction phase would be 'not significant'.

Given the short-term nature of the construction phase and the comparatively low volume of vehicle movements that will likely arise (when compared to the operational phase, for which a full assessment has been undertaken), there is predicted to be an insignificant effect on air quality from construction-generated vehicle emissions.

8.2 Operational Phase

The assessment of operational phase effects considered impacts on all relevant receptors from road traffic emissions associated with the Proposed Development. As a precautionary approach the operational phase assessment has been based upon trip generation associated with the 100% B2 use-class scenario as that which results in the greatest incremental emission rate from development trips.

The ADMS-Roads dispersion model was used to determine the likely NO₂, PM₁₀ and PM_{2.5} concentrations at all assessed receptor locations for a series of scenarios, in accordance with technical guidance presented in LAQM.TG(16). Predicted pollutant concentration changes relevant receptor locations as a result of the Proposed Development were assessed using the EPUK/IAQM significance criteria.

In accordance with EPUK/IAQM guidance, the impacts of the Proposed Development on NO₂, PM₁₀ and PM_{2.5} concentrations at all of assessed receptor locations are considered to be 'negligible'. Overall, the unmitigated effects associated with NO₂, PM₁₀ and PM_{2.5} concentrations at assessed receptor locations are therefore considered 'not significant'.

APPENDIX A – Advanced Model Input and Verification

Advanced Model Input Summary

Advanced modelling input parameters used (not previously disclosed) are summarised in Table A-1.

Table A-1
Advanced Modelling Inputs

Parameter	Input Variable
Surface Roughness	A roughness length z0 of 0.5m was used to represent the surface roughness of the principal study area - i.e. parkland, open suburbia.
	A roughness length z0 of 0.005m was used to represent the surface roughness of the meteorological site – i.e. short grass.

Traffic Data

Traffic used within the assessment was provided by Prime Transport Planning. As discussed in Section 3.2.3, three vehicular trip generation scenarios were provided based upon different use-classes. The traffic data for each of these scenarios is shown in Table A-2 below. In summary, the total trip generation for each considered use-class mix is:

- 70%/30% B8/B2 use-class: 302 LDV and 74 HDVs as a 24-hour AADT;
- 100% B2 use-class: 599 LDV and 23 HDVs as a 24-hour AADT; and
- 100% B8 use-class: 260 LDV and 101 HDVs as a 24-hour AADT.

Additional traffic data required for model verification was sought from publicly available datasets provided by the DfT.

Table A-2
Traffic Data Used Within the Assessment

Link		2019 BC		2027 DM		2027 DS		Speed (kph) (A)
ID	Description	AADT	% HDV	AADT	% HDV	AADT	% HDV	
100% B2 use-class (as assessed)								
1	Site Access to the West of Ormskirk Road	0	0.0	0	0.0	622	3.7	32
2	Ormskirk Road to the North of Site Access	11,836	5.1	12,927	5.0	13,360	5.0	80
3	Ormskirk Road to the South of Site Access	11,836	5.1	12,927	5.0	13,116	5.1	80
4A	A580 to the West of A5208	10,474	3.1	11,328	3.0	11,456	2.9	80
4B	A580 to the West of A5208 (E Bound)	10,474	3.1	11,328	3.0	11,456	2.9	80
5A	A580 to the East of A5208	12,650	2.7	13,748	2.5	13,802	2.5	80
5B	A580 to the East of A5208 (E Bound)	12,650	2.7	13,748	2.5	13,802	2.5	80
6	B5202 to the North-East of Kitling Road	1,733	0.0	1,879	0.0	1,879	0.0	80
7	A5208 to the North of A580	16,208	7.9	17,731	7.4	17,799	7.4	80
70%/30% B8/B2 use-class								

Link		2019 BC		2027 DM		2027 DS		Speed (kph) (A)
ID	Description	AADT	% HDV	AADT	% HDV	AADT	% HDV	
1	Site Access to the West of Ormskirk Road	0	0.0	0	0.0	376	19.7	32
2	Ormskirk Road to the North of Site Access	11,836	5.1	12,927	5.0	13,178	5.2	80
3	Ormskirk Road to the South of Site Access	11,836	5.1	12,927	5.0	13,052	5.2	80
4A	A580 to the West of A5208	10,474	3.1	11,328	3.0	11,399	3.0	80
4B	A580 to the West of A5208 (E Bound)	10,474	3.1	11,328	3.0	11,399	3.0	80
5A	A580 to the East of A5208	12,650	2.7	13,748	2.5	13,785	2.6	80
5B	A580 to the East of A5208 (E Bound)	12,650	2.7	13,748	2.5	13,785	2.6	80
6	B5202 to the North-East of Kitling Road	1,733	0.0	1,879	0.0	1,879	0.0	80
7	A5208 to the North of A580	16,208	7.9	17,731	7.4	17,765	7.41	80
100% B8 use-class (B)								
1	Site Access to the West of Ormskirk Road	0	0.0	0	0.0	361	28.1	32
Model verification (C)								
V1	A5207 Moorgate Road (N Bound) (DfT count ID: 57010)	9,994	12.7	-	-	-	-	64
V2	A5207 Moorgate Road (S Bound) (DfT count ID: 57010)	9,256	13.1	-	-	-	-	64
V3	B5208 Country Road (W Bound) (DfT count ID: 37830)	5,338	4.6	-	-	-	-	64
V4	B5208 Country Road (E Bound) (DfT count ID: 37830)	4,843	4.4	-	-	-	-	64
V5	Lees Road (N Bound) (DfT count ID: 803657)	5,829	12.2	-	-	-	-	48
V6	Lees Road (S Bound) (DfT count ID: 803657)	4,487	12.8	-	-	-	-	48
V7	A5208 South Boundary Road (W Bound) (DfT count ID: 17693)	4,763	8.4	-	-	-	-	64
V8	A5208 South Boundary Road (E Bound) (DfT count ID: 17693)	4,083	9.0	-	-	-	-	64
V9	Roundabout (D)	24,297	10.3	-	-	-	-	32
Note: (A) Speeds based upon National Speed Limits. Traffic speeds have been adjusted to take into account queues and congestion in accordance with LAQM.TG(16). (B) Distribution data was not provided by Prime Transport Planning for this scenario. (C) Traffic flows sourced from the DfT (D) Traffic flows on Link V9 have been calculated following the method described within DEFRA LAQM.TG(16).								

Model Verification

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is specifically listed in the DEFRA's LAQM.TG(16) guidance as an accepted dispersion model.

Model validation undertaken by the software developer (CERC) will not have included validation in the vicinity of the Site. It is therefore necessary to perform a comparison of modelled results with local monitoring data at relevant locations. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results.

Prior to undertaking model verification, model setup parameters and input data were reviewed to maximise the performance of the dispersion model in relation to the real-world conditions.

NO_x / NO₂ Verification

For NO_x model verification, KMBC's 2019 LAQM NO₂ monitoring data has been used (Table A-3).

Table A-3
Local Monitoring Data Available for Model Verification

Site ID	X	Y	2019 Monitored NO ₂ Concentration (µg/m ³)	2019 Data Capture (%)
K10	342421	397755	29.4	100

NO_x/NO₂ verification, relates to the comparison and adjustment of modelled road-NO_x (as output from the ADMS-Roads dispersion model), relative to monitored road-NO_x.

As NO₂ concentrations are solely reported using diffusion tubes, NO_x was back calculated using the latest version of DEFRA's NO_x to NO₂ Calculator (v8.1). The NO_x to NO₂ Calculator was also used to facilitate the conversion of modelled road-NO_x (as output from the ADMS-Roads dispersion model) into road-NO₂.

Verification was completed using the 2019 DEFRA background mapped concentrations (2018 reference year) for the relevant 1km x 1km grid squares (i.e. those within which the model verification locations are located), as displayed in Section 4.1, with those already modelled sources removed, to avoid duplication.

Comparison of the modelled vs. monitored road NO_x contribution at K10 is provided in Table A-4. An adjustment factor of 2.599 has been derived, based on a linear regression forced through zero, as shown in Figure A-1. No further improvement to the ADMS-Roads dispersion model could be achieved.

Table A-4
NO_x/NO₂ Model Verification (2.599)

Site ID	Monitored Total NO ₂ (µg/m ³)	Monitored Road NO _x (µg/m ³)	Modelled Road NO _x (µg/m ³)	Adjustment Factor
K10	29.4	25.3	9.7	2.599

On this basis, the derived verification factor (2.599) was considered acceptable and was subsequently applied to all road-NO_x concentrations predicted (as output of the ADMS Roads dispersion model).

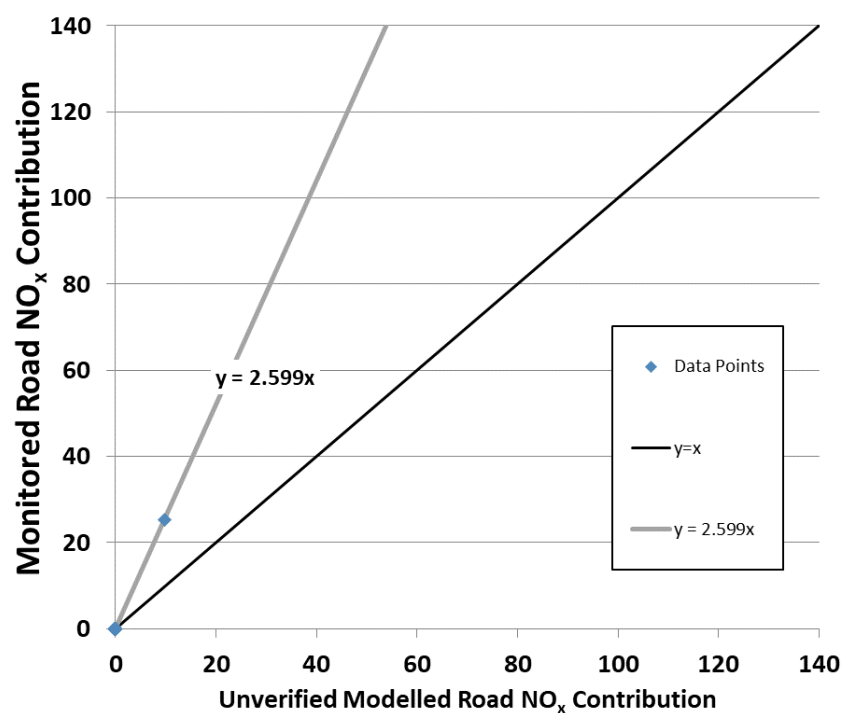


Figure A-1
Comparison of Modelled vs. Monitored Road NO_x Contribution (2.599)

PM₁₀ / PM_{2.5} Verification

The calculated NO_x adjustment factors discussed above were also applied to road-PM₁₀ and PM_{2.5} concentrations (as output of the ADMS Roads dispersion model), following the recommendations of LAQM.TG(16) guidance, in the absence of local particulate monitoring.

APPENDIX B – Mass Balance Calculation

As discussed in Section 3.2.3, Prime Transport Planning (the appointed Transport Consultants for the Proposed Development) provided vehicular trip generation relating to three use-class scenarios as 70%/30% B8/B2 use-class; 100% B2 use-class; and 100% B8 use-class. As further discussed in Section 3.2.3, the predicted total trip generation associated with the 70%/30% B8/B2 scenario is below the EPUK/IAQM 'indicative criterion for assessment' and therefore was 'screened out', with effects on air quality associated with this scenario considered to be 'insignificant'.

However, the 100% B2 use-class scenario and 100% B8 use-class scenario are predicted to generate additional development trips in excess of the EPUK/IAQM 'indicative criterion for assessment' and, thus, warrant further consideration to determine associated impacts on air quality. The predicted additional development trips associated with each scenario are:

- 100% B2 use-class scenario: +599 LDVs and +23 HDVs as a 24-hour AADT; and
- 100% B8 use-class scenario: +260 LDVs and +101 HDVs as a 24-hour AADT.

Given the differing associated emission factors between LDVs and HDVs, it is not possible to understand the differences in total emission contribution from the two scenarios by means of a simple numerical comparison and assessment of the total development trips generated (i.e. simply comparing LDV + HDV between the B2 and B8 scenarios). Therefore, in order to provide a robust assessment which considers the worst-case scenario in terms of associated potential impacts on air quality associated with either the 100% B2 use-class or 100% B8 use-class scenarios, an analysis of these scenarios was undertaken utilising a mass balance calculation to compare resulting incremental vehicle emissions associated with the respective trip generation. This mass balance was completed using the EFT version 11.0 as developed by DEFRA²¹ for the 2027 completed development opening year, and based upon consideration of NO_x emission factors, only. Reference should be made to Table B-1 and Table B-2 for input and outputs of the EFT, respectively, as part of the mass balance calculation.

Table B-1
Mass Balance Calculation – EFT Inputs

Source ID	Road Type	Traffic Flow	% HDV	Speed (kph)	No of Hours
100% B8 LDV	Urban (not London)	260	0	48	24
100% B8 HDV	Urban (not London)	101	100	48	24
100% B2 LDV	Urban (not London)	599	0	48	24
100% B2 HDV	Urban (not London)	23	100	48	24

Table B-2
Mass Balance Calculation – EFT Outputs

Source ID	All LDVs (NO _x g/km/s)	All HDVs (NO _x g/km/s)	Sum of LDVs and HDVs (NO _x g/km/s)
100% B8 LDV	0.00041	-	0.00083
100% B8 HDV	-	0.00042	
100% B2 LDV	0.00096	-	0.00105
100% B2 HDV	-	0.00010	

²¹ DEFRA, EFT v11.0 (2021). <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>.

Table B-2 demonstrates that the 100% B2 scenario results in the greatest calculated total NO_x emission rate in comparison to the 100% B8 scenario (0.00105g/km/s Vs 0.00083g/km/s). As such, the operational phase impact assessment, as presented in Section 6.0 of this Air Quality Assessment, has utilised the predicted vehicular trip generation associated the 100% B2 scenario as a worst-case assessment. An impact assessment utilising trip generation associated with any other considered unit mix (i.e. 70%/30% B8/B2 or 100% B8) would ultimately result in a lower impact on air quality.

EUROPEAN OFFICES

United Kingdom

AYLESBURY

T: +44 (0)1844 337380

BELFAST

belfast@slrconsulting.com

BRADFORD-ON-AVON

T: +44 (0)1225 309400

BRISTOL

T: +44 (0)117 906 4280

CARDIFF

T: +44 (0)29 2049 1010

CHELMSFORD

T: +44 (0)1245 392170

EDINBURGH

T: +44 (0)131 335 6830

EXETER

T: + 44 (0)1392 490152

GLASGOW

T: +44 (0)141 353 5037

GUILDFORD

T: +44 (0)1483 889800

LONDON

T: +44 (0)203 805 6418

MAIDSTONE

T: +44 (0)1622 609242

MANCHESTER (Media City)

T: +44 (0)161 872 7564

NEWCASTLE UPON TYNE

T: +44 (0)191 261 1966

NOTTINGHAM

T: +44 (0)115 964 7280

SHEFFIELD

T: +44 (0)114 245 5153

SHREWSBURY

T: +44 (0)1743 23 9250

STIRLING

T: +44 (0)1786 239900

WORCESTER

T: +44 (0)1905 751310

France

GRENOBLE

T: +33 (0)6 23 37 14 14

Ireland

DUBLIN

T: + 353 (0)1 296 4667