



**LOVELL HOMES**

**MILES PLATTING, PHASE 3.1**

**AIR QUALITY ASSESSMENT**

**JANUARY 2021**

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**LOVELL HOMES**

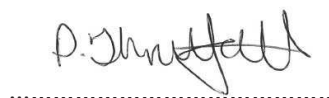
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**PREPARED BY:**

P Threlfall Environmental Scientist (Air Quality)



**REVIEWED BY:**

Dr. S K Lees Associate Director (Air Quality)



**APPROVED BY:**

M Dawson Technical Director and Service Lead



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## CONTENTS

|                                                                            |    |
|----------------------------------------------------------------------------|----|
| EXECUTIVE SUMMARY .....                                                    | 1  |
| 1 INTRODUCTION .....                                                       | 2  |
| 1.1 Background .....                                                       | 2  |
| 2 LEGISLATION AND POLICY CONTEXT .....                                     | 3  |
| 2.1 Relevant Air Quality Legislation and Guidance .....                    | 3  |
| 2.2 Assessment Criteria .....                                              | 3  |
| 3 ASSESSMENT METHODOLOGY .....                                             | 5  |
| 3.1 Consultation and Scope of Assessment .....                             | 5  |
| 3.2 Construction Phase Assessment .....                                    | 5  |
| 3.3 Operational Phase Assessment .....                                     | 6  |
| 3.4 Limitations and Uncertainties .....                                    | 9  |
| 4 BASELINE SITUATION .....                                                 | 12 |
| 4.1 Manchester City Council Local Air Quality Management .....             | 12 |
| 4.2 Background Air Pollutant Concentrations .....                          | 12 |
| 4.3 Modelled Baseline Concentrations at Existing Sensitive Receptors ..... | 13 |
| 5 IMPACT ASSESSMENT .....                                                  | 16 |
| 5.1 Construction Phase Assessment .....                                    | 16 |
| 5.2 Operational Phase Assessment .....                                     | 19 |
| 6 CONCLUSIONS .....                                                        | 26 |
| 6.1 Construction Phase Assessment .....                                    | 26 |
| 6.2 Operational Phase Assessment .....                                     | 26 |
| 6.3 Summary .....                                                          | 27 |

## APPENDICES

Appendix A: Air Quality Legislation and Guidance

Appendix B: Methodology for Construction Phase Assessment

Appendix C: Methodology for Operational Phase Assessment

Appendix D: Sensitivity Analysis

Appendix E: Professional Experience of Assessors

| DRAWINGS    | TITLE                                              | SCALE   |
|-------------|----------------------------------------------------|---------|
| GM10234-003 | Existing and Proposed Sensitive Receptor Locations | 1:5,000 |

## EXECUTIVE SUMMARY

An air quality assessment has been undertaken to accompany a planning application for a proposed residential development (Phase 3.1) in Miles Platting, Manchester.

For the construction phase of the development, the risk of dust soiling effects is classed as high for earthworks and construction activities and medium for trackout. The risk of human health effects is classed as low for earthworks, construction and trackout. Mitigation measures are proposed to reduce any potential impacts based on best practice guidance.

For the operational phase assessment, annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations have been modelled at twenty-one existing receptor locations using the most recent Emission Factor Toolkit available from DEFRA (v 10.1). In accordance with national guidance, a sensitivity analysis has been undertaken in which base year background pollutant concentrations and vehicle emission factors have been applied to the opening/future years scenarios. This is considered to provide a conservative upper-bound to the assessment. Predicted annual mean pollutant concentrations have been compared to the relevant air quality objectives and target level.

The impact of the development during the operational phase is predicted to be negligible at all twenty-one existing sensitive receptors that have been considered as part of the assessment. Air quality effects are, therefore, considered to be 'not significant'.

The assessment demonstrates that the proposed development will not lead to an unacceptable risk from air pollution or to any breach of national air quality objectives. Therefore, the proposed development is compliant with relevant national planning policy and there are no material reasons in relation to air quality why the proposed scheme should not proceed, subject to appropriate planning conditions.

## **1 INTRODUCTION**

### **1.1 Background**

- 1.1.1 Wardell Armstrong LLP (WA) has been commissioned by Lovell Homes to undertake an air quality assessment to accompany a planning application for a proposed residential development (Phase 3.1) in Miles Platting, Manchester.
- 1.1.2 The proposed development site is located in the urban area of Miles Platting. The development site is a small plot of land to the north and east of Butler Street and to the south of the A62 Oldham Road. The development site is located in a heavily urbanised area and so is surrounded by existing residential dwellings and road networks. The site is currently open, unused land.
- 1.1.3 It is understood that the proposed development is for 43 residential dwellings and associated infrastructure.
- 1.1.4 This report details the results of the air quality assessment which has been undertaken to accompany the planning application for the proposed development. The report discusses the potential dust and fine particulate matter impacts associated with the construction phase, and an assessment of the potential air quality impacts associated with the additional road traffic generated by the proposed development. Air pollutant concentrations are considered at existing sensitive receptor locations in the vicinity of the proposed development. As the proposals are for residential use, air pollutant concentrations are also considered within the proposed development site itself.

## 2 LEGISLATION AND POLICY CONTEXT

### 2.1 Relevant Air Quality Legislation and Guidance

2.1.1 The air quality assessment has been undertaken in accordance with the following legislation and guidance:

- EU Ambient Air Quality Directive 2008/50/EC (i.e. the CAFE Directive);
- The Environment Act 1995;
- Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007;
- The Air Quality Standards Regulations 2010;
- Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(16), February 2018;
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework, February 2019; and
- Department for Communities and Local Government, Planning Practice Guidance: Air Quality, November 2019.

2.1.2 Further details of these documents are included in **Appendix A**.

### 2.2 Assessment Criteria

2.2.1 The relevant air quality objectives and limit values for this assessment are included within Table 1.

| Table 1: Air Quality Objectives and Limit Values Relevant to the Assessment* |                                                                     |                  |                                     |
|------------------------------------------------------------------------------|---------------------------------------------------------------------|------------------|-------------------------------------|
| Pollutant                                                                    | Objective/Limit Value                                               | Averaging Period | Obligation                          |
| Nitrogen Dioxide (NO <sub>2</sub> )                                          | 200µg/m <sup>3</sup> , not to be exceeded more than 18 times a year | 1-hour mean      | All local authorities               |
|                                                                              | 40µg/m <sup>3</sup>                                                 | Annual mean      | All local authorities               |
| Particulate Matter (PM <sub>10</sub> )                                       | 50µg/m <sup>3</sup> , not to be exceeded more than 35 times a year  | 24-hour mean     | England, Wales and Northern Ireland |
|                                                                              | 40µg/m <sup>3</sup>                                                 | Annual mean      | England, Wales and Northern Ireland |
| Particulate Matter (PM <sub>2.5</sub> )                                      | Limit Value of 25µg/m <sup>3</sup>                                  | Annual mean      | England, Wales and Northern Ireland |
| *In accordance with the Air Quality Standards Regulations 2010               |                                                                     |                  |                                     |

2.2.2 Further details of where these objectives and limit values apply are provided in **Appendix A.**

### 3 ASSESSMENT METHODOLOGY

#### 3.1 Consultation and Scope of Assessment

3.1.1 An assessment methodology was discussed with Manchester City Council (MCC), via email correspondence on 17<sup>th</sup> December 2020.

3.1.2 A summary of the consultation undertaken is provided in Table 2.

| Table 2: Summary of Consultation                                                                                                                   |                                                                                                                                                                                                                                    |                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Assessment Stage                                                                                                                                   | Proposed Method                                                                                                                                                                                                                    | Response             |
| Construction phase assessment to consider dust and fine particulate matter (PM <sub>10</sub> )                                                     | Qualitative assessment in accordance with Institute of Air Quality Management (IAQM) guidance                                                                                                                                      | No Response Received |
| Operational phase assessment to consider nitrogen dioxide (NO <sub>2</sub> ) and fine particulate matter (PM <sub>10</sub> and PM <sub>2.5</sub> ) | Detailed assessment using the ADMS-Roads atmospheric dispersion model, in accordance with Environmental Protection UK (EPUK)/IAQM guidance, and with all predicted concentrations compared to air quality objectives/limit values. | No Response Received |
|                                                                                                                                                    | 2019 meteorological data from Manchester recording station                                                                                                                                                                         | No Response Received |
|                                                                                                                                                    | Background NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations from 2018-based DEFRA default maps                                                                                                              | No Response Received |
|                                                                                                                                                    | Assessment undertaken using EFT10 emission factors, as well as a sensitivity analysis.                                                                                                                                             | No Response Received |
|                                                                                                                                                    | There are two Council owned roadside diffusion tubes in close proximity to the proposed development site (MAN 36 and MAN71) and so these will be used for model verification purposes.                                             | No Response Received |

3.1.3 At the time of writing, no response has been received from MCC with regard to the scope of works outlined above in the methodology.

#### 3.2 Construction Phase Assessment

3.2.1 To assess the impacts associated with dust and fine particulate matter releases during the construction phase of the development, an assessment has been undertaken in accordance with guidance from the Institute of Air Quality Management (IAQM)<sup>1</sup>.

<sup>1</sup> Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, February 2014

Further details of the construction assessment methodology are provided in **Appendix B**.

- 3.2.2 The closest sensitive human receptors to where construction phase activities will take place are predominantly residential in nature and are detailed in Table 3.

| Table 3: Existing Sensitive Receptors Considered in the Construction Phase Assessment |                         |                                                 |
|---------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------|
| Receptor                                                                              | Direction from the Site | Approximate Distance from the Site Boundary (m) |
| Existing residential receptors off Gunson Street                                      | North west              | Approximately 32m at closest point              |
| Existing residential receptors off Gunson Street                                      | East                    | Approximately 24m at closest point              |
| Existing residential receptors off Butler Street                                      | South east              | Approximately 12m at closest point              |
| Existing residential receptors off Butler Street                                      | West                    | Approximately 42m at closest point              |

- 3.2.3 There are no ecological receptors, or potentially dust sensitive statutory designated habitat sites, within 50m of the site and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). Ecological effects do not therefore need to be considered within this assessment.
- 3.2.4 The criteria used to assess the construction impact of the proposed development, and the associated significance of effects, at existing sensitive receptors are included in **Appendix B**.

### 3.3 Operational Phase Assessment

- 3.3.1 The air dispersion model ADMS-Roads (CERC, Version 5.0) has been used to assess the impacts associated with road traffic emissions during the operational phase assessment. The impacts have been assessed in accordance with guidance from Environmental Protection UK (EPUK) and the IAQM<sup>2</sup>. Further details of the modelling and assessment methodology are provided in **Appendix C**.
- 3.3.2 NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations have been predicted at existing receptors as

<sup>2</sup> Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

these are the pollutants considered most likely to exceed the objectives and limit values.

3.3.3 Pollutant concentrations within the proposed development site have also been considered within the assessment, to represent future residents of the proposed development.

3.3.4 Air dispersion modelling has been carried out to estimate pollutant concentrations, due to road traffic emissions, for three assessment scenarios as follows:

- **Scenario 1:** 2019 Base Year, the most recent year for which traffic flow information and meteorological data are available;
- **Scenario 2:** 2026 Opening/Future Year, without the proposed development in place;
- **Scenario 3:** 2026 Opening/Future Year, with the proposed development in place;

#### ***Existing Sensitive Receptors***

3.3.5 A number of representative existing sensitive receptors (identified as ESR 1 to ESR 21) have been selected for consideration in the air quality assessment. These have been chosen based on their sensitivity and their proximity to roads and junctions which will be affected by development generated traffic.

3.3.6 Details of the receptors considered are provided in Table 4, and their locations are shown on drawing GM10234-003.

| Table 4: Existing Sensitive Receptors Considered in Operational Phase Assessment |                                 |                |          |               |
|----------------------------------------------------------------------------------|---------------------------------|----------------|----------|---------------|
| Receptor                                                                         | Address                         | Grid Reference |          | Receptor Type |
|                                                                                  |                                 | Easting        | Northing |               |
| ESR 1                                                                            | Butler Street, Miles Platting   | 385589         | 398898   | Residential   |
| ESR 2                                                                            |                                 | 385676         | 398718   | Residential   |
| ESR 3                                                                            |                                 | 385453         | 399009   | Residential   |
| ESR 4                                                                            | A62 Oldham Road, Miles Platting | 385356         | 399138   | Residential   |
| ESR 5                                                                            |                                 | 385500         | 399337   | Residential   |
| ESR 6                                                                            |                                 | 385530         | 399383   | Residential   |
| ESR 7                                                                            |                                 | 385567         | 399520   | First floor   |

|        |                                                    |        |        |                            |
|--------|----------------------------------------------------|--------|--------|----------------------------|
|        |                                                    |        |        | residential                |
| ESR 8  |                                                    | 384886 | 398847 | First floor<br>residential |
| ESR 9  | Livesey Street, Miles Platting                     | 385215 | 399143 | Residential                |
| ESR 10 | St Patrick RC Primary School,<br>Livesey Street    | 385142 | 399246 | School                     |
| ESR 11 | Abbott Community Primary<br>School, Miles Platting | 385041 | 399336 | School                     |
| ESR 12 | New Allen Street, Miles<br>Platting                | 385156 | 399205 | Residential                |
| ESR 13 | A62 Oldham Road, Miles<br>Platting                 | 384778 | 398819 | Residential                |
| ESR 14 | A665 Great Ancoats Street,<br>Miles Platting       | 384742 | 398633 | First floor<br>residential |
| ESR 15 |                                                    | 384810 | 398572 | First floor<br>residential |
| ESR 16 | Old Mill Street, Miles<br>Platting                 | 385259 | 398286 | Residential                |
| ESR 17 |                                                    | 385319 | 398328 | Residential                |
| ESR 18 |                                                    | 385332 | 398337 | First floor<br>residential |
| ESR 19 |                                                    | 385364 | 398402 | Residential                |
| ESR 20 |                                                    | 385499 | 398467 | Residential                |
| ESR 21 |                                                    | 385559 | 399256 | Residential                |

3.3.7 The criteria used to assess the operational impact of the proposed development, and the associated significance of effects, at existing sensitive receptors are included in **Appendix C.**

#### **Proposed Sensitive Receptors**

3.3.8 Two proposed sensitive receptors (referred to as PR 1 and PR 2) have been selected within the development site boundary. These receptors are considered to be representative of the proposed residential areas which will be closest to the main existing source(s) of pollution. In this case, the main source is considered to be vehicle emissions from the A62 Oldham Road, Butler Street and the proposed site access road into the development site.

- 3.3.9 Pollutant concentrations at the proposed receptors have been predicted for scenario 3 only (as detailed in paragraph 3.3.4). It is only necessary to consider the 'with development' scenario for the proposed receptors as they will not experience any 'without development' conditions. It is not therefore necessary to consider the changes in pollutant concentrations at the proposed receptors.
- 3.3.10 Details of the proposed sensitive receptors are provided in Table 5, and their locations are shown on drawing GM10234-003.

| Table 5: Proposed Sensitive Receptors Considered in the Operational Phase Assessment |                                                                                                                                        |                |          |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|
| Receptor Point                                                                       | Location                                                                                                                               | Grid Reference |          |
|                                                                                      |                                                                                                                                        | Easting        | Northing |
| PR 1                                                                                 | Location considered to be representative of the closest proposed residential property to Butler Street and the Site Access Road        | 385306         | 399032   |
| PR 2                                                                                 | Location considered to be representative of the closest proposed residential property to the A62 Oldham Road and the Site Access Road. | 385271         | 399081   |

- 3.3.11 Pollutant concentrations associated with road traffic emissions are expected to be highest at lower floor levels and, therefore, both of the proposed receptors (i.e. PR 1 to PR 2) have been modelled at ground level (i.e. 1.5m).
- 3.3.12 The predicted concentrations at the proposed receptors have been assessed against the air quality objectives and limit values detailed in Table 1.

### 3.4 Limitations and Uncertainties

- 3.4.1 At present, there is a degree of uncertainty associated with the prediction of future NO<sub>2</sub> concentrations and, consequently, the assessment of impacts relating to development generated road traffic emissions.
- 3.4.2 Air quality assessments make use of official sources of information (i.e. vehicle emission factors and background concentrations) which are increasingly considered to be overly optimistic. Monitoring data collected by the UK Government and local authorities shows that annual mean NO<sub>2</sub> concentrations have remained higher than previously expected (especially in roadside locations). This is widely thought to be due to the lower than expected decline in NO<sub>x</sub> emissions from diesel vehicles (even though new Euro standards have been introduced), coupled with an overall increase in the number of diesel vehicles on the road.

- 3.4.3 The vehicle emission factors used in this assessment are from Defra's latest Emission Factor Toolkit (EFT v10.1)<sup>3</sup>, which was released in August 2020 and is the most up-to-date version available. This version supersedes the previous version, EFT v9.0.1.
- 3.4.4 A position statement was produced by the IAQM in 2018 which deals specifically with the use of EFT v8 and the consideration of uncertainties in predicting future air quality<sup>4</sup>. The statement concludes that the approaches for dealing with this uncertainty should be decided on a case-by-case basis, but may include use of a sensitivity test, in which it is assumed that NO<sub>x</sub> emissions will not reduce as quickly as within the EFT. The statement also highlights the need for careful consideration of the results of any sensitivity test, particularly with regard to assessing impacts and the significance of effects. A precautionary approach is recommended.
- 3.4.5 At the time of the assessment, no IAQM update has been provided for EFT v10.1. However, a recent study provides evidence that the previous version, EFT v9.0, may be relied upon to predict the 'most likely' future emissions reductions where model verification has been undertaken using monitored data from 2016 or later<sup>5</sup>. A further study in September 2020 concluded that the differences between the current EFT v.10.1 and the previous EFT v.9.0.1 are sufficiently small that the previous work to validate the EFT remains valid for the most recent edition<sup>6</sup>. The IAQM has yet to comment on these studies.
- 3.4.6 In accordance with Defra guidance, the air quality assessment has been carried out using EFT v10.1. However, a sensitivity analysis has been undertaken for the NO<sub>2</sub> modelling in which the 2019 background pollution concentrations and vehicle emission factors have been applied to the 2026 opening/future year, to provide a conservative upper-bound to the assessment. Further details of the methodology are provided in **Appendix C** and the results of the sensitivity analysis are detailed in **Appendix D**.
- 3.4.7 Several steps have been taken to ensure that the model is as accurate and representative as possible. These comprise:

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<sup>3</sup> Defra Local Air Quality Management webpages (<https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>)

<sup>4</sup> Institute of Air Quality Management, Dealing with Uncertainty in Vehicle NO<sub>x</sub> Emissions within Air Quality Assessments v1.1, July 2018

<sup>5</sup> <https://www.aqconsultants.co.uk/news/march-2020/defra%E2%80%99s-emission-factor-toolkit-now-matching-measu>

<sup>6</sup> Air Quality Consultants, Comparison of EFT v10 with EFT v9, September 2020

- Consultation has been undertaken with MCC to confirm their agreement with the methodology used within the assessment;
- Detailed traffic data has been obtained from the appointed transport consultant following extensive consultation to ensure its appropriateness and robustness;
- The latest Defra LAQM tools have been incorporated into the assessment following their release in August 2020;
- Meteorological data, obtained from a representative meteorological recording station, has been incorporated into the assessment;
- Extensive detailed modelling of the roads included in the study area has been undertaken. Individual road lengths, widths and vehicle speeds have been reviewed in detail, as have the locations of the ESRs in relation to their proximity to the modelled roads, to ensure all information is as accurate as possible;

## **4 BASELINE SITUATION**

### **4.1 Manchester City Council Local Air Quality Management**

- 4.1.1 The proposed development site is located within the administrative area of Manchester City Council (MCC), which is responsible for the management of local air quality.
- 4.1.2 MCC is part of the Greater Manchester Combined Authority (GMCA) which oversees the management of air quality across the entirety of Greater Manchester.
- 4.1.3 GMCA currently has one declared Air Quality Management Area (AQMA), the Greater Manchester AQMA, which lies in parts of all the 10 districts of Greater Manchester. It should be noted this AQMA is not region-wide and predominantly covers busy main roads within the GMCA including arterial routes, district centres and airport.
- 4.1.4 The proposed development site is located adjacent to a section of the Greater Manchester AQMA. Therefore, the development is located in an area of known poor air quality.
- 4.1.5 A review of the 2019 Air Quality Annual Status Report (ASR) for GMCA (the latest report available) indicates numerous air quality monitoring locations within MCC's borough.
- 4.1.6 Two air quality monitoring locations (REF: MAN36 and MAN71) are situated close to the proposed development site, on roads for which traffic data is available. According to the 2019 NO<sub>2</sub> diffusion tube dataset published by MCC on their website<sup>7</sup>, these tubes recorded annual mean, bias adjusted, NO<sub>2</sub> concentrations of 31.70 and 45.30 µg/m<sup>3</sup> respectively in 2019. Diffusion tube MAN71 therefore exceeds the NO<sub>2</sub> annual mean objective of 40 µg/m<sup>3</sup>.
- 4.1.7 **Background Air Pollutant Concentrations**
- 4.1.8 The air quality assessment needs to take into account background pollutant concentrations upon which local, traffic derived pollution is superimposed.
- 4.1.9 As there are currently no representative NO<sub>2</sub>, PM<sub>10</sub> or PM<sub>2.5</sub> background monitoring locations in the vicinity of the proposed development site, background concentrations for these pollutants have been obtained from the 2018-based Defra default

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<sup>7</sup> [https://www.manchester.gov.uk/downloads/download/6992/monitoring\\_data\\_reports](https://www.manchester.gov.uk/downloads/download/6992/monitoring_data_reports)

concentration maps, for the appropriate grid squares<sup>8</sup>.

4.1.10 The background pollutant concentrations used in this assessment are detailed in Table 6.

| Table 6: Background Pollutant Concentrations Used in the Air Quality Assessment |                                        |                                     |                                  |                                   |
|---------------------------------------------------------------------------------|----------------------------------------|-------------------------------------|----------------------------------|-----------------------------------|
| Receptors                                                                       | Oxides of Nitrogen (NO <sub>x</sub> )* | Nitrogen Dioxide (NO <sub>2</sub> ) | Particulates (PM <sub>10</sub> ) | Particulates (PM <sub>2.5</sub> ) |
| 2019 Annual Mean Concentrations (µg/m <sup>3</sup> )                            |                                        |                                     |                                  |                                   |
| ESR 1-2 & 16 - 20<br>(385500, 398500)                                           | 39.40                                  | 25.02                               | 11.77                            | 7.97                              |
| ESR 3 – 7, 9-12, 21 & PR1-2<br>(385500, 399500)                                 | 34.33                                  | 22.50                               | 11.73                            | 7.90                              |
| ESR 8 & 13 - 15<br>(385500, 398500)                                             | 51.76                                  | 30.82                               | 13.19                            | 8.63                              |
| 2026 Annual Mean Concentrations (µg/m <sup>3</sup> )                            |                                        |                                     |                                  |                                   |
| ESR 1-2 & 16 - 20<br>(385500, 398500)                                           | 27.02                                  | 18.72                               | 11.68                            | 7.70                              |
| ESR 3 – 7, 9-12, 21 & PR1-2<br>(385500, 399500)                                 | 22.72                                  | 16.20                               | 11.51                            | 7.60                              |
| ESR 8 & 13 - 15<br>(385500, 398500)                                             | 36.13                                  | 23.64                               | 12.67                            | 8.11                              |

## 4.2 Modelled Baseline Concentrations at Existing Sensitive Receptors

4.2.1 A recent study provides evidence that the previous version of the EFT, EFT v9.0, may be relied upon to predict the 'most likely' future emissions reductions where model verification has been undertaken using monitored data from 2016 or later<sup>9</sup>. A further study in September 2020 concluded that the differences between the current EFT v.10.1 and the previous EFT v.9.0.1 are sufficiently small that the previous work validating the EFT remains valid<sup>10</sup>.

4.2.2 The baseline assessment (i.e. scenarios 1 and 2) has been carried out for the existing sensitive receptors considered. The adjusted NO<sub>2</sub> and unadjusted PM<sub>10</sub> and PM<sub>2.5</sub>

<sup>8</sup> Accessed through the Defra Local Air Quality Management webpages (<http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>)

<sup>9</sup> <https://www.aqconsultants.co.uk/news/march-2020/defra%E2%80%99s-emission-factor-toolkit-now-matching-measu>

<sup>10</sup> Air Quality Consultants, Comparison of EFT v10 with EFT v9, September 2020

concentrations are detailed in Table 7.

| <b>Table 7: Predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 1 and 2</b> |                                                                 |                        |                         |                                                                  |                        |                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------|-------------------------|------------------------------------------------------------------|------------------------|-------------------------|
| <b>Receptor</b>                                                                                                                                     | <b>Calculated Annual Mean Concentrations (µg/m<sup>3</sup>)</b> |                        |                         |                                                                  |                        |                         |
|                                                                                                                                                     | <b>Scenario 1: 2019 Base Year</b>                               |                        |                         | <b>Scenario 2: 2026 Opening/Future Year, Without Development</b> |                        |                         |
|                                                                                                                                                     | <b>NO<sub>2</sub></b>                                           | <b>PM<sub>10</sub></b> | <b>PM<sub>2.5</sub></b> | <b>NO<sub>2</sub></b>                                            | <b>PM<sub>10</sub></b> | <b>PM<sub>2.5</sub></b> |
| ESR 1                                                                                                                                               | 30.45                                                           | 12.51                  | 8.41                    | 21.37                                                            | 12.44                  | 8.12                    |
| ESR 2                                                                                                                                               | 30.77                                                           | 12.49                  | 8.40                    | 21.54                                                            | 12.41                  | 8.11                    |
| ESR 3                                                                                                                                               | 27.29                                                           | 12.38                  | 8.28                    | 18.55                                                            | 12.18                  | 7.97                    |
| ESR 4                                                                                                                                               | 26.73                                                           | 12.35                  | 8.26                    | 18.34                                                            | 12.17                  | 7.96                    |
| ESR 5                                                                                                                                               | 27.14                                                           | 12.43                  | 8.31                    | 18.57                                                            | 12.25                  | 8.01                    |
| ESR 6                                                                                                                                               | 26.21                                                           | 12.32                  | 8.24                    | 18.08                                                            | 12.13                  | 7.94                    |
| ESR 7                                                                                                                                               | 29.74                                                           | 12.93                  | 8.60                    | 19.84                                                            | 12.77                  | 8.29                    |
| ESR 8                                                                                                                                               | 36.62                                                           | 13.95                  | 9.08                    | 26.59                                                            | 13.46                  | 8.55                    |
| ESR 9                                                                                                                                               | 31.14                                                           | 12.74                  | 8.51                    | 20.45                                                            | 12.55                  | 8.18                    |
| ESR 10                                                                                                                                              | 25.93                                                           | 12.20                  | 8.17                    | 17.88                                                            | 11.99                  | 7.87                    |
| ESR 11                                                                                                                                              | 26.68                                                           | 12.27                  | 8.22                    | 18.21                                                            | 12.06                  | 7.90                    |
| ESR 12                                                                                                                                              | 28.11                                                           | 12.49                  | 8.35                    | 18.95                                                            | 12.30                  | 8.03                    |
| ESR 13                                                                                                                                              | 39.00                                                           | 14.48                  | 9.39                    | 27.82                                                            | 14.02                  | 8.85                    |
| ESR 14                                                                                                                                              | 39.97                                                           | 14.80                  | 9.56                    | 28.69                                                            | 14.37                  | 9.05                    |
| ESR 15                                                                                                                                              | 39.88                                                           | 14.80                  | 9.56                    | 28.64                                                            | 14.38                  | 9.05                    |
| ESR 16                                                                                                                                              | 31.50                                                           | 12.67                  | 8.50                    | 22.27                                                            | 12.63                  | 8.23                    |
| ESR 17                                                                                                                                              | 28.75                                                           | 12.31                  | 8.29                    | 20.76                                                            | 12.25                  | 8.02                    |
| ESR 18                                                                                                                                              | 28.30                                                           | 12.25                  | 8.25                    | 20.51                                                            | 12.18                  | 7.98                    |
| ESR 19                                                                                                                                              | 30.93                                                           | 12.64                  | 8.48                    | 21.98                                                            | 12.60                  | 8.21                    |
| ESR 20                                                                                                                                              | 29.14                                                           | 12.28                  | 8.27                    | 20.96                                                            | 12.21                  | 7.99                    |
| ESR 21                                                                                                                                              | 24.27                                                           | 11.98                  | 8.05                    | 17.10                                                            | 11.78                  | 7.75                    |

- 4.2.3 The results show that three of the ESR locations are predicted to experience NO<sub>2</sub> concentrations close to the annual objective in the 2019 base year, however the predicted NO<sub>2</sub> concentrations at all twenty-one locations are below the annual mean objective in the 2019 base year and the 2026 opening/future year scenarios.
- 4.2.4 The predicted PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are below the relevant objective and limit values in the 2019 base year and the 2026 opening/future year without development scenarios.

## 5 IMPACT ASSESSMENT

### 5.1 Construction Phase Assessment

#### *Step 2 – Impact Assessment*

- 5.1.1 In accordance with the IAQM guidance, the main activities to be considered during the construction phase of a development are demolition, earthworks, construction and trackout.
- 5.1.2 The proposed development site is currently open, unused land and there are no demolition activities associated with the proposed development. Therefore, demolition activities are not considered further in this assessment.
- 5.1.3 Earthworks cover the processes of soil-stripping, ground-levelling, excavation and landscaping. Construction activities will focus on the proposed buildings, access roads and car parking areas. Trackout is defined as the transport of dust and dirt by vehicles travelling from a construction site onto the public road network. This may occur through the spillage of dusty materials onto road surfaces or through the transportation of dirt by vehicles that have travelled over muddy ground on the site. This dust and dirt can then be deposited and re-suspended by other vehicles.

#### *Step 2A*

- 5.1.4 Step 2A of the assessment defines the potential dust emission magnitude from earthworks, construction and trackout in the absence of site-specific mitigation.
- 5.1.5 Examples of the criteria for the dust emission classes are detailed in **Appendix B**. The results of this step are detailed in Table 8.

#### *Step 2B*

- 5.1.6 Step 2B of the construction phase dust assessment defines the sensitivity of the area, taking into account the significance criteria detailed in **Appendix B**, for earthworks, construction and trackout. The sensitivity of the area to each activity is assessed for potential dust soiling, human health effects and ecological effects (where applicable).
- 5.1.7 For earthworks and construction, there are currently between 10 and 100 receptors (residential and commercial) within 20m of where these activities may take place, which is assumed to be the site boundary for the purpose of this assessment.
- 5.1.8 The routing of construction vehicles used in the construction of the proposed development is currently unknown and therefore a worst-case scenario has been

adopted. The assessment assumes that the construction traffic will travel along Butler Street towards Old Mill Street.

- 5.1.9 As a result, for trackout, there are between 10 and 100 receptors (mainly residential) within 20m of where trackout may occur for a distance of up to 500m from the site entrance.

### **Step 2C**

- 5.1.10 Step 2C of the construction phase dust assessment defines the risk of impacts from each activity, by combining the dust emission magnitude with the sensitivity of the surrounding area.

- 5.1.11 The risk of dust impacts from each activity, with no mitigation in place, has been assessed in accordance with the criteria detailed in **Appendix B**. The results of this step are detailed in Table 8.

### **Summary of Step 2**

- 5.1.12 Table 8 details the results of Step 2 of the construction phase assessment for human receptors.

| <b>Table 8: Construction Phase Dust Assessment for Human Receptors</b>                                                                                                                                                                                                                               |                   |                    |                     |                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------|---------------------|---------------------|
|                                                                                                                                                                                                                                                                                                      | <b>Activity</b>   |                    |                     |                     |
|                                                                                                                                                                                                                                                                                                      | <b>Demolition</b> | <b>Earthworks</b>  | <b>Construction</b> | <b>Trackout</b>     |
| <b>Step 2A</b>                                                                                                                                                                                                                                                                                       |                   |                    |                     |                     |
| Dust Emission Magnitude                                                                                                                                                                                                                                                                              | N/A               | Large <sup>a</sup> | Large <sup>b</sup>  | Medium <sup>c</sup> |
| <b>Step 2B</b>                                                                                                                                                                                                                                                                                       |                   |                    |                     |                     |
| Sensitivity of Closest Receptors                                                                                                                                                                                                                                                                     | N/A               | High               | High                | High                |
| Sensitivity of Area to Dust Soiling Effects                                                                                                                                                                                                                                                          | N/A               | High               | High                | High                |
| Sensitivity of Area to Human Health Effects                                                                                                                                                                                                                                                          | N/A               | Low <sup>d</sup>   | Low <sup>d</sup>    | Low <sup>d</sup>    |
| <b>Step 2C</b>                                                                                                                                                                                                                                                                                       |                   |                    |                     |                     |
| Dust Risk: Dust Soiling                                                                                                                                                                                                                                                                              | N/A               | High Risk          | High Risk           | Medium Risk         |
| Dust Risk: Human Health                                                                                                                                                                                                                                                                              | N/A               | Low Risk           | Low Risk            | Low Risk            |
| <i>a. Total site area estimated to be &gt; 10,000m<sup>2</sup></i><br><i>b. Total building volume estimated to be &gt; 100,000m<sup>3</sup> with potentially dusty construction materials</i><br><i>c. Number of construction phase vehicles estimated to be between 10 and 50 movements per day</i> |                   |                    |                     |                     |

**Table 8: Construction Phase Dust Assessment for Human Receptors**

|                                                                                                                                                                  | Activity   |            |              |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|--------------|----------|
|                                                                                                                                                                  | Demolition | Earthworks | Construction | Trackout |
| <i>d. Background annual mean PM<sub>10</sub> concentration is taken from the LAQM Defra default concentration maps, for the appropriate grid square for 2019</i> |            |            |              |          |

### **Step 3 – Mitigation**

5.1.13 During the construction phase, the implementation of effective mitigation measures will substantially reduce the potential for nuisance dust and fine particulate matter to be generated.

5.1.14 Step 2C of the assessment has identified that the risk of dust soiling and human health effects is not negligible for all the activities and therefore site-specific mitigation will need to be implemented to ensure that dust effects from these activities will be not significant.

### **Recommendations for Site-Specific Mitigation**

5.1.15 Specific mitigation relating to dust control may be in the form of construction best practices or could include a dust management plan. Recommendations for mitigation within the IAQM guidance include:

- Re-vegetation of earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Protection of surfaces and exposed material from winds until disturbed areas are sealed and stable;
- Dampening down of exposed stored materials, which will be stored as far from sensitive receptors as possible;
- Ensuring 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;
- Avoiding activities that generate large amounts of dust during windy conditions;
- Ensuring 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;
- Avoiding dry sweeping of large areas;

- Using 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;
- Ensuring vehicles entering and leaving the site are covered to prevent escape of materials during transport;
- Implementing a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- Minimising of vehicle movements and limitation of vehicle speeds – the slower the vehicle speeds, the lower the dust generation;
- Ensuring there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever the site size and layout permits; and
- Access gates to be located at least 10m from receptors, where possible.

5.1.16 All dust and air quality complaints should be recorded and appropriate measures be taken to identify causes and reduce emissions in a timely manner. Exceptional incidents which cause dust and/or emissions, and the action taken to resolve the situation, should be recorded in a logbook and made available to MCC on request.

5.1.17 It is recognised that the final design solutions will be developed with the input of the Contractor to maximise construction efficiencies, to use modern construction techniques and sustainable materials and to incorporate the particular skills and experience offered by the appointed Contractor.

#### ***Step 4 – Residual Effects***

5.1.18 Step 4 of the construction phase dust assessment has been undertaken to determine the significance of the dust effects arising from earthworks, construction and trackout associated with the proposed development.

5.1.19 The implementation of effective mitigation measures during the construction phase, such as those detailed in Step 3, will substantially reduce the potential for nuisance dust and fine particulate matter to be generated and any residual impact should be **not significant**.

## **5.2 Operational Phase Assessment**

### ***Existing Sensitive Receptor – Human Health***

5.2.1 This assessment has been undertaken using the latest EFT, EFT v10. A recent study

provides evidence that the previous version of the EFT, EFT v9.0, may be relied upon to predict the 'most likely' future emissions reductions where model verification has been undertaken using monitored data from 2016 or later<sup>11</sup>. A further study in September 2020 concluded that the differences between the current EFT v.10.1 and the previous EFT v.9.0.1 are sufficiently small that previous work validating the EFT remains valid<sup>12</sup>.

- 5.2.2 The results of the EFT v10.1 assessment are detailed below. However, in accordance with current national guidance, the assessment has also undertaken a sensitivity analysis for the NO<sub>2</sub> modelling, in which the 2019 background pollution concentrations and vehicle emission factors have been applied to the 2026 opening/future year to provide a conservative upper-bound to the assessment. The sensitivity analysis results are provided in **Appendix D**.
- 5.2.3 The impact assessment has been carried out for the representative existing sensitive receptors considered (i.e. ESR 1 to ESR 21).
- 5.2.4 Table 9 details the predicted NO<sub>2</sub> concentrations for the 2026 opening/future year, for both the without development and with development scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| Table 9: Predicted Adjusted NO <sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 |                                                                                         |                  |                                 |                                             |                     |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------------------------|---------------------------------------------|---------------------|
| Receptor                                                                                                         | Calculated Annual Mean NO <sub>2</sub> Concentrations (µg/m <sup>3</sup> ) <sup>a</sup> |                  |                                 |                                             |                     |
|                                                                                                                  | Without Development                                                                     | With Development |                                 | Concentration Change as Percentage of AQUAL | Impact <sup>b</sup> |
|                                                                                                                  |                                                                                         | Concentration    | Percentage in Relation to AQUAL |                                             |                     |
| ESR 1                                                                                                            | 21.37                                                                                   | 21.40            | <75%                            | <0.5%                                       | Negligible          |
| ESR 2                                                                                                            | 21.54                                                                                   | 21.57            | <75%                            | <0.5%                                       | Negligible          |
| ESR 3                                                                                                            | 18.55                                                                                   | 18.57            | <75%                            | <0.5%                                       | Negligible          |
| ESR 4                                                                                                            | 18.34                                                                                   | 18.34            | <75%                            | <0.5%                                       | Negligible          |
| ESR 5                                                                                                            | 18.57                                                                                   | 18.57            | <75%                            | <0.5%                                       | Negligible          |
| ESR 6                                                                                                            | 18.08                                                                                   | 18.08            | <75%                            | <0.5%                                       | Negligible          |

<sup>11</sup> <https://www.aqconsultants.co.uk/news/march-2020/defra%E2%80%99s-emission-factor-toolkit-now-matching-measu>

<sup>12</sup> Air Quality Consultants, Comparison of EFT v10 with EFT v9, September 2020

| Table 9: Predicted Adjusted NO <sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3                                                                                                                                                                                                                                                         |                                                                                         |                  |                                 |                                             |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------------------------|---------------------------------------------|---------------------|
| Receptor                                                                                                                                                                                                                                                                                                                                                                 | Calculated Annual Mean NO <sub>2</sub> Concentrations (µg/m <sup>3</sup> ) <sup>a</sup> |                  |                                 |                                             |                     |
|                                                                                                                                                                                                                                                                                                                                                                          | Without Development                                                                     | With Development |                                 | Concentration Change as Percentage of AQUAL | Impact <sup>b</sup> |
|                                                                                                                                                                                                                                                                                                                                                                          |                                                                                         | Concentration    | Percentage in Relation to AQUAL |                                             |                     |
| ESR 7                                                                                                                                                                                                                                                                                                                                                                    | 19.84                                                                                   | 19.84            | <75%                            | <0.5%                                       | Negligible          |
| ESR 8                                                                                                                                                                                                                                                                                                                                                                    | 26.59                                                                                   | 26.59            | <75%                            | <0.5%                                       | Negligible          |
| ESR 9                                                                                                                                                                                                                                                                                                                                                                    | 20.45                                                                                   | 20.46            | <75%                            | <0.5%                                       | Negligible          |
| ESR 10                                                                                                                                                                                                                                                                                                                                                                   | 17.88                                                                                   | 17.88            | <75%                            | <0.5%                                       | Negligible          |
| ESR 11                                                                                                                                                                                                                                                                                                                                                                   | 18.21                                                                                   | 18.21            | <75%                            | <0.5%                                       | Negligible          |
| ESR 12                                                                                                                                                                                                                                                                                                                                                                   | 18.95                                                                                   | 18.95            | <75%                            | <0.5%                                       | Negligible          |
| ESR 13                                                                                                                                                                                                                                                                                                                                                                   | 27.82                                                                                   | 27.82            | <75%                            | <0.5%                                       | Negligible          |
| ESR 14                                                                                                                                                                                                                                                                                                                                                                   | 28.69                                                                                   | 28.69            | <75%                            | <0.5%                                       | Negligible          |
| ESR 15                                                                                                                                                                                                                                                                                                                                                                   | 28.64                                                                                   | 28.64            | <75%                            | <0.5%                                       | Negligible          |
| ESR 16                                                                                                                                                                                                                                                                                                                                                                   | 22.27                                                                                   | 22.27            | <75%                            | <0.5%                                       | Negligible          |
| ESR 17                                                                                                                                                                                                                                                                                                                                                                   | 20.76                                                                                   | 20.76            | <75%                            | <0.5%                                       | Negligible          |
| ESR 18                                                                                                                                                                                                                                                                                                                                                                   | 20.51                                                                                   | 20.51            | <75%                            | <0.5%                                       | Negligible          |
| ESR 19                                                                                                                                                                                                                                                                                                                                                                   | 21.98                                                                                   | 21.98            | <75%                            | <0.5%                                       | Negligible          |
| ESR 20                                                                                                                                                                                                                                                                                                                                                                   | 20.96                                                                                   | 20.96            | <75%                            | <0.5%                                       | Negligible          |
| ESR 21                                                                                                                                                                                                                                                                                                                                                                   | 17.10                                                                                   | 17.10            | <75%                            | <0.5%                                       | Negligible          |
| <sup>a</sup> NO <sub>2</sub> concentrations obtained by inputting predicted NO <sub>x</sub> concentrations into the NO <sub>x</sub> to NO <sub>2</sub> calculator, in accordance with LAQM.TG(16)<br><sup>b</sup> Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible |                                                                                         |                  |                                 |                                             |                     |

5.2.5 The results of the assessment show that with the development in place, the NO<sub>2</sub> concentrations at all existing sensitive receptors considered are predicted to remain below the relevant objective. In accordance with the EPUK/IAQM guidance, all impacts as a result of the development are classed as negligible.

5.2.6 Table 10 details the PM<sub>10</sub> concentrations for the 2026 opening/future year, for both the without development and with development scenarios. The impact has been

assessed in accordance with the descriptors included in **Appendix C**.

| <b>Table 10: Predicted Unadjusted PM<sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3</b>                                          |                                                                                |                         |                                       |                                                   |                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------|---------------------------------------|---------------------------------------------------|---------------------------|
| <b>Receptor</b>                                                                                                                                                     | <b>Calculated Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)</b> |                         |                                       |                                                   |                           |
|                                                                                                                                                                     | <b>Without Development</b>                                                     | <b>With Development</b> |                                       | <b>Concentration Change as Percentage of AQAL</b> | <b>Impact<sup>a</sup></b> |
|                                                                                                                                                                     |                                                                                | <b>Concentration</b>    | <b>Percentage in Relation to AQAL</b> |                                                   |                           |
| ESR 1                                                                                                                                                               | 12.44                                                                          | 12.45                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 2                                                                                                                                                               | 12.41                                                                          | 12.42                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 3                                                                                                                                                               | 12.18                                                                          | 12.19                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 4                                                                                                                                                               | 12.17                                                                          | 12.17                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 5                                                                                                                                                               | 12.25                                                                          | 12.25                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 6                                                                                                                                                               | 12.13                                                                          | 12.13                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 7                                                                                                                                                               | 12.77                                                                          | 12.77                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 8                                                                                                                                                               | 13.46                                                                          | 13.46                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 9                                                                                                                                                               | 12.55                                                                          | 12.56                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 10                                                                                                                                                              | 11.99                                                                          | 11.99                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 11                                                                                                                                                              | 12.06                                                                          | 12.06                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 12                                                                                                                                                              | 12.30                                                                          | 12.30                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 13                                                                                                                                                              | 14.02                                                                          | 14.02                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 14                                                                                                                                                              | 14.37                                                                          | 14.37                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 15                                                                                                                                                              | 14.38                                                                          | 14.38                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 16                                                                                                                                                              | 12.63                                                                          | 12.63                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 17                                                                                                                                                              | 12.25                                                                          | 12.25                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 18                                                                                                                                                              | 12.18                                                                          | 12.18                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 19                                                                                                                                                              | 12.60                                                                          | 12.60                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 20                                                                                                                                                              | 12.21                                                                          | 12.21                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 21                                                                                                                                                              | 11.78                                                                          | 11.78                   | <75%                                  | <0.5%                                             | Negligible                |
| <sup>a</sup> Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible |                                                                                |                         |                                       |                                                   |                           |

- 5.2.7 The results of the conservative assessment show that in the 2026 opening/future year, with the development in place, the PM<sub>10</sub> concentrations are predicted to remain below the relevant objective at all existing sensitive receptors considered. In accordance with the EPUK/IAQM guidance, all impacts as a result of the development are classed as negligible.
- 5.2.8 Table 11 details the PM<sub>2.5</sub> concentrations for the 2026 opening/future year, for both the without development and with development scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| <b>Table 11: Predicted Unadjusted PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3</b> |                                                                                |                         |                                       |                                                   |                           |
|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------|---------------------------------------|---------------------------------------------------|---------------------------|
| <b>Receptor</b>                                                                                                             | <b>Calculated Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)</b> |                         |                                       |                                                   |                           |
|                                                                                                                             | <b>Without Development</b>                                                     | <b>With Development</b> |                                       | <b>Concentration Change as Percentage of AQAL</b> | <b>Impact<sup>a</sup></b> |
|                                                                                                                             |                                                                                | <b>Concentration</b>    | <b>Percentage in Relation to AQAL</b> |                                                   |                           |
| ESR 1                                                                                                                       | 8.12                                                                           | 8.12                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 2                                                                                                                       | 8.11                                                                           | 8.11                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 3                                                                                                                       | 7.97                                                                           | 7.97                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 4                                                                                                                       | 7.96                                                                           | 7.96                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 5                                                                                                                       | 8.01                                                                           | 8.01                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 6                                                                                                                       | 7.94                                                                           | 7.94                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 7                                                                                                                       | 8.29                                                                           | 8.29                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 8                                                                                                                       | 8.55                                                                           | 8.55                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 9                                                                                                                       | 8.18                                                                           | 8.18                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 10                                                                                                                      | 7.87                                                                           | 7.87                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 11                                                                                                                      | 7.90                                                                           | 7.90                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 12                                                                                                                      | 8.03                                                                           | 8.03                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 13                                                                                                                      | 8.85                                                                           | 8.85                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 14                                                                                                                      | 9.05                                                                           | 9.05                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 15                                                                                                                      | 9.05                                                                           | 9.05                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 16                                                                                                                      | 8.23                                                                           | 8.23                    | <75%                                  | <0.5%                                             | Negligible                |
| ESR 17                                                                                                                      | 8.02                                                                           | 8.02                    | <75%                                  | <0.5%                                             | Negligible                |

| Table 11: Predicted Unadjusted PM <sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3                                               |                                                                            |                  |                                |                                            |                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------|--------------------------------|--------------------------------------------|---------------------|
| Receptor                                                                                                                                                            | Calculated Annual Mean NO <sub>2</sub> Concentrations (µg/m <sup>3</sup> ) |                  |                                |                                            |                     |
|                                                                                                                                                                     | Without Development                                                        | With Development |                                | Concentration Change as Percentage of AQAL | Impact <sup>a</sup> |
|                                                                                                                                                                     |                                                                            | Concentration    | Percentage in Relation to AQAL |                                            |                     |
| ESR 18                                                                                                                                                              | 7.98                                                                       | 7.98             | <75%                           | <0.5%                                      | Negligible          |
| ESR 19                                                                                                                                                              | 8.21                                                                       | 8.21             | <75%                           | <0.5%                                      | Negligible          |
| ESR 20                                                                                                                                                              | 7.99                                                                       | 7.99             | <75%                           | <0.5%                                      | Negligible          |
| ESR 21                                                                                                                                                              | 7.75                                                                       | 7.75             | <75%                           | <0.5%                                      | Negligible          |
| <sup>a</sup> Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible |                                                                            |                  |                                |                                            |                     |

5.2.9 The results of the conservative assessment show that in the 2026 opening/future year with the development in place, the PM<sub>2.5</sub> concentrations are predicted to remain below the relevant limit value at all existing sensitive receptors considered. In accordance with the EPUK/IAQM guidance, all impacts as a result of the development are classed as negligible.

#### Proposed Sensitive Receptors

5.2.10 Pollutant concentrations have been modelled for the proposed sensitive receptors for the 2026 opening/future year, as detailed in Table 12.

| Table 12: Predicted NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> Concentrations at the Proposed Sensitive Receptors for Scenario 3 |                                                            |                  |                   |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------|-------------------|
| Proposed Sensitive Receptor                                                                                                                    | Calculated Annual Mean Concentrations (µg/m <sup>3</sup> ) |                  |                   |
|                                                                                                                                                | NO <sub>2</sub>                                            | PM <sub>10</sub> | PM <sub>2.5</sub> |
| PR 1                                                                                                                                           | 20.39                                                      | 12.69            | 8.25              |
| PR 2                                                                                                                                           | 21.79                                                      | 12.82            | 8.33              |

5.2.11 All predicted pollutant concentrations are below the relevant objectives/limit values, at both proposed sensitive receptors considered.

### Assessment of Significance for Human Receptors

5.2.12 The significance of the overall effects of the proposed development has been assessed in accordance with the EPUK/IAQM guidance. This assessment is based on professional judgement and details of the assessor's experience is included in **Appendix E**.

5.2.13 The assessment of significance has taken into account a number of factors, including:

- Baseline NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations in the 2019 base year are below the relevant annual mean objectives and limit value for all existing receptors;
- NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations in 2026 are below the relevant annual mean objectives at all of the twenty-one existing sensitive receptors considered in the EFT 10.1 assessment. The proposed development does not lead to an exceedance of the objectives;
- The EFT 10.1 assessment predicts a negligible impact on NO<sub>2</sub> PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at all twenty-one existing sensitive receptors considered, with the development in place;
- The sensitivity analysis (included in **Appendix D**) also predicts negligible impacts on NO<sub>2</sub> PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at all twenty-one existing sensitive receptors considered, with the development in place;
- Pollutant concentrations within the proposed development site are predicted to be well below the relevant objectives and limit values.

5.2.14 Based on the above factors, in accordance with the EPUK/IAQM guidance, the effect of the proposed development on human receptors is considered to be **not significant**.

## 6 CONCLUSIONS

### 6.1 Construction Phase Assessment

6.1.1 The construction phase assessment has been undertaken to determine the risk and significance of dust and fine particulate matter effects from earthworks, construction and trackout associated with the proposed development, in accordance with guidance published by the IAQM.

6.1.2 With site specific mitigation measures in place, the significance of dust and fine particulate matter effects from earthworks, construction and trackout is considered to be **not significant**.

### 6.2 Operational Phase Assessment

#### *Existing Sensitive Receptors*

6.2.1 An air quality assessment has been undertaken using EFT 10.1 to predict pollutant concentrations as a result of the proposed development.

6.2.2 The predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations in 2026 are below the relevant annual mean objectives at all of the twenty-one existing sensitive receptors considered in the EFT 10.1 assessment. The proposed development does not lead to an exceedance of the objectives.

6.2.3 The EFT 10.1 assessment predicts a negligible impact on NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at all twenty-one existing sensitive receptors considered, with the development in place.

6.2.4 The conservative sensitivity analysis (included in **Appendix D**) also predicts a negligible impact on NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at all twenty-one existing sensitive receptors considered, with the development in place.

6.2.5 Predicted pollutant concentrations within the development site are below the relevant annual mean objectives and limit values at the proposed receptors considered in the assessment and the sensitivity analysis.

6.2.6 The effect of the proposed development on human receptors is therefore considered to be **not significant**.

#### *Recommendations for Mitigation*

6.2.8 The impact of the proposed development is predicted to be not significant. However, mitigation measures will assist in reducing any potential impact and general best

practice measures in relation to air quality could be implemented.

- 6.2.9 This could include measures such as the inclusion of EV charging points, the installation of low NO<sub>x</sub> boilers and the provision of a travel plan.

### **6.3 Summary**

- 6.3.1 The assessment demonstrates that the proposed development will accord with all relevant national planning policy and will not lead to an unacceptable risk from air pollution. There are no material reasons in relation to air quality why the proposed scheme should not proceed, subject to appropriate planning conditions.

## APPENDICES

## **Appendix A: Air Quality Legislation and Guidance**

### **European Legislation**

- A.1 The European Union (EU) Ambient Air Quality Directive 2008/50/EC<sup>1</sup> (i.e. the CAFE Directive) came into force in June 2008. This EU Directive consolidates previous air quality legislation, with the exception of the 4<sup>th</sup> daughter Directive<sup>2</sup>, and sets air quality limit values for seven pollutants. The Directive also provides a regulatory framework for fine particulate matter smaller than 2.5µm in diameter (PM<sub>2.5</sub>).
- A.2 EU Directive 2008/50/EC was transposed into legislation in the UK on 11<sup>th</sup> June 2010 as The Air Quality Standards Regulations 2010<sup>3</sup>.

### **National Air Quality Strategy**

- A.3 The Environment Act 1995 requires the UK government to prepare a national Air Quality Strategy. The first UK strategy was published in March 1997, setting out policies for the management of ambient air quality. This was subsequently updated in 2007<sup>4</sup>.
- A.4 The 2007 strategy establishes the framework for air quality management in England, Scotland, Wales and Northern Ireland. Air quality standards and objectives are set out for eight pollutants which may potentially occur at levels that give cause for concern. The strategy also provides details of the role that local authorities are required to take in working towards improvements in air quality, known as the Local Air Quality Management (LAQM) regime.

### **Air Quality Standards and Objectives**

- A.5 Air quality standards and objectives are set out in the strategy for the following pollutants: nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), lead (Pb), fine particulate matter (PM<sub>10</sub>), benzene (C<sub>6</sub>H<sub>6</sub>), 1, 3-butadiene (C<sub>4</sub>H<sub>6</sub>) and ozone (O<sub>3</sub>).

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<sup>1</sup> 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

<sup>2</sup> Directive 2004/107/EC of the European Parliament and the Council of 15<sup>th</sup> December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air

<sup>3</sup> The Air Quality Standards Regulations 2010

<sup>4</sup> Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007

A.6 Objectives for each pollutant, except O<sub>3</sub>, were first given statutory status in the Air Quality Regulations 2000<sup>5</sup> and Air Quality (Amendment) Regulations 2002<sup>6</sup>. These objectives are defined in the strategy as:

*“the maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, within a specified timescale.”*

A.7 The EU limit values, transposed into UK legislation as The Air Quality Standards Regulations 2010, are mostly the same as the air quality objectives in terms of concentrations; however, there are differences in determining how compliance is achieved.

A.8 Whilst there is no specific objective for PM<sub>2.5</sub> in England and Wales, a limit value of 25µg/m<sup>3</sup> is referred to in the regulations, which has been adopted for use in this assessment (as recommended by the LAQM Helpdesk). An objective has been set for PM<sub>2.5</sub> in Scotland since early 2016.

A.9 Examples of where these objectives and limit values apply are detailed in the Defra LAQM Technical Guidance document LAQM.TG(16)<sup>7</sup> and are included in Table A1.

| Table A1: Examples of Where the Air Quality Objectives Should Apply |                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Averaging Period                                                    | Objectives Should Apply at:                                                                                                                               | Objectives Should Generally Not Apply at:                                                                                                                                                                                                                                                                                                                        |
| Annual mean                                                         | All locations where members of the public might be regularly exposed.<br>Building façades of residential properties, schools, hospitals, care homes, etc. | Building facades of offices or other places of work where members of the public do not have regular access.<br>Hotels, unless people live there as their permanent residence.<br>Gardens of residential properties.<br>Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term |
| 24-hour mean and 8-hour mean                                        | All locations where the annual mean objectives would apply, together with hotels.<br>Gardens of residential properties <sup>a</sup>                       | Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term                                                                                                                                                                                                                        |

<sup>5</sup> The Air Quality Regulations 2000. SI No 928

<sup>6</sup> The Air Quality (Amendment) Regulations 2002

<sup>7</sup> Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(16), February 2018

| Table A1: Examples of Where the Air Quality Objectives Should Apply                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Averaging Period                                                                                                                                                                                                                                                                                                                                              | Objectives Should Apply at:                                                                                                                                                                                                                                                                                                                                                                                        | Objectives Should Generally Not Apply at:                                |
| 1-hour mean                                                                                                                                                                                                                                                                                                                                                   | All locations where the annual mean and 24 and 8-hour objectives apply.<br>Kerbside sites (e.g. pavements of busy shopping streets).<br>Those parts of car parks and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more.<br>Any outdoor locations to which the public might reasonably be expected to spend one hour or longer | Kerbside sites where public would not be expected to have regular access |
| 15-minute mean                                                                                                                                                                                                                                                                                                                                                | All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer                                                                                                                                                                                                                                                                                                         |                                                                          |
| <i><sup>a</sup>. Such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied</i> |                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                          |

### Local Air Quality Management

- A.10 LAQM legislation in the Environment Act 1995 requires local authorities to conduct the periodic review and assessments of air quality. These aim to identify all those areas where the objectives are being, or are likely to be, exceeded. Where exceedances are likely to occur, local authorities are required to declare an Air Quality Management Area (AQMA).
- A.11 LAQM.TG(16) presents a streamlined approach for LAQM in England and Scotland; however, Wales and Northern Ireland are still considering changes to LAQM and therefore work according to the previous regimes.
- A.12 Local authorities in England are required to produce Annual Status Reports (ASRs), and in Scotland, Annual Progress Reports (APRs). These replace all other reports which previously had to be submitted including Updating and Screening Assessments, Progress Reports and Detailed Assessments (which would be produced to assist with an AQMA declaration).
- A.13 Local authorities now have the option of a fast track AQMA declaration option. This allows more expert judgement to be used and removes the need for a Detailed

Assessment where a local authority is confident of the outcome. Detailed Assessments should however still be used if there is any doubt.

- A.14 As part of the UK Government's requirement to improve air quality, selected local authorities in England are also currently investigating the feasibility of setting up Clean Air Zones (CAZs). These are areas where targeted action and co-ordinated resources aim to improve air quality within an urban setting, in order to achieve compliance with the EU limit values within the shortest possible time.
- A.15 Five local authorities outside of London were initially selected to implement a CAZ by 2020 (Birmingham, Leeds, Nottingham, Derby and Southampton). A further 23 local authorities were subsequently chosen to investigate the feasibility of establishing a CAZ, and 33 local authorities may potentially have to proceed to this stage where compliance is not achieved.

#### **National Planning Policy Framework**

- A.16 The National Planning Policy Framework (NPPF)<sup>8</sup>, introduced in March 2012 and most recently updated in February 2019, requires that:

*"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of AQMAs and CAZs, 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 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 AQMAs and CAZs is consistent with the local air quality action plan."*

#### **Planning Practice Guidance**

- A.17 The Planning Practice Guidance (PPG)<sup>9</sup>, updated in November 2019, states that 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

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<sup>8</sup> Ministry of Housing, Communities and Local Government, National Planning Policy Framework, February 2019

<sup>9</sup> Department for Communities and Local Government. Planning Practice Guidance: Air Quality, March 2014

likely to generate air quality impacts 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).

- A.18 Where a proposed development is anticipated to give rise to concerns about air quality, an appropriate assessment needs to be carried out. Where the assessment concludes that the proposed development (including mitigation) will not lead to an unacceptable risk from air pollution, prevent sustained compliance with national objectives or fail to comply with the requirements of the Habitats Regulations, then the local authority should proceed to decision with appropriate planning conditions and/or obligations.

## Appendix B: Methodology for Construction Phase Assessment

### Institute of Air Quality Management Guidance

- B.1 The methodology for the construction phase dust assessment is set out in guidance from the Institute of Air Quality Management (IAQM)<sup>10</sup>.

#### Step 1

- B.2 Step 1 is to screen the requirement for a more detailed assessment. The guidance states that an assessment will normally be required where there are existing sensitive human receptors within 350m of the site boundary and/or within 100m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- B.3 With regards to ecological receptors, the guidance states that an assessment will normally be required where there are existing receptors within 50m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- B.4 Where any of these criteria are met, it is necessary to proceed to Step 2.

#### Step 2

- B.5 Step 2 determines the potential risk of dust arising in sufficient quantities to cause annoyance and/or health or ecological impacts. The risk is related to:
- The activities being undertaken (demolition, number of vehicles and plant etc);
  - The duration of these activities;
  - The size of the site;
  - The meteorological conditions (wind speed, direction and rainfall);
  - The proximity of receptors to the activity;
  - The adequacy of the mitigation measures applied to reduce or eliminate dust; and
  - The sensitivity of receptors to dust.
- B.6 The risk of dust impacts is determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based upon the following two factors (known as Step 2A and Step 2B).

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<sup>10</sup> Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, February 2014

B.7 **Step 2A** assesses the scale and nature of the works which determines the potential dust emission magnitude as small, medium or large. Examples of how the magnitude may be defined are included in Table B1.

| Table B1: Determining the Dust Emission Magnitude of Construction Phase Activities                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Activity                                                                                                                                                                                                                                                     | Dust Emission Class                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                              | Large                                                                                                                                                                                                                                                                                              | Medium                                                                                                                                                                                                                                  | Small                                                                                                                                                                                                                                                            |
| <b>Demolition</b>                                                                                                                                                                                                                                            | Total building volume >50,000m <sup>3</sup> ;<br>Potentially dusty construction material (e.g. concrete);<br>On-site crushing and screening;<br>Demolition activities >20m above ground level                                                                                                      | Total building volume 20,000-50,000m <sup>3</sup> ;<br>Potentially dusty construction material;<br>Demolition activities 10-20m above ground level                                                                                      | Total building volume <20,000m <sup>3</sup> ;<br>Construction material with low potential for dust release (e.g. metal cladding or timber)                                                                                                                       |
| <b>Earthworks</b>                                                                                                                                                                                                                                            | Total site area >10,000m <sup>2</sup> ;<br>Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size);<br>>10 heavy earth moving vehicles active at any one time;<br>Formation of bunds >8m in height;<br>Total material moved >100,000 tonnes | Total site area 2,500-10,000m <sup>2</sup> ;<br>Moderately dusty soil type (e.g. silt);<br>5-10 heavy earth moving vehicles active at any one time;<br>Formation of bunds 4-8m in height;<br>Total material moved 20,000-100,000 tonnes | Total site area <2,500m <sup>2</sup> ;<br>Soil type with large grain size (e.g. sand);<br><5 heavy earth moving vehicles active at any one time;<br>Formation of bunds <4m in height;<br>Total material moved <20,000 tonnes;<br>Earthworks during wetter months |
| <b>Construction</b>                                                                                                                                                                                                                                          | Total building volume >100,000m <sup>3</sup> ;<br>On-site concrete batching;<br>Sandblasting                                                                                                                                                                                                       | Total building volume 25,000-100,000m <sup>3</sup> ;<br>Potentially dusty construction material (e.g. concrete);<br>On-site batching                                                                                                    | Total building volume <25,000m <sup>3</sup> ;<br>Construction material with a low potential for dust release (e.g. metal cladding or timber)                                                                                                                     |
| <b>Trackout</b>                                                                                                                                                                                                                                              | >50 HDV (>3.5t) outward movements <sup>a</sup> in any one day <sup>b</sup> ;<br>Potentially dusty surface material (e.g. high clay content);<br>Unpaved road length >100m                                                                                                                          | 10-50 HDV (>3.5t) outward movements <sup>a</sup> in any one day <sup>b</sup> ;<br>Moderately dusty surface material (e.g. high clay content);<br>Unpaved road length 50-100m                                                            | <10 HDV (>3.5t) outward movements <sup>a</sup> in any one day <sup>b</sup> ;<br>Surface material with low potential for dust release;<br>Unpaved road length <50m                                                                                                |
| <p><i>a. A vehicle movement is a one way journey i.e. from A to B, and excludes the return journey</i><br/> <i>b. HDV movements during a construction project may vary over its lifetime, and the number of movements is the maximum not the average</i></p> |                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                  |

B.8 **Step 2B** considers the sensitivity of the area to dust impacts which is defined as low, medium or high. The sensitivity categories for different types of receptors are described in Table B2.

| Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects |                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sensitivity Category                                                                   | Dust Soiling Effects                                                                                                                                                                                                                                                                                                                                                                          | Health effects of PM <sub>10</sub>                                                                                                                                                                                                                                          | Ecological Effects                                                                                                                                                                                                                                                                                    |
| <b>High</b>                                                                            | Users can reasonably expect to enjoy a high level of amenity; Appearance, aesthetics or value of a property would be diminished; Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car show rooms                                                                                                                            | Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM <sub>10</sub> ; Examples include residential properties, hospitals, schools, and residential care homes                                                | Locations with an international or national designation and the designated features may be affected by dust soiling; Locations where there is a community of a particularly dust sensitive species; Examples include a Special Area of Conservation with dust sensitive features                      |
| <b>Medium</b>                                                                          | Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; The appearance, aesthetics or value of their property could be diminished; People or property wouldn't reasonably be expected to be continuously present or regularly for extended periods of time; Examples include parks and places of work | Locations where people are exposed as workers and exposure is over a period of time relevant to the air quality objective for PM <sub>10</sub> ; Examples include office and shop workers but will generally not include workers occupationally exposed to PM <sub>10</sub> | Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; Locations with a national designation where the features may be affected by dust deposition; Examples include a Site of Special Scientific Interest with dust sensitive features |

| Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects |                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                          |                                                                                                                                                                              |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sensitivity Category                                                                   | Dust Soiling Effects                                                                                                                                                                                                                                                                                                                                                            | Health effects of PM <sub>10</sub>                                                                                                       | Ecological Effects                                                                                                                                                           |
| <b>Low</b>                                                                             | <p>Enjoyment of amenity would not reasonably be expected;</p> <p>Property would not be diminished in appearance, aesthetics or value;</p> <p>People or property would be expected to be present only for limited periods of time;</p> <p>Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads</p> | <p>Locations where human exposure is transient;</p> <p>Examples include public footpaths, playing fields, parks and shopping streets</p> | <p>Locations with a local designation where the features may be affected by dust deposition;</p> <p>Examples include a Local Nature Reserve with dust sensitive features</p> |

B.9 Based on the sensitivity of individual receptors, the overall sensitivity of the area to dust soiling, human health and ecological effects is then determined using the criteria detailed in Tables B3 to B5, respectively.

| Table B3: Sensitivity of the Area to Dust Soiling Effects on People and Property <sup>ab</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                                       |        |        |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------------------|--------|--------|-------|
| Receptor Sensitivity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Number of Receptors | Distance from Source (m) <sup>c</sup> |        |        |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     | <20m                                  | <50m   | <100m  | <350m |
| <b>High</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | >100                | High                                  | High   | Medium | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10-100              | High                                  | Medium | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1-10                | Medium                                | Low    | Low    | Low   |
| <b>Medium</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | >1                  | Medium                                | Low    | Low    | Low   |
| <b>Low</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | >1                  | Low                                   | Low    | Low    | Low   |
| <p>a. The sensitivity to the area should be derived for each of the four activities</p> <p>b. Estimate the total number of receptors within the stated distance. Only the highest level of sensitivity from the table needs to be considered</p> <p>c. For trackout, distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur for up to 500m from large sites, 200m from medium sites and 50m from small sites, measured from the site exit. The impact declines with distance from the site and it is only necessary to consider trackout impacts up to 50m from the edge of the road</p> |                     |                                       |        |        |       |

| Table B4: Sensitivity of the Area to Human Health Impacts <sup>ab</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                         |                                  |                                       |        |        |        |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|---------------------------------------|--------|--------|--------|-------|
| Receptor Sensitivity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Annual Mean PM <sub>10</sub> Concentration <sup>c</sup> | Number of Receptors <sup>d</sup> | Distance from Source (m) <sup>e</sup> |        |        |        |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                  | <20m                                  | <50m   | <100m  | <200m  | <350m |
| High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | >32µg/m <sup>3</sup>                                    | >100                             | High                                  | High   | High   | Medium | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 10-100                           | High                                  | High   | Medium | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 1-10                             | High                                  | Medium | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 28-32µg/m <sup>3</sup>                                  | >100                             | High                                  | High   | Medium | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 10-100                           | High                                  | Medium | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 1-10                             | High                                  | Medium | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 24-28µg/m <sup>3</sup>                                  | >100                             | High                                  | Medium | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 10-100                           | High                                  | Medium | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 1-10                             | Medium                                | Low    | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <24µg/m <sup>3</sup>                                    | >100                             | Medium                                | Low    | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 10-100                           | Low                                   | Low    | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 1-10                             | Low                                   | Low    | Low    | Low    | Low   |
| Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | >32µg/m <sup>3</sup>                                    | >10                              | High                                  | Medium | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 1-10                             | Medium                                | Low    | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 28-32µg/m <sup>3</sup>                                  | >10                              | Medium                                | Low    | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 1-10                             | Low                                   | Low    | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 24-28µg/m <sup>3</sup>                                  | >10                              | Low                                   | Low    | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 1-10                             | Low                                   | Low    | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <24µg/m <sup>3</sup>                                    | >10                              | Low                                   | Low    | Low    | Low    | Low   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | 1-10                             | Low                                   | Low    | Low    | Low    | Low   |
| Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -                                                       | >1                               | Low                                   | Low    | Low    | Low    | Low   |
| <p>a. The sensitivity to the area should be derived for each of the four activities</p> <p>b. Estimate the total number of receptors within the stated distance. Only the highest level of sensitivity from the table needs to be considered</p> <p>c. Most straightforwardly taken from the national background maps, but should also take account of local sources. The values are based on 32µg/m<sup>3</sup> being the annual mean concentration at which an exceedance of the 24-hour mean objective is likely in England, Wales and Northern Ireland. In Scotland, there is an annual mean objective of 18µg/m<sup>3</sup></p> <p>d. In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties</p> <p>e. For trackout, distances should be measured from the side of the roads used by construction traffic</p> |                                                         |                                  |                                       |        |        |        |       |

| Table B5: Sensitivity of the Area to Ecological Impacts <sup>ab</sup>                                                                                                                                                                                                                      |                                           |        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------|
| Receptor Sensitivity                                                                                                                                                                                                                                                                       | Distance from the Source (m) <sup>c</sup> |        |
|                                                                                                                                                                                                                                                                                            | <20                                       | <50    |
| High                                                                                                                                                                                                                                                                                       | High                                      | Medium |
| Medium                                                                                                                                                                                                                                                                                     | Medium                                    | Low    |
| Low                                                                                                                                                                                                                                                                                        | Low                                       | Low    |
| <p>a. The sensitivity to the area should be derived for each of the four activities</p> <p>b. Only the highest level of sensitivity from the table needs to be considered</p> <p>c. For trackout, distances should be measured from the side of the roads used by construction traffic</p> |                                           |        |

B.10 These two factors are combined in **Step 2C** to determine the risk of dust impacts with no mitigation applied.

B.11 The risk of dust effects is determined for four types of construction phase activities, with each activity being considered separately. If a construction phase activity is not taking place on the site, then it does not need to be assessed. The four types of activities to be considered are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

B.12 The risk of dust being generated by demolition activities at the site is determined using the criteria in Table B6.

| Table B6: Risk of Dust Impacts for Demolition |                         |             |             |
|-----------------------------------------------|-------------------------|-------------|-------------|
| Sensitivity of Area                           | Dust Emission Magnitude |             |             |
|                                               | Large                   | Medium      | Small       |
| High                                          | High Risk               | Medium Risk | Medium Risk |
| Medium                                        | High Risk               | Medium Risk | Low Risk    |
| Low                                           | Medium Risk             | Low Risk    | Negligible  |

B.13 The risk of dust being generated by earthworks and construction at the site is determined using the criteria in Table B7.

| Table B7: Risk of Dust Impacts for Earthworks and Construction |                         |             |            |
|----------------------------------------------------------------|-------------------------|-------------|------------|
| Sensitivity of Area                                            | Dust Emission Magnitude |             |            |
|                                                                | Large                   | Medium      | Small      |
| High                                                           | High Risk               | Medium Risk | Low Risk   |
| Medium                                                         | Medium Risk             | Medium Risk | Low Risk   |
| Low                                                            | Low Risk                | Low Risk    | Negligible |

- B.14 The risk of dust being generated by trackout at the site is determined using the criteria in Table B8.

| Table B8: Risk of Dust Impacts for Trackout |                         |             |            |
|---------------------------------------------|-------------------------|-------------|------------|
| Sensitivity of Area                         | Dust Emission Magnitude |             |            |
|                                             | Large                   | Medium      | Small      |
| High                                        | High Risk               | Medium Risk | Low Risk   |
| Medium                                      | Medium Risk             | Low Risk    | Negligible |
| Low                                         | Low Risk                | Low Risk    | Negligible |

### Step 3

- B.15 Step 3 of the assessment determines the site-specific mitigation required for each of the activities, based on the risk determined in Step 2. Mitigation measures are detailed in guidance published by the Greater London Authority<sup>11</sup>, recommended for use outside the capital by LAQM guidance, and the IAQM guidance document itself. Professional judgement should be used to determine the type and scale of mitigation measures required.
- B.16 If the risk is classed as negligible, no mitigation measures beyond those required by legislation will be necessary.

### Step 4

- B.17 Step 4 assesses the residual effect, with mitigation measures in place, to determine whether or not these are significant.

<sup>11</sup> Greater London Authority, The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance, 2006

### **Professional Judgement**

- B.18 The IAQM guidance makes reference to the use of professional judgement when assessing the risks of dust and fine particulate matter from demolition and construction sites. Details of the experience of the personnel involved with the project are provided in **Appendix E**.

## Appendix C: Methodology for Operational Phase Assessment

### Air Dispersion Modelling Inputs

- C.1 The air dispersion model ADMS-Roads (CERC, Version 5.0) has been used to assess the potential air quality impacts associated with development-generated road traffic emissions. This dispersion model is widely used and accepted for the purpose of undertaking assessments to support both planning and Environmental Permit applications.

### Traffic Flow Data

- C.2 The ADMS-Roads model requires the input of detailed road traffic flow data for those routes which may be affected by the proposed development. Traffic flow data has been provided for this project by Eddisons, the appointed transport consultants for the project. The study extent of the model is shown in Figure C.1.

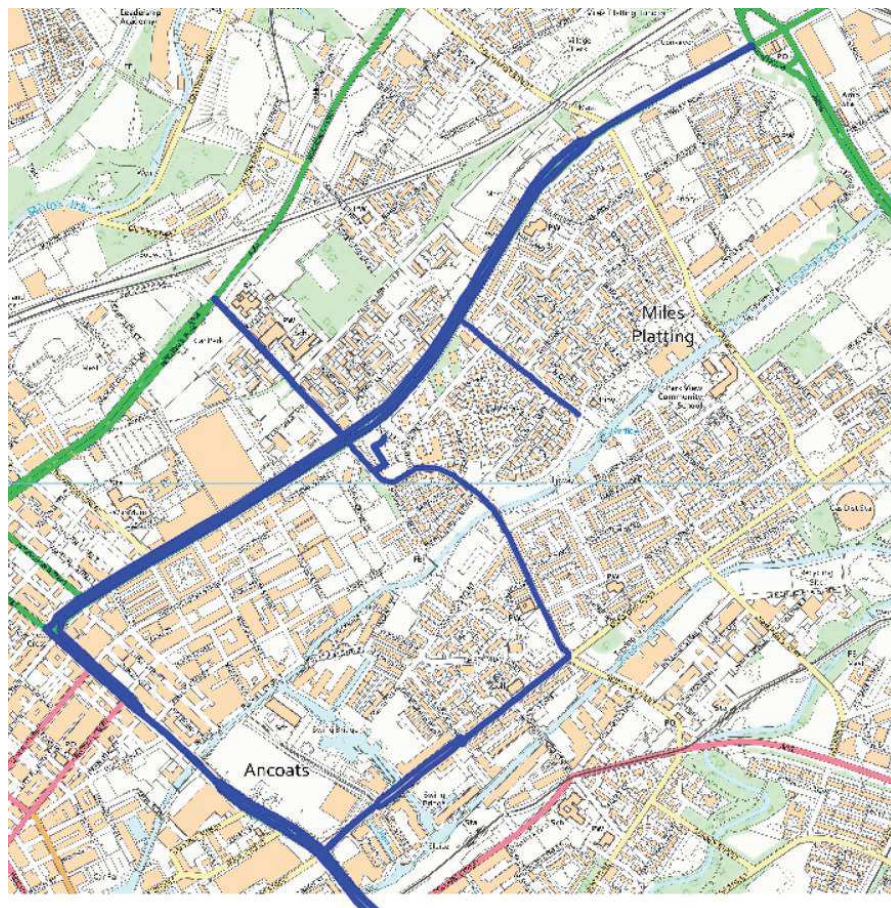


**Figure C.1:** Study Extent of Air Dispersion Model. The roads modelled in the assessment can be seen in blue ('Reproduced from Ordnance Survey Maps © Crown Copyright All Rights Reserved Licence No. 0100031673')

- C.3 Data has been provided as 24-hour Annual Average Daily Traffic (AADT) flows, with HDV percentages. Average speed information has not been provided and so individual road speed limits have been applied to each road link.
- C.4 A reduction to 15 has been applied to locations where congestion or the slowing down of vehicles would be expected.
- C.5 The traffic flow data used in the assessment is included in Table C1.

| Link | Link Name                          | Speed Info (kph) | Scenario 1: 2019 Verification and Base Year |      | Scenario 2: 2026 Opening/Future Year, With Development |     | Scenario 3: 2026 Opening/Future Year, With Development |      |
|------|------------------------------------|------------------|---------------------------------------------|------|--------------------------------------------------------|-----|--------------------------------------------------------|------|
|      |                                    |                  | LGV                                         | HGV  | LGV                                                    | HGV | LGV                                                    | HGV  |
| 1    | Butler Street                      | 32               | 7590                                        | 881  | 8572                                                   | 995 | 8621                                                   | 1001 |
| 3    | Naylor Street                      | 32               | 1483                                        | 101  | 1675                                                   | 114 | 1675                                                   | 114  |
| 5    | Site Access                        | 48               | 0                                           | 0    | 0                                                      | 0   | 88                                                     | 2    |
| 6EB  | Great Ancoats East Bound           | 48               | 12829                                       | 452  | 14490                                                  | 510 | 14490                                                  | 510  |
| 6WB  | Great Ancoats West Bound           | 48               | 17372                                       | 611  | 19619                                                  | 691 | 19619                                                  | 691  |
| 7N   | Old Mill Street North              | 32               | 5884                                        | 176  | 6646                                                   | 198 | 6650                                                   | 199  |
| 7S   | Old Mill Street South              | 32               | 5016                                        | 155  | 5666                                                   | 175 | 5670                                                   | 175  |
| 8EB  | A62 Oldham Road South - East Bound | 48               | 7911                                        | 840  | 8935                                                   | 949 | 8939                                                   | 949  |
| 8WB  | A62 Oldham Road South - West Bound | 48               | 9283                                        | 731  | 10484                                                  | 826 | 10489                                                  | 826  |
| 9EB  | A62 Oldham Road North - East Bound | 48               | 2171                                        | 832  | 2452                                                   | 940 | 2455                                                   | 940  |
| 9WB  | A62 Oldham Road North - West Bound | 48               | 3054                                        | 324  | 3449                                                   | 366 | 3452                                                   | 367  |
| 10   | Livesy Street                      | 32               | 5356                                        | 703  | 6049                                                   | 794 | 6058                                                   | 795  |
| 11   | A664 Rochdale Road*                | 48               | 14897                                       | 2465 |                                                        |     |                                                        |      |

\* The A664 Rochdale Road was used only during the 2019 base year for model verification purposes

### Vehicle Emission Factors

- C.6 The air quality assessment has used vehicle emission factors calculated using the Emissions Factor Toolkit (EFT) version 10.1 released in August 2020. This is the most up-to-date version of the EFT currently available.

- C.7 As discussed in the section 3.4 of the report, a recent study provides evidence that the previous version of the EFT, EFT v9.0, may be relied upon to predict the ‘most likely’ future emissions reductions where model verification has been undertaken using monitored data from 2016 or later<sup>12</sup>. A further study in September 2020 concluded that the differences between the current EFT v.10.1 and the previous EFT v.9.0.1 are sufficiently small that previous work validating the current EFT remains valid<sup>13</sup>.
- C.8 However, in accordance with national guidance, a sensitivity analysis has also been undertaken which has applied 2019 background pollution concentrations and vehicle emission factors to the 2026 opening/future year to provide a conservative upper-bound to the assessment.

### ***Street Canyons***

- C.9 LAQM.TG(16) states that ‘*street canyons can generally be defined as narrow streets where the height of buildings on both sides of the road is greater than the road width*’. The principal effects of a street canyon on the dispersion of pollution from a road source are:
- Pollution is channelled along the canyon;
  - Pollution is dispersed across the canyon by circulating flow at road height;
  - Pollutants are trapped in recirculation regions;
  - Pollutants leave the canyon between gaps in the buildings;
  - Pollutants leave the canyon from the canyon top; and
  - Pollutants leave the canyon from the downstream end of the canyon.
- C.10 The model has not included any street canyons as there are none along the road network considered in the assessment.

### ***Meteorological Data***

- C.11 The meteorological data used in the air quality modelling has been obtained from ADM Limited and is from the Manchester recording station, covering the period between 1<sup>st</sup> January and 31<sup>st</sup> December 2019.

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<sup>12</sup> <https://www.aqconsultants.co.uk/news/march-2020/defra%E2%80%99s-emission-factor-toolkit-now-matching-measu>

<sup>13</sup> Air Quality Consultants, Comparison of EFT v10 with EFT v9, September 2020

C.12 The Manchester recording station is located approximately 14km from the proposed development and is considered to be the most representative of the conditions at the proposed development, due to its relative location and similar altitude.

C.13 The 2019 wind rose for the Manchester Meteorological Recording Station is shown in Figure C2.

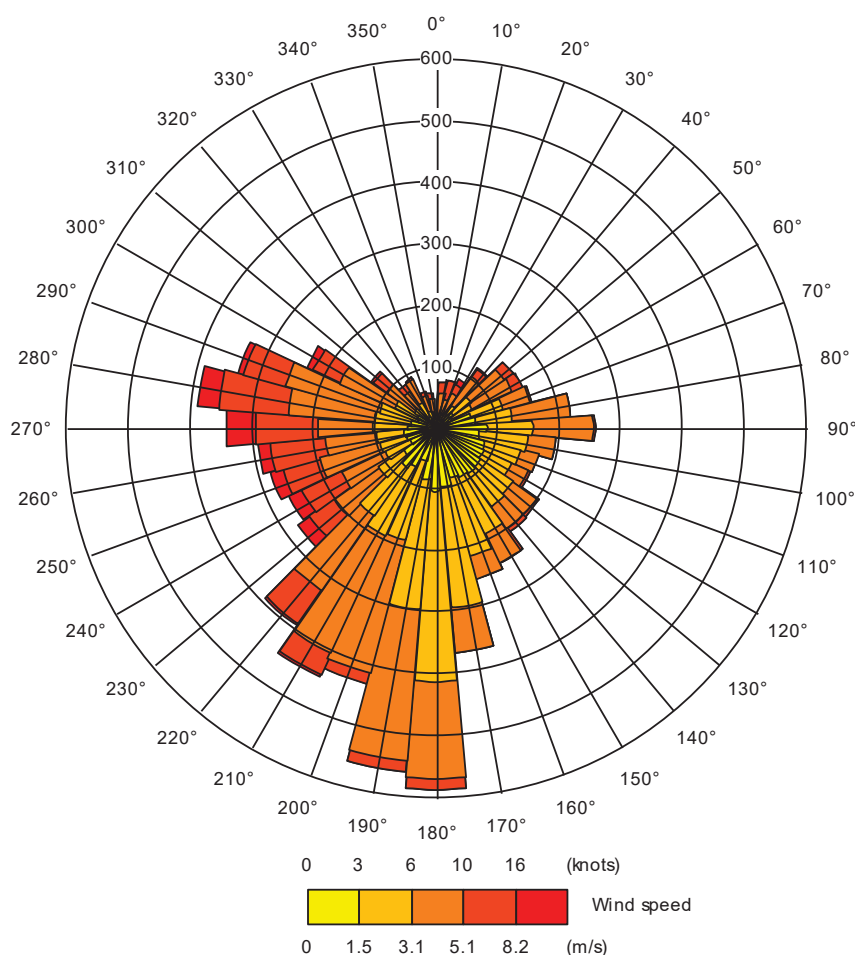


**Figure C.2:** 2019 Wind Rose for the Manchester Meteorological Station

### ***Dispersion and Meteorological Site Characteristics***

C.14 The characteristics for the dispersion site and the meteorological site, included in the ADMS-Roads model, are detailed in Table C2.

| <b>Table C2: Dispersion and Meteorological Site Characteristics</b> |                        |                            |
|---------------------------------------------------------------------|------------------------|----------------------------|
| <b>Setting</b>                                                      | <b>Dispersion Site</b> | <b>Meteorological Site</b> |
| Surface Roughness                                                   | 1.5m                   | 0.02m                      |
| Surface Albedo                                                      | 0.23                   | 0.23                       |

| Table C2: Dispersion and Meteorological Site Characteristics |                 |                     |
|--------------------------------------------------------------|-----------------|---------------------|
| Setting                                                      | Dispersion Site | Meteorological Site |
| Minimum Monin-Obukhov Length                                 | 30m             | 1m                  |
| Priestley-Taylor Parameter                                   | 1               | 1                   |

### ***NO<sub>x</sub> to NO<sub>2</sub> Conversion***

- C.15 In accordance with the guidance detailed within LAQM.TG(16), the ADMS-Roads model has been run to predict the road-contribution NO<sub>x</sub> concentrations at each receptor location. These have then been converted to NO<sub>2</sub> concentrations using the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator<sup>14</sup>.

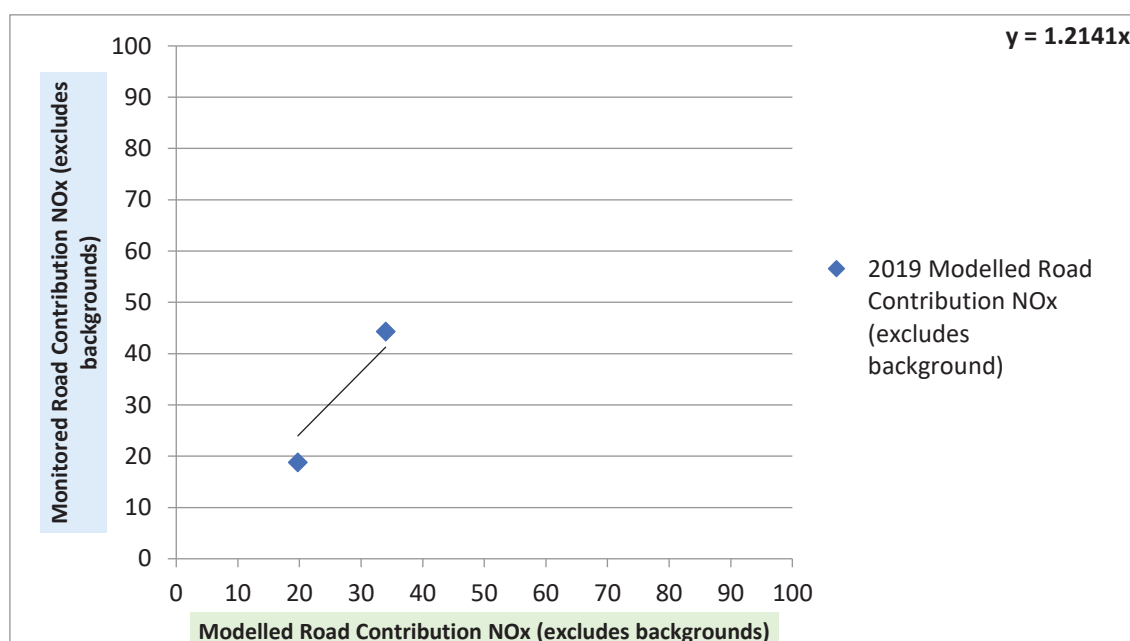
### ***Model Validation and Verification***

- C.16 LAQM.TG(16) refers to model validation as *“the general comparison of modelled results against monitoring data carried out by model developers”*. ADMS-Roads is widely accepted by regulatory authorities for use in this type of assessment.
- C.17 Model verification is used to check the performance of the model at a local level. The verification of the ADMS-Roads air dispersion model is achieved by modelling concentration(s) at existing monitoring location(s) in the vicinity of the proposed development, and comparing the modelled concentration(s) with the measured concentration(s).
- C.18 Following review of the 2019 Annual Status Report (ASR) for MCC, it is understood there are two roadside NO<sub>2</sub> monitoring locations in the vicinity of the proposed development site. Therefore, these diffusion tubes have been used to verify the results of the model.
- C.19 As no PM<sub>10</sub> or PM<sub>2.5</sub> monitoring locations are situated along roads where traffic flow data is available, it has not been possible to carry out model verification for modelled PM<sub>10</sub> or PM<sub>2.5</sub> concentrations.
- C.20 The monitoring data that has been used in the model verification procedure is detailed in Table C3.

<sup>14</sup> Defra Local Air Quality Management web pages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

| Table C3: NO <sub>2</sub> Monitoring Data Used for Verification Purposes |                         |                            |          |                                                                                      |
|--------------------------------------------------------------------------|-------------------------|----------------------------|----------|--------------------------------------------------------------------------------------|
| Monitoring Location Reference                                            | Type                    | Approximate Grid Reference |          | 2019 Bias Adjusted NO <sub>2</sub> Annual Average Concentration (µg/m <sup>3</sup> ) |
|                                                                          |                         | Easting                    | Northing |                                                                                      |
| MAN71                                                                    | Roadside Diffusion Tube | 385161                     | 398290   | 45.30                                                                                |
| MAN36                                                                    | Roadside Diffusion Tube | 385205                     | 399750   | 31.70                                                                                |

- C.21 The modelled road-contribution NO<sub>x</sub> concentrations for the diffusion tubes has been compared against the measured road-contribution NO<sub>x</sub> concentrations for the same location. The measured concentrations have been derived using the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator, taking into account the background NO<sub>x</sub> concentration for the local area.
- C.22 The comparison is shown in the graph below. The equation of the trend line is based on linear regression through zero, which provides an overall adjustment factor of 1.2141.



- C.23 This adjustment factor has been applied to the modelled road-contribution NO<sub>x</sub> concentrations. The total NO<sub>2</sub> concentrations have been derived by combining the adjusted road-contribution NO<sub>x</sub> concentration and background NO<sub>2</sub> concentration, using the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator.

- C.24 A final comparison has been made between the total measured NO<sub>2</sub> concentrations and total modelled NO<sub>2</sub> concentrations, as shown in Table C4. Following adjustment, modelled concentrations are within 10% of measured concentrations.

| Table C4: Comparison Between Measured and Monitored NO <sub>2</sub> Concentrations |                                                                   |                                                                   |                |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|----------------|
| Monitoring Location Reference                                                      | Measured Total NO <sub>2</sub> Concentration (µg/m <sup>3</sup> ) | Modelled Total NO <sub>2</sub> Concentration (µg/m <sup>3</sup> ) | Difference (%) |
| MAN71                                                                              | 45.30                                                             | 44.67                                                             | -1.39          |
| MAN36                                                                              | 31.70                                                             | 34.47                                                             | 8.74           |

- C.25 A Root Mean Square Error (RMSE) calculation has been undertaken as part of the model verification for NO<sub>2</sub> concentrations. This has been carried out for the monitoring locations included within the model verification, in accordance with the guidance detailed in LAQM.TG(16).
- C.26 The RMSE calculation following adjustment is detailed in Table C5.

| Table C5: RMSE Calculation for Nitrogen Dioxide Concentrations |                    |                 |            |      |
|----------------------------------------------------------------|--------------------|-----------------|------------|------|
| Diffusion Tube Location                                        | After Verification |                 |            |      |
|                                                                | Observed Value     | Predicted Value | Difference | RMSE |
| MAN36                                                          | 31.70              | 33.86           | 0.63       | 2.01 |
| MAN71                                                          | 45.30              | 44.21           | -2.77      |      |

- C.27 LAQM.TG(16) states that “ideally an RMSE value within 10% of the objective would be derived”, a value of within 25% is considered acceptable. The RMSE value above of 2.01 µg/m<sup>3</sup> equates to 5.03% of the NO<sub>2</sub> annual mean objective (40 µg/m<sup>3</sup>). Therefore, the model is considered to be performing to an acceptable standard.

## Assessment Criteria

### Assessing the Impact of a Proposed Development on Human Receptors

- C.28 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM<sup>15</sup> with relation to the assessment of the air quality impacts of proposed developments

<sup>15</sup> Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

and their significance.

- C.29 The impact of a development is usually assessed at specific receptors, and takes into account both the long-term background concentrations, in relation to the relevant Air Quality Assessment Level (AQAL) at these receptors, and the change with the development in place.
- C.30 The impact descriptors for individual receptors are detailed in Table C6.

| Table C6: Impact Descriptors for Individual Receptors                                                                                                                                                           |                                                                                     |             |             |             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------|-------------|-------------|
| Long Term Average Concentration at Receptor in Assessment Year*                                                                                                                                                 | Percentage Change in Concentration Relative to Air Quality Assessment Level (AQAL)* |             |             |             |
|                                                                                                                                                                                                                 | 1%                                                                                  | 2-5%        | 6-10%       | >10         |
| 75% or less of AQAL                                                                                                                                                                                             | Negligible                                                                          | Negligible  | Slight      | Moderate    |
| 76-94% of AQAL                                                                                                                                                                                                  | Negligible                                                                          | Slight      | Moderate    | Moderate    |
| 95-102% of AQAL                                                                                                                                                                                                 | Slight                                                                              | Moderate    | Moderate    | Substantial |
| 103-109% of AQAL                                                                                                                                                                                                | Moderate                                                                            | Moderate    | Substantial | Substantial |
| 110% or more of AQAL                                                                                                                                                                                            | Moderate                                                                            | Substantial | Substantial | Substantial |
| *Percentage pollutant concentrations have been rounded to whole numbers, to make it easier to assess the impact. Changes of 0% (i.e. less than 0.5% or 0.2µg/m <sup>3</sup> ) should be described as Negligible |                                                                                     |             |             |             |

### ***Determining the Significance of Effects***

- C.31 Impacts on air quality, whether adverse or beneficial, will have an effect on human receptors that can be judged as either 'significant' or 'not significant'.
- C.32 Once the impact of the proposed development has been assessed for the individual impacts, the overall significance is determined using professional judgement. This takes into account a number of factors such as:
- The existing and future air quality in the absence of the development;
  - The extent of the current and future population exposure to the impacts; and
  - The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

## Appendix D: Operational Phase Assessment Sensitivity Analysis

### Existing Sensitive Receptors

- D.1 A sensitivity analysis has been undertaken, for NO<sub>2</sub> concentrations, in which the 2019 base year background pollutant concentrations and vehicle emission factors have been applied to the 2026 opening/future year scenarios.
- D.2 Table D1 details the predicted NO<sub>2</sub> concentrations for the 2026 Opening/Future Year, for both the 'Without Development' and 'With Development' scenarios, for the sensitivity analysis. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| Table D1: Predicted Adjusted NO <sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Sensitivity Analysis |                                                                                         |                  |                                 |                                             |                     |
|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------------------------|---------------------------------------------|---------------------|
| Receptor                                                                                                                                 | Calculated Annual Mean NO <sub>2</sub> Concentrations (µg/m <sup>3</sup> ) <sup>a</sup> |                  |                                 |                                             |                     |
|                                                                                                                                          | Without Development                                                                     | With Development |                                 | Concentration Change as Percentage of AQUAL | Impact <sup>b</sup> |
|                                                                                                                                          |                                                                                         | Concentration    | Percentage in Relation to AQUAL |                                             |                     |
| ESR 1                                                                                                                                    | 31.07                                                                                   | 31.14            | 76-94%                          | <0.5%                                       | Negligible          |
| ESR 2                                                                                                                                    | 31.44                                                                                   | 31.51            | 76-94%                          | <0.5%                                       | Negligible          |
| ESR 3                                                                                                                                    | 27.85                                                                                   | 27.91            | <75%                            | <0.5%                                       | Negligible          |
| ESR 4                                                                                                                                    | 27.26                                                                                   | 27.28            | <75%                            | <0.5%                                       | Negligible          |
| ESR 5                                                                                                                                    | 27.74                                                                                   | 27.74            | <75%                            | <0.5%                                       | Negligible          |
| ESR 6                                                                                                                                    | 26.66                                                                                   | 26.66            | <75%                            | <0.5%                                       | Negligible          |
| ESR 7                                                                                                                                    | 30.54                                                                                   | 30.54            | 76-94%                          | <0.5%                                       | Negligible          |
| ESR 8                                                                                                                                    | 37.35                                                                                   | 37.35            | 76-94%                          | <0.5%                                       | Negligible          |
| ESR 9                                                                                                                                    | 32.21                                                                                   | 32.22            | 76-94%                          | <0.5%                                       | Negligible          |
| ESR 10                                                                                                                                   | 26.34                                                                                   | 26.35            | <75%                            | <0.5%                                       | Negligible          |
| ESR 11                                                                                                                                   | 27.15                                                                                   | 27.15            | <75%                            | <0.5%                                       | Negligible          |
| ESR 12                                                                                                                                   | 28.79                                                                                   | 28.80            | <75%                            | <0.5%                                       | Negligible          |
| ESR 13                                                                                                                                   | 39.99                                                                                   | 39.99            | <75%                            | <0.5%                                       | Negligible          |
| ESR 14                                                                                                                                   | 41.04                                                                                   | 41.04            | 95-102%                         | <0.5%                                       | Negligible          |
| ESR 15                                                                                                                                   | 40.93                                                                                   | 40.93            | 95-102%                         | <0.5%                                       | Negligible          |

| Table D1: Predicted Adjusted NO <sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Sensitivity Analysis                                                                                                                                                                                                                                 |                                                                                         |                  |                                |                                            |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|--------------------------------|--------------------------------------------|---------------------|
| Receptor                                                                                                                                                                                                                                                                                                                                                                 | Calculated Annual Mean NO <sub>2</sub> Concentrations (µg/m <sup>3</sup> ) <sup>a</sup> |                  |                                |                                            |                     |
|                                                                                                                                                                                                                                                                                                                                                                          | Without Development                                                                     | With Development |                                | Concentration Change as Percentage of AQAL | Impact <sup>b</sup> |
|                                                                                                                                                                                                                                                                                                                                                                          |                                                                                         | Concentration    | Percentage in Relation to AQAL |                                            |                     |
| ESR 16                                                                                                                                                                                                                                                                                                                                                                   | 32.33                                                                                   | 32.33            | 76-94%                         | <0.5%                                      | Negligible          |
| ESR 17                                                                                                                                                                                                                                                                                                                                                                   | 29.24                                                                                   | 29.24            | <75%                           | <0.5%                                      | Negligible          |
| ESR 18                                                                                                                                                                                                                                                                                                                                                                   | 28.73                                                                                   | 28.73            | <75%                           | <0.5%                                      | Negligible          |
| ESR 19                                                                                                                                                                                                                                                                                                                                                                   | 31.67                                                                                   | 31.68            | 76-94%                         | <0.5%                                      | Negligible          |
| ESR 20                                                                                                                                                                                                                                                                                                                                                                   | 29.68                                                                                   | 29.68            | <75%                           | <0.5%                                      | Negligible          |
| ESR 21                                                                                                                                                                                                                                                                                                                                                                   | 24.49                                                                                   | 24.49            | <75%                           | <0.5%                                      | Negligible          |
| <sup>a</sup> NO <sub>2</sub> concentrations obtained by inputting predicted NO <sub>x</sub> concentrations into the NO <sub>x</sub> to NO <sub>2</sub> calculator, in accordance with LAQM.TG(16)<br><sup>b</sup> Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible |                                                                                         |                  |                                |                                            |                     |

D.3 Table D2 details the predicted NO<sub>2</sub> concentrations within the proposed development site, for the 2026 Opening/Future Year 'With Development' scenario, as part of the sensitivity analysis. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| Table D2: Predicted NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> Concentrations at the Proposed Sensitive Receptor for Scenario 3 |                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Proposed Sensitive Receptor                                                                                                                   | Calculated Annual Mean Concentrations (µg/m <sup>3</sup> ) |
|                                                                                                                                               | NO <sub>2</sub>                                            |
| PR 1                                                                                                                                          | 31.99                                                      |
| PR 2                                                                                                                                          | 35.07                                                      |

## **Appendix E: Professional Experience of Assessors**

- E.1 The assessment of air quality impacts, and the significance of the associated effects, takes into account the professional judgement of the assessor. Details of the experience of the personnel involved with the project are provided below:

**Paul Threlfall**  
**BSc (Hons), MSc**

**Environmental Scientist**  
**(Air Quality)**

Paul joined Wardell Armstrong in October 2017 as an Air Quality Scientist, after completing his MSc Water, Energy and the Environment at Liverpool John Moores University. The majority of his work is carried out in support of planning applications and, therefore, he has experience of undertaking air quality assessments for a wide range of projects including residential developments, commercial developments and mixed-use developments. Paul has a good range of skills and knowledge of air quality modelling and monitoring through his involvement in air quality projects, both as individual commissions and as part of Environmental Impact Assessments (EIAs). Paul also has extensive knowledge and experience of undertaking odour assessments, ranging from qualitative desk-based assessments to more detailed odour dispersion modelling assessments using AERMOD, as well as extensive experience of undertaking odour 'sniff test' observations.

**Dr. Steven Lees**  
**BSc (Hons), PhD**

**Associate Director (Air Quality)**

Steven holds a PhD on the effects of nitrogen pollution on designated conservation sites and BSc (Hons) in Environmental Science. Following completion of his PhD, Steven has accumulated seven years of experience in air quality consultancy and currently leads a team of air quality consultants. Steven is involved in managing and undertaking air quality impact studies for a wide range of development proposals, including schemes which require EIA, and has also provided expert evidence for planning inquiries.

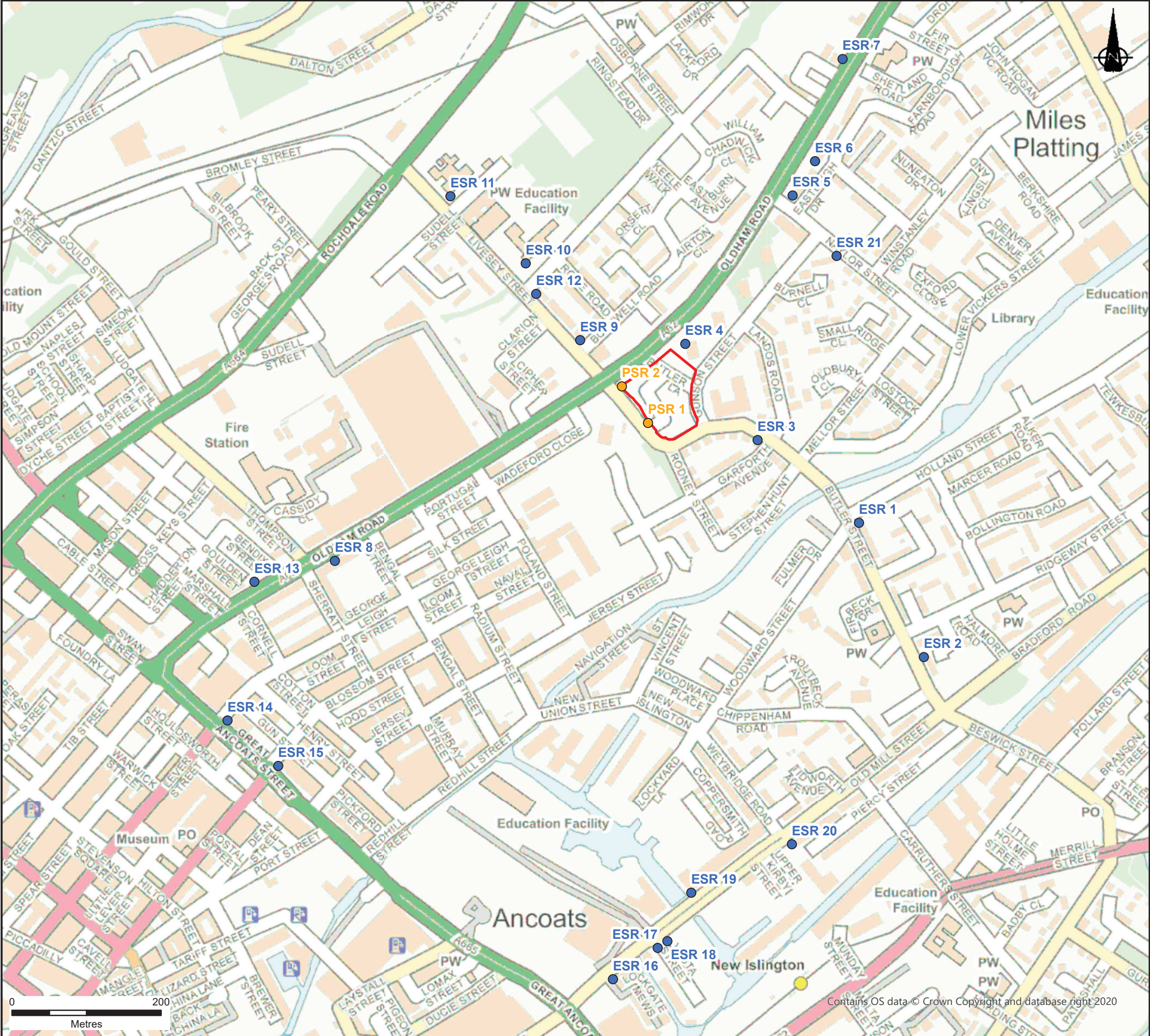
**Mark Dawson**

**BSc (Hons) MA (Env Law) Dip (Air Pollution Control),  
Dip (Acoustics & Noise Control) CEnv MIEEnvSc MIOA  
MIAQM FRMetS**

**Technical Director –  
Service Lead Acoustics  
and Air Quality**

Mark holds a Bachelor of Science degree in Geography, the Diploma in Air Pollution Control, the Diploma in Acoustics and Noise Control and Master's degree in Environmental Law and Policy. Mark is a Chartered Environmentalist and Member of the Institute of Environmental Sciences, Institute of Acoustics, Institute of Air Quality Management and Fellow of the Royal Meteorological Society. Mark has over 30 years' experience in regulation and consultancy. Having given evidence to over forty planning inquiries, Mark is experienced in putting forward persuasive technical arguments in plain English. Mark is the service lead for acoustics and air quality at Wardell Armstrong. He has extensive experience of managing commissions involving environmental impact assessment. He is involved in noise and air quality impact studies for mineral and waste operations and for residential, commercial, industrial and retail development. The majority of the work is carried out in support of planning applications and Mark has long experience of dealing with environmental health officers and planning officers.

## **DRAWINGS**



KEY

Site Boundary

Existing Sensitive Receptors

Proposed Sensitive Receptors

REVISION

DETAILS

DATE

DRAWN

CHKD

APPD

CLIENT

LOVELL HOMES

PROJECT

MILES PLATTING PHASE 3.1

DRAWING TITLE

EXISTING, FUTURE AND PROPOSED SENSITIVE RECEPTOR LOCATIONS

DRG No.

GM10234-003

REV

A

DRG SIZE

A3

SCALE

1:5,000

DATE

06/01/2021

DRAWN BY

EF

CHECKED BY

PT

APPROVED BY

CMD

NEWCASTLE UPON TYNE | TEL 0191 232 0943

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**STOKE-ON-TRENT**

Sir Henry Doulton House  
Forge Lane  
Etruria  
Stoke-on-Trent  
ST1 5BD  
Tel: +44 (0)1782 276 700

**BIRMINGHAM**

Two Devon Way  
Longbridge Technology Park  
Longbridge  
Birmingham  
B31 2TS  
Tel: +44 (0)121 580 0909

**BOLTON**

41-50 Futura Park  
Aspinall Way  
Middlebrook  
Bolton  
BL6 6SU  
Tel: +44 (0)1204 227 227

**CARDIFF**

Tudor House  
16 Cathedral Road  
Cardiff  
CF11 9LJ  
Tel: +44 (0)292 072 9191

**CARLISLE**

Marconi Road  
Burgh Road Industrial Estate  
Carlisle  
Cumbria  
CA2 7NA  
Tel: +44 (0)1228 550 575

**EDINBURGH**

Great Michael House  
14 Links Place  
Edinburgh  
EH6 7EZ  
Tel: +44 (0)131 555 3311

**GLASGOW**

2 West Regent Street  
Glasgow  
G2 1RW  
Tel: +44 (0)141 433 7210

**LEEDS**

36 Park Row  
Leeds  
LS1 5JL  
Tel: +44 (0)113 831 5533

**LONDON**

Third Floor  
46 Chancery Lane  
London  
WC2A 1JE  
Tel: +44 (0)207 242 3243

**MANCHESTER**

76 King Street  
Manchester  
M2 4NH  
Tel: +44 (0)161 817 5038

**NEWCASTLE UPON TYNE**

City Quadrant  
11 Waterloo Square  
Newcastle upon Tyne  
NE1 4DP  
Tel: +44 (0)191 232 0943

**TRURO**

Baldhu House  
Wheal Jane Earth Science Park  
Baldhu  
Truro  
TR3 6EH  
Tel: +44 (0)187 256 0738

**International offices:**

**ALMATY**

29/6 Satpaev Avenue  
Regency Hotel  
Office Tower  
Almaty  
Kazakhstan  
050040  
Tel: +7(727) 334 1310

**MOSCOW**

21/5 Kuznetskiy Most St.  
Moscow  
Russia  
Tel: +7(495) 626 07 67