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**COUNTRYSIDE PROPERTIES**

**BARUGH GREEN, BARNSELY**

**AIR QUALITY ASSESSMENT**

**AUGUST 2020**

**DATE ISSUED:** August 2020  
**JOB NUMBER:** LD10092  
**REPORT NUMBER:** 0001  
**VERSION:** V1.0  
**STATUS:** FINAL

**COUNTRYSIDE PROPERTIES**

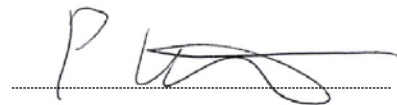
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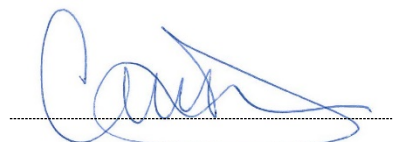
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## EXECUTIVE SUMMARY

An air quality assessment has been undertaken to accompany a detailed planning application for a proposed residential development at Barugh Green, Barnsley. The proposals include up to 140 residential dwellings. The site is part of the Barnsley Local Plan allocation (Local Plan Mixed Use Site MU1).

The assessment has considered dust and fine particulate matter during the construction phase, and road traffic emissions during the operational phase.

The construction phase assessment has identified a potential risk of dust soiling and human health impacts for earthworks, construction and track out. Mitigation measures, based on best practice guidance, have been proposed to reduce any potential impacts such that the residual effect is negligible.

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 16 existing sensitive receptor locations and one proposed sensitive receptor location, using the most recent Emission Factor Toolkit available from DEFRA (EFT v9.0). In accordance with national guidance a sensitivity analysis has also been undertaken for NO<sub>2</sub> concentrations to provide a realistic upper-bound conservative approach. Predicted annual mean concentrations have been compared to the relevant air quality objectives and target level.

The operational phase assessment has concluded that the proposed development will result in concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> remaining below the air quality objectives/target values, both without and with the development for the proposed 2023 opening and 2026 future year scenarios. The impact of the development is predicted to be negligible at all 16 existing sensitive receptors that were assessed. Air quality effects are therefore considered to be 'not significant'.

An additional scenario to consider the combined effects of the proposed development and the residential uses of the wider MU1 Phase 1 was requested by Barnsley Metropolitan Borough Council. This scenario is presented in an appendix. The contribution of the proposed development vehicle flows to cause an impact at the nearby Air Quality Management Areas is deemed to be 'not significant.'

The assessment has demonstrated that the Proposed Development will not lead to an unacceptable risk from air pollution, or to any breach in national objectives. Therefore, 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 Countryside Properties to undertake an air quality assessment to accompany an outline planning application for a proposed residential development at land at Barugh Green, Barnsley.
- 1.1.2 The proposed development site is currently open agricultural land and is located to the south of Barugh Green Road (A635). This road borders the site to the north with commercial uses located beyond. Existing residential dwellings on Claycliffe Avenue border the site to the east. The land to the south and west is currently open land, however it is allocated for future development as part of the 'MU1' allocation in the Barnsley Local Plan (2019). The proposed development site is also part of the MU1 mixed-use allocation.
- 1.1.3 The MU1 site has an indicative capacity of up to 1,700 dwellings and 43ha of employment land. The proposed development site is located within a single ownership and is to be submitted before the wider MU1 planning application is submitted. Planning applications for two parts of internal MU1 spine road have, however, been submitted to date (Ref. 2020/0027 & 2020/0028, January 2020).
- 1.1.4 This report has been prepared for the 140-dwelling detailed planning submission. The air quality predictions and reporting are for this parcel of land only. This development would be constructed and occupied by 2023, which is three years prior to the anticipated first occupation of the wider MU1 allocation. The first phase of the wider MU1 is anticipated to be occupied by 2026. The development will be served by a dedicated access route onto Barugh Green Road. A cumulative assessment to consider 2026 and the effect of a spine road has been included in this assessment.
- 1.1.5 The air quality modelling was initially completed from a trip generation and routing arising from 130 residential dwellings. Following completion of the modelling and issuing the air quality assessment, minor amendments were made to the site design to provide 10 additional dwellings, providing a total 140 residential dwellings. The total trip generation from these 10 additional dwellings is 48 movements, almost all of which travel eastwards from the site. This report provides the conclusions based on the modelling of the trip generation from 130 dwellings. Based on the findings of this assessment, it is considered that an additional 48 vehicle movements (associated with

a further 10 dwellings) will not change the overall conclusions made, which remain as not significant.

- 1.1.6 This report details the results of the air quality assessment undertaken to accompany an outline 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 of 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, and at a proposed receptor location within the 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;
- Department for Communities and Local Government, Planning Practice Guidance: Air Quality, November 2019; and
- Barnsley Metropolitan Borough Council. Air Quality and Emissions Good Practice Planning Guidance, March 2020.

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 |
|                                                                              | 18µg/m <sup>3</sup>                                                 | Annual mean      | Scotland only                       |

| Table 1: Air Quality Objectives and Limit Values Relevant to the Assessment* |                                    |                  |                                     |
|------------------------------------------------------------------------------|------------------------------------|------------------|-------------------------------------|
| Pollutant                                                                    | Objective/Limit Value              | Averaging Period | Obligation                          |
| Particulate Matter (PM <sub>2.5</sub> )                                      | Limit Value of 25µg/m <sup>3</sup> | Annual mean      | England, Wales and Northern Ireland |
|                                                                              | 10µg/m <sup>3</sup>                | Annual mean      | Scotland only                       |
| <i>*In accordance with the Air Quality Standards Regulations 2010</i>        |                                    |                  |                                     |

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

### 3 ASSESSMENT METHODOLOGY

#### 3.1 Consultation and Scope of Assessment

3.1.1 The assessment methodology was discussed and agreed with Mr Chris Shields (Technical Officer (Pollution Control)) of the Regulatory Services department at Barnsley Metropolitan Borough Council (BMBC). The methodology was discussed via emails between 25<sup>th</sup> March to 21<sup>st</sup> May 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 from BMBC Technical Officer                                                                                                                           |
| 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 objection to method                                                                                                                                         |
| 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 objection to method. Request that existing and proposed sensitive receptors are agreed in advance (see below).                                              |
|                                                                                                                                                    | Scenarios to be considered include a 2018 base year, 2023 opening year without and with development, and a 2026 future year without and with development (but including MU1 Phase 1).                                             | No objection to method. Request for confirmation that the Phase 1 flows are the same as those submitted to the Portal to date.                                 |
|                                                                                                                                                    | Detailed assessment to be screened out at the BMBC A628 AQMA Where there is no exceedance of the IAQM 100 AADT criterion.                                                                                                         | No objection to method. Request for inclusion of a combined scenario which includes project development traffic flows and the MU1 Phase 1 vehicle flows.       |
|                                                                                                                                                    | 2018 meteorological data from Emley Moor recording station                                                                                                                                                                        | No objection to method. Confirmation that the 2019 air quality monitoring data is unavailable for model verification. Approved the use of 2018 as a base year. |
|                                                                                                                                                    | Background concentrations from 2017-based Defra default maps (initial suggestion)<br>This was revised on 21 <sup>st</sup> May 2020 to instead use NO <sub>2</sub> and NO <sub>x</sub> concentrations                              | No objection to method.                                                                                                                                        |

| Table 2: Summary of Consultation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                            |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assessment Stage                 | Proposed Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Response from BMBC Technical Officer                                                                                                                                                                       |
|                                  | from the nearby 'CM3' urban background air quality monitor.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                            |
|                                  | Assessment undertaken using EFT v9.0 emission factors, and inclusion of a sensitivity analysis.                                                                                                                                                                                                                                                                                                                                                                                                                       | No objection to method.                                                                                                                                                                                    |
|                                  | Model verification using kerbside monitor DT9. It is anticipated that the adjustment factor for DT9 would be applied to this location only. LAQM.TG (16) states kerbside listing are usually not appropriate for use in verification as they may often have inflated adjustment requirements due to their positioning close to the road.<br>Request for permission to use / inclusion of the AECOM monitoring data in the verification procedure (see Section 4 for further details / explanation of the AECOM data). | No objection to method.<br>Confirmation that the AECOM data would be suitable for use and provided a link to download the data.                                                                            |
|                                  | The assessment and mitigation requirements will be undertaken in accordance with BMBC 'Air Quality and Emissions Good Practice Planning Guidance' 2020.                                                                                                                                                                                                                                                                                                                                                               | No objection to method.<br>Provision of further information relating to the requirements of electric vehicle charging from the recently adopted 'BMBC Sustainable Travel Supplementary Planning Document'. |
| Further Information              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                            |
| Sensitive Receptor Plan          | A drawing showing the locations and a list of x & y co-ordinates for the existing and proposed sensitive receptors to be assessed were provided.                                                                                                                                                                                                                                                                                                                                                                      | No objection.                                                                                                                                                                                              |

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

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

- 3.2.2 The closest sensitive human receptors to where construction phase activities will take place include residential and commercial uses 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 commercial premises at A635 (Barugh Green Road)                              | North                   | Approximately 12m at closest point              |
| Existing residential dwellings at Claycliffe Avenue                                   | East                    | Approximately 15m at closest point              |
| Existing residential dwellings at A635 (Barugh Green Road)                            | West                    | Approximately 10m at closest point              |
| Four existing residential dwellings at A635 (Barugh Green Road)                       | West                    | Approximately 15m at closest point              |
| Existing residential dwellings at A635 (Barugh Green Road) & The Meadows              | West                    | Approximately 230m 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**.

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

- 3.3.2 NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations have been predicted at existing and proposed sensitive receptors, as these are the pollutants considered most likely to exceed the objectives and limit values.
- 3.3.3 Air dispersion modelling has been carried out to estimate pollutant concentrations, due to road traffic emissions, for six assessment scenarios as follows:
- **Scenario 1:** 2018 Verification and Base Year, the most recent year for which traffic flow information, local monitored pollution data and meteorological data is available;
  - **Scenario 2:** 2023 Opening Year, without the proposed development;
  - **Scenario 3:** 2023 Opening Year, with the proposed development;
  - **Scenario 4:** 2026 Future Year, without the proposed development, including the MU1 Phase 1 as a committed development;
  - **Scenario 5:** 2026 Future Year, with the proposed development; and
  - **Scenario 6:** 2026 Future Year, with the proposed development, MU1 Phase 1 and MU1 spine road – assessment of the combined flows at the Barnsley A628 / Junction 37 AQMA.
- 3.3.4 The above scenarios include the Dearne Hall Road and MU1 Phase 1 residential developments as a committed development. The Dearne Hall Road development is currently under-construction and is located approximately 700m to the north of the proposed development site.
- 3.3.5 Scenarios 4 and 5 do not include the proposed MU1 spine road. The proposed development has been demonstrated to operate without the need of the spine road, as outlined further in the proposed development's Transport Assessment. The proposed development would also be operational for up to three years prior to the spine road construction. Countryside Properties are not aware of how the future spine road would be provided (i.e. from the outset or to be built in stages as the wider MU1 construction progresses).
- 3.3.6 Scenario 6 includes the MU1 Phase 1 flows in the 'with development' scenario rather than as a committed development in the 'without development' scenario, at the request of the BMBC technical officer as an additional scenario consideration in the assessment.

- 3.3.7 The spine road has a minor influence on the proposed development flows. To ensure a robust assessment, the screening assessment for the AQMA includes consideration of the development without and with spine road.

***Scope of Assessment***

- 3.3.8 The scope of the air quality assessment has been selected based on the local road network expected to receive the largest proportion of vehicles from the development proposals and has been determined through consultation with the appointed transport consultant. Most of the proposed development traffic flows are predicted to travel within the northern part of Barnsley, near the site. Pollutant concentrations in this area of the city are below the air quality objectives.
- 3.3.9 BMBC has declared the M1 and A628 / M1 Junction 37 as AQMAs (AQMA No.1 and AQMA No. 2A respectively) due to exceedances of the NO<sub>2</sub> annual mean air quality objective.
- 3.3.10 The M1 AQMA No.1 is declared for the entire route passing through BMBC. Part of this AQMA is located to the west of Barugh Green and it is expected that vehicles travelling to the west of the site could result in an increase in traffic within this AQMA. This route, however, is an overpass and there are no existing sensitive receptors to be affected, either side of the M1 at this location. The potential AQMA impacts are therefore focussed on vehicles travelling south from the site, entering AQMAs No. 1 and No.2A.
- 3.3.11 The routes south of the proposed development site provide access to the A628 / M1 Junction 37 AQMA No. 2A. A review of the traffic generated from the proposed development has been compared to the EPUK 2017 Guidance<sup>2</sup> 100 AADT criterion to determine whether a detailed air quality assessment is required at the AQMA. The guidance recommends a change of more than 100 AADT at AQMA locations. Below this criterion, it is accepted that the air quality change is likely to be negligible.
- 3.3.12 Two scenarios were considered to determine whether the 100 AADT guidance criterion would be met at the A628 / M1 Junction 37 AQMA; without and with the MU1 spine road, for the proposed development vehicle flows. The spine road would be provided north to south as part of the MU1 allocation. The spine road is considered as part of a separate planning application, and the proposed development itself is anticipated to be fully operational for up to 3 years before the MU1 Phase 1 (and spine road) is operational.

3.3.13 At this stage the timing of the buildout of the spine road is not yet known, however, to provide a robust assessment the 100 AADT criterion has been applied both without and with the spine road:

- No Spine Road – vehicles travel west and then south onto Higham Common Road. A total of 43 AADT vehicles travel west, of which 15 AADT travel south. This equates to approximately 7% of total vehicles.
- 2026 scenario, with MU1 Spine Road – vehicles travel west and then south onto the spine road, increasing the total vehicle distribution from approximately 7% to 16%. This equates to 99 AADT travelling south on the spine road.

3.3.14 Both scenarios predict that vehicle generation arising from the proposed development would be below IAQM guidance criteria thresholds for undertaking a detailed air quality assessment at AQMAs.

3.3.15 During the methodology discussions, BMBC's Technical Officer requested that the screening process also considered combined flows of the proposed development site and the MU1 Phase 1 development. Since individual impacts of each development cannot be established using this approach, an appropriate level of mitigation cannot be determined.

3.3.16 The MU1 Phase 1, and wider MU1, is not yet submitted to the planning portal. Estimates of the MU1 Phase 1 vehicle generation and distribution has been made by the appointed traffic consultant to Countryside Properties. Scenario 6 focusses on the impact at the AQMA.

3.3.17 The MU1 Phase 1, in 2026 with the spine road, is anticipated to generate up to 626 AADT at the two declared AQMAs. This results in a combined flow of up to 725 AADT and, therefore, exceeds the EPUK 2017 Guidance 100 AADT criterion for assessment.

3.3.18 Scenario 6 presents the air quality model results of the combined assessment at three existing sensitive receptors (ESRs 14 to 16) at the two AQMAs. The results of Scenario 6 and details of model verification at these AQMA locations are included in Appendix D.

3.3.19 The exact routing of the MU1 Phase 1 traffic is unknown to Countryside Properties. Therefore, to ensure a worst-case assessment, an assumption has been made whereby the total vehicle generation associated with MU1 Phase 1 (i.e. 626 AADT) is allocated to each road leading to and within the AQMAs, including the A628.

- 3.3.20 The proposed development's 99 AADT will enter the M1 Junction 37 roundabout and then exit onto the M1 southbound carriageway, as confirmed by the appointed transport consultant. Consequently, the nearest dwellings are those on the A628, which are up to approximately 32m from the roundabout (distance to centre of the road). The air quality change at properties this far from the additional vehicles on the road would be insignificant.
- 3.3.21 The proposed development's total traffic generation would ordinarily not require a detailed assessment (as the 100 AADT criterion of EPUK 2017 Guidance is not met) and a negligible impact would be expected to occur.
- 3.3.22 Scenario 6 presents the combined impact of the development (99 AADT) and the MU1 Phase 1 (626 AADT). As the proposed development is only a small proportion of the total vehicles assessed, and the distance of these vehicles is up to 32m from a residential property, the air quality change attributed to this development is anticipated to be very low.
- 3.3.23 Scenario 6 is presented in Appendix D. This report provides the findings of the proposed development, which assumes the AQMA assessment has been scoped out.

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

- 3.3.24 Several representative existing sensitive receptors (identified as ESR 1 to ESR 16) have been selected for consideration in the air quality assessment. These have been chosen based on their sensitivity and proximity to roads which will be affected by development generated traffic.
- 3.3.25 Details of these receptors considered are provided in Table 4, and their locations are shown on drawing LD10092-001.

| <b>Table 4: Existing Sensitive Receptors Considered in Operational Phase Assessment</b> |                                                |                       |                 |
|-----------------------------------------------------------------------------------------|------------------------------------------------|-----------------------|-----------------|
| <b>Receptor</b>                                                                         | <b>Address</b>                                 | <b>Grid Reference</b> |                 |
|                                                                                         |                                                | <b>Easting</b>        | <b>Northing</b> |
| ESR 1                                                                                   | Residential dwelling at A628 Barugh Green Road | 432008                | 407866          |
| ESR 2                                                                                   | Residential dwelling at A637 Claycliffe Road   | 431483                | 408577          |
| ESR 3                                                                                   | Residential dwelling at Barugh Lane            | 431454                | 408560          |
| ESR 4                                                                                   | Residential dwelling at A637 Barnsley Road     | 431464                | 408652          |
| ESR 5                                                                                   | Residential dwelling at A635 Barugh Green Road | 431946                | 407874          |

| <b>Table 4: Existing Sensitive Receptors Considered in Operational Phase Assessment</b>                                             |                                                |                       |                 |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------|-----------------|
| <b>Receptor</b>                                                                                                                     | <b>Address</b>                                 | <b>Grid Reference</b> |                 |
|                                                                                                                                     |                                                | <b>Easting</b>        | <b>Northing</b> |
| ESR 6                                                                                                                               | Residential dwelling at A635 Barugh Green Road | 431643                | 407934          |
| ESR 7                                                                                                                               | Residential dwelling at A635 Barugh Green Road | 431249                | 408031          |
| ESR 8                                                                                                                               | Residential dwelling at A635 Barugh Green Road | 431245                | 408002          |
| ESR 9                                                                                                                               | Residential dwelling at A635 Barugh Green Road | 431041                | 408056          |
| ESR 10                                                                                                                              | Residential dwelling at Higham Common Road     | 431052                | 408030          |
| ESR 11                                                                                                                              | Residential dwelling at A635 Cawthorne Road    | 430938                | 408062          |
| ESR 12                                                                                                                              | Residential dwelling at A635 Wilthorpe Road    | 432299                | 407776          |
| ESR 13                                                                                                                              | Residential dwelling at A635 Wilthorpe Road    | 432080                | 407818          |
| ESR 14*                                                                                                                             | Residential dwelling at A628 Dodworth Road     | 432281                | 405962          |
| ESR 15*                                                                                                                             | Residential dwelling at A628 Dodworth Road     | 432289                | 405928          |
| ESR 16*                                                                                                                             | Residential dwelling at A628 Whinby Road       | 432061                | 405851          |
| *Located within the Junction 37 / A628 AQMAs. Pollutant predictions for these sensitive receptors are provided for Scenario 6 only. |                                                |                       |                 |

3.3.26 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***

3.3.27 One proposed sensitive receptor (referred to as PSR1) has been selected within the development site boundary. This receptor is located on the northern boundary of the site and is representative of the proposed residential areas which will be closest to the main source(s) of pollution. In this case, the main existing source is vehicle emissions from the A635 Barugh Green Road and the site access.

3.3.28 Pollutant concentrations at the proposed receptors have been predicted for scenarios 3 and 5 only (as detailed in paragraph 3.3.3). It is only necessary to consider the 'with development' scenarios 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.

3.3.29 Details of the proposed sensitive receptor are provided in Table 5, and its location is shown on drawing LD10092-001.

| Table 5: Proposed Sensitive Receptor Considered in the Operational Phase Assessment |                                                                                                             |                |          |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------|----------|
| Receptor Point                                                                      | Location                                                                                                    | Grid Reference |          |
|                                                                                     |                                                                                                             | Easting        | Northing |
| PSR 1                                                                               | Location considered to be representative of the closest proposed residential property to A635 & site access | 431821         | 407910   |

3.3.30 Pollutant concentrations associated with road traffic emissions are expected to be highest at lower floor levels, and therefore, each of the sensitive receptors have been modelled at ground level (i.e. 1.5m).

3.3.31 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 as 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 Emission Factor Toolkit (EFT v9.0.1)<sup>3</sup>, which is the most up-to-date version available. Although this is more realistic than earlier versions, some uncertainty remains.

3.4.4 A position statement was produced by the IAQM in 2018 which deals specifically with the use of EFT v8.0 and the consideration of uncertainties in predicting future air

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

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 over time as within the EFT. The statement also highlights the need for careful consideration of the results of any sensitivity test, particularly about assessing impacts and the significance of effects. A precautionary approach is recommended.

- 3.4.5 As yet, no IAQM update has been provided for EFT v9.0, however a recent study provides evidence that EFT v9.0 may be relied upon to predict the 'most likely' future emissions reductions as long as model verification has been undertaken using monitored data from 2016 or later<sup>5</sup>. The IAQM has yet to comment on this study.
- 3.4.6 In accordance with Defra guidance, the air quality assessment has been carried out using EFT v9.0. A sensitivity analysis has also been undertaken whereby the uptake of future, cleaner, vehicle classes has been assumed to be poorer, by reverting the Euro VI (d) class to instead all be a Euro VI (c) class. This has been applied on the future year scenarios. In addition, no improvement in background concentrations from the base year is also included. Further details of the sensitivity analysis approach / changes applied, including the results, are provided in **Appendices C and D**, respectively.

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<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> Air Quality Consultants, Performance of Defra's Emission Factor Toolkit 2013 – 2019, February 2020

## **4 BASELINE SITUATION**

### **4.1 Barnsley Metropolitan Borough Council Local Air Quality Management**

- 4.1.1 The proposed development site is located within the administrative area of BMBC, which is responsible for the management of local air quality.
- 4.1.2 BMBC has declared eight AQMAs for exceedance of the NO<sub>2</sub> annual mean. Two of these eight AQMAs are of relevance to this study:
- AQMA No.1: declared at the M1 for the entire route is passes through BMBC.
    - o Vehicles travelling west on the A635 Cawthorne Road pass through AQMA No.1. This is an overpass and there are no nearby sensitive receptors present.
    - o Vehicles travelling south from the proposed development may enter the M1 Junction 37 roundabout (the eastern arm of this roundabout is AQMA No. 2A).
  - AQMA No. 2A: declared for the A628 Dodworth Road.
    - o The proposed development vehicles do not travel down the A628, as there are other routes available from the site to the destination. All vehicles travelling south exit onto the M1 southbound carriageway.
- 4.1.3 BMBC operates a kerbside monitor in northern Barnsley. Diffusion tube 9 (reference, DT9) is located approximately 700m to the north of the site, adjacent to the A637. Several air quality monitors are located within the A628 AQMA (DT19 to DT23).
- 4.1.4 The air quality concentrations in the northern part of Barnsley (i.e. Barugh Green) are below the air quality objectives, whereas concentrations in the south at the two AQMAs are exceeding the air quality objectives. The BMBC air quality concentrations, within the study area, are shown on Plate 1.

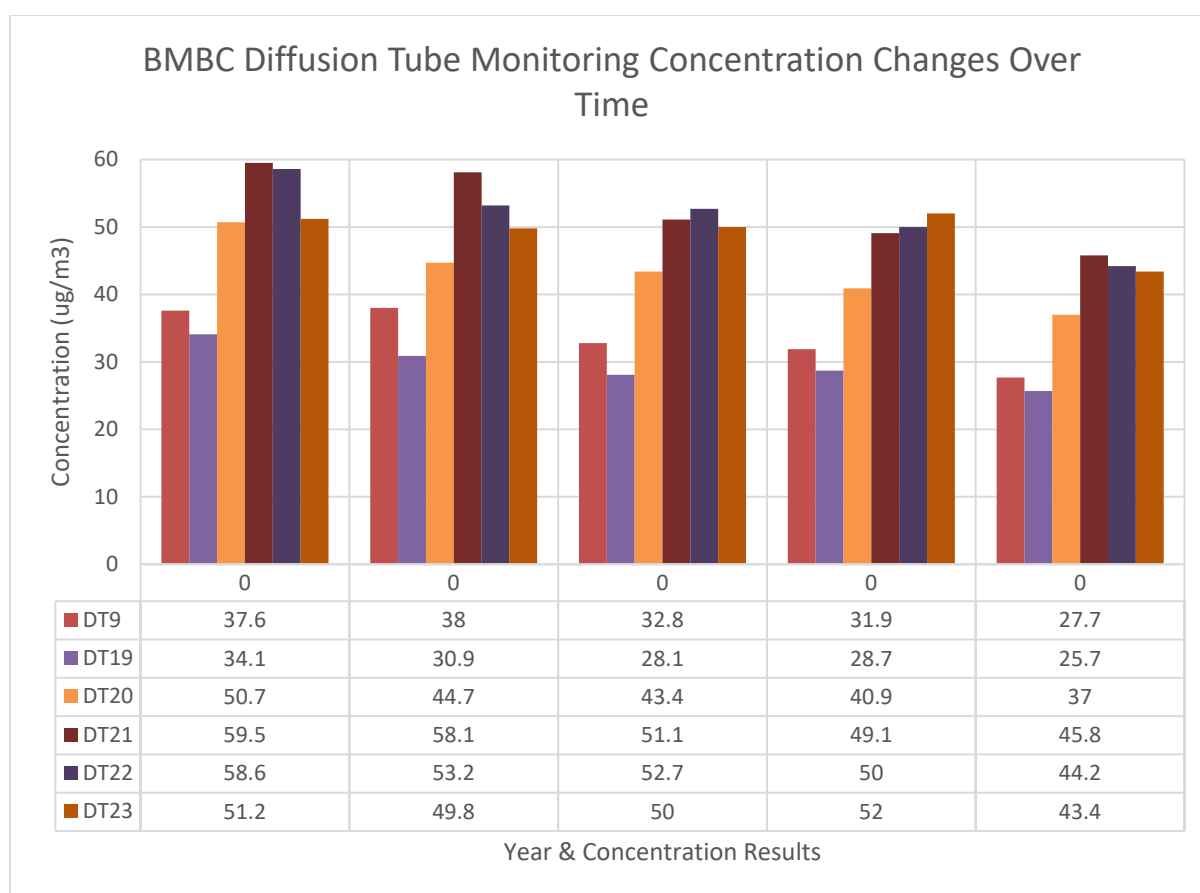


**Plate 1: BMBC diffusion tube concentrations**

- 4.1.5 It is understood that during the MU1 allocation period, AECOM were instructed by BMBC to support works on MU1. A local air quality monitoring study was completed in and around the MU1 allocation. BMBC provided agreement to utilise these AECOM monitoring data in the verification procedure. The data was obtained from the MU1 spine road planning applications (Ref. 2020/0027 & 2020/0028).
- 4.1.6 The AECOM monitors are located along Barugh Green Road (AECOM 1, 2a and 5), Barugh Lane (AECOM 2b), Hermit Lane (AECOM 8), Higham Lane (AECOM 9) and A628 Whinby Road (AECOM 10). AECOM 8, 9 and 10 are located to the south of the proposed development site, on the road network leading to the AQMAs. The AECOM pollutant concentrations are provided in Plate 2.

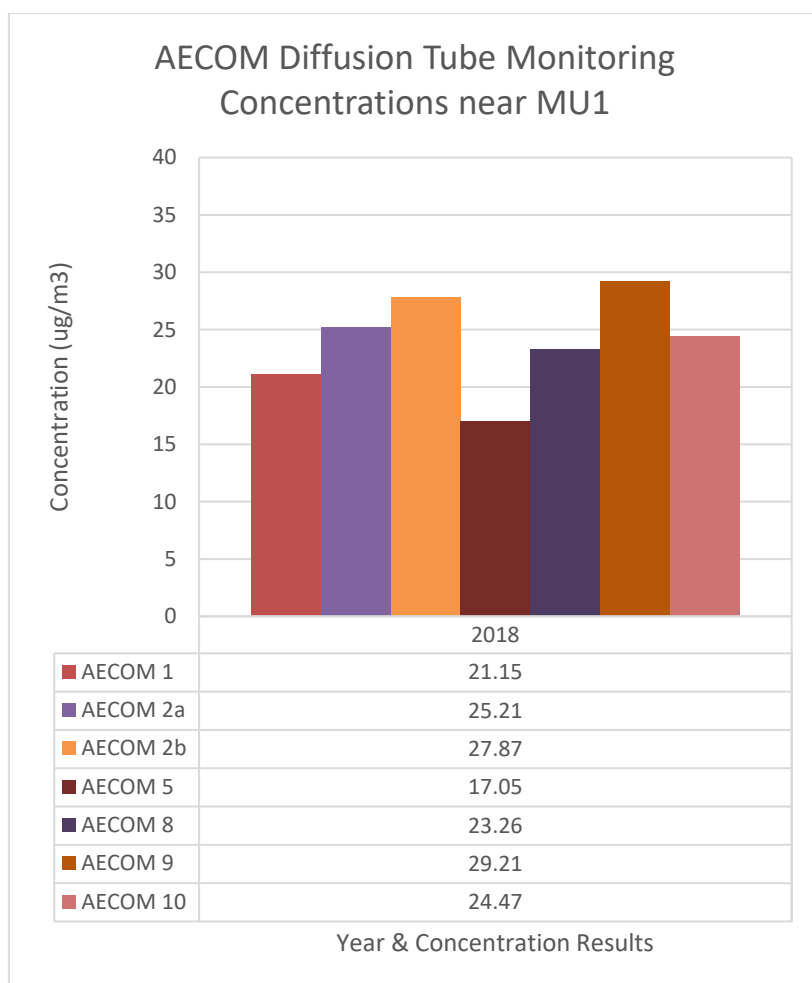


**Plate 2: AECOM diffusion tube concentrations**

## 4.2 Background Air Pollutant Concentrations

- 4.2.1 The air quality assessment considers background concentrations upon which the local, traffic derived pollution is superimposed.
- 4.2.2 BMBC operates an urban background automatic monitor for NO<sub>2</sub>, which is located approximately 750m to the south east of the proposed development site (monitor reference 'CM3'). The urban background monitor is representative of the study area given the proximity and local road network it monitors. The NO<sub>x</sub> concentration has been calculated using the NO<sub>x</sub> to NO<sub>2</sub> calculator. The 2023 and 2026 concentrations are calculated by applying the air quality reduction from the Defra-based maps, for the same grid square where CM3 is located.
- 4.2.3 As there are currently no representative PM<sub>10</sub> or PM<sub>2.5</sub> monitoring locations in the vicinity of the proposed development site, background concentrations have been

obtained from the 2017-based Defra default concentration maps, for the appropriate grid squares<sup>6</sup>.

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

| <b>Table 6: Background Pollutant Concentrations Used in the Air Quality Assessment</b> |                                            |                                          |                                             |                                              |
|----------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------|---------------------------------------------|----------------------------------------------|
| <b>Receptor &amp; Grid Square (x, y)</b>                                               | <b>Oxides of Nitrogen (NO<sub>x</sub>)</b> | <b>Nitrogen Dioxide (NO<sub>2</sub>)</b> | <b>Particulate matter (PM<sub>10</sub>)</b> | <b>Particulate matter (PM<sub>2.5</sub>)</b> |
| <b>2018 Annual Mean Concentrations (µg/m<sup>3</sup>)</b>                              |                                            |                                          |                                             |                                              |
| ESR 5, ESR 6, ESR 12 (431500, 407500)                                                  | 23.09                                      | 15.59                                    | 10.72                                       | 6.72                                         |
| ESR 1, ESR 13 (432500, 407500)                                                         | 23.09                                      | 15.59                                    | 10.07                                       | 6.65                                         |
| ESR 11 (430500, 408500)                                                                | 23.09                                      | 15.59                                    | 13.50                                       | 7.75                                         |
| ESRs 2 to 4, ESRs 7 to 10 (431500, 408500)                                             | 23.09                                      | 15.59                                    | 10.46                                       | 6.66                                         |
| ESR 14 to 16 (32500, 405500)                                                           | 23.09                                      | 15.59                                    | 12.45                                       | 7.65                                         |
| <b>2023 Annual Mean Concentrations (µg/m<sup>3</sup>)</b>                              |                                            |                                          |                                             |                                              |
| ESR 5, ESR 6, ESR 12 (431500, 407500)                                                  | 18.31                                      | 12.62                                    | 10.26                                       | 6.32                                         |
| ESR 1, ESR 13 (432500, 407500)                                                         | 18.31                                      | 12.62                                    | 9.59                                        | 6.24                                         |
| ESR 11 (430500, 408500)                                                                | 18.31                                      | 12.62                                    | 13.04                                       | 7.36                                         |
| ESRs 2 to 4, ESRs 7 to 10 (431500, 408500)                                             | 18.31                                      | 12.62                                    | 10.00                                       | 6.27                                         |
| ESR 14 to 16 (32500, 405500)                                                           | 18.31                                      | 12.62                                    | 11.98                                       | 7.24                                         |
| <b>2026 Annual Mean Concentrations (µg/m<sup>3</sup>)</b>                              |                                            |                                          |                                             |                                              |
| ESR 5, ESR 6, ESR 12 (431500, 407500)                                                  | 16.49                                      | 11.46                                    | 10.10                                       | 6.19                                         |
| ESR 1, ESR 13 (432500, 407500)                                                         | 16.49                                      | 11.46                                    | 9.44                                        | 6.11                                         |
| ESR 11 (430500, 408500)                                                                | 16.49                                      | 11.46                                    | 12.88                                       | 7.22                                         |

<sup>6</sup> Accessed through the Defra Local Air Quality Management webpages (<http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>)

| Table 6: Background Pollutant Concentrations Used in the Air Quality Assessment |                                       |                                     |                                        |                                         |
|---------------------------------------------------------------------------------|---------------------------------------|-------------------------------------|----------------------------------------|-----------------------------------------|
| Receptor & Grid Square (x, y)                                                   | Oxides of Nitrogen (NO <sub>x</sub> ) | Nitrogen Dioxide (NO <sub>2</sub> ) | Particulate matter (PM <sub>10</sub> ) | Particulate matter (PM <sub>2.5</sub> ) |
| ESRs 2 to 4, ESRs 7 to 10 (431500, 408500)                                      | 16.49                                 | 11.46                               | 9.85                                   | 6.14                                    |
| ESR 14 to 16 (32500, 405500)                                                    | 16.49                                 | 11.46                               | 11.82                                  | 7.10                                    |

### 4.3 Modelled Baseline Concentrations at Existing Sensitive Receptors

- 4.3.1 The baseline assessment (i.e. scenarios 1, 2 and 4) has been carried out for the existing sensitive receptors considered, in accordance with Defra guidance (i.e. using EFT v9.0). The baseline model predictions for ESRs 14 to 16 (in the AQMA) are provided, however the operational phase impact assessment (Scenario 6) is provided in **Appendix D**.
- 4.3.2 The adjusted NO<sub>2</sub> and unadjusted PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are detailed in Table 7 and Table 8.

| Table 7: Predicted Adjusted NO <sub>2</sub> and Unadjusted PM <sub>10</sub> and PM <sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 1 and 2 |                                                            |                  |                   |                                                    |                  |                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------|-------------------|----------------------------------------------------|------------------|-------------------|
| Receptor                                                                                                                                                               | Calculated Annual Mean Concentrations (µg/m <sup>3</sup> ) |                  |                   |                                                    |                  |                   |
|                                                                                                                                                                        | Scenario 1: 2018 Base Year                                 |                  |                   | Scenario 2: 2023 Opening Year, Without Development |                  |                   |
|                                                                                                                                                                        | NO <sub>2</sub>                                            | PM <sub>10</sub> | PM <sub>2.5</sub> | NO <sub>2</sub>                                    | PM <sub>10</sub> | PM <sub>2.5</sub> |
| ESR 1                                                                                                                                                                  | 25.55                                                      | 10.80            | 7.09              | 19.31                                              | 10.32            | 6.65              |
| ESR 2                                                                                                                                                                  | 29.15                                                      | 11.43            | 7.25              | 22.13                                              | 10.97            | 6.82              |
| ESR 3                                                                                                                                                                  | 28.50                                                      | 11.37            | 7.21              | 21.50                                              | 10.90            | 6.78              |
| ESR 4                                                                                                                                                                  | 23.14                                                      | 11.13            | 7.06              | 17.92                                              | 10.67            | 6.65              |
| ESR 5                                                                                                                                                                  | 23.09                                                      | 11.30            | 7.06              | 17.45                                              | 10.83            | 6.64              |
| ESR 6                                                                                                                                                                  | 23.83                                                      | 11.46            | 7.15              | 17.87                                              | 10.98            | 6.73              |
| ESR 7                                                                                                                                                                  | 24.42                                                      | 11.18            | 7.09              | 18.29                                              | 10.71            | 6.66              |
| ESR 8                                                                                                                                                                  | 27.99                                                      | 11.51            | 7.28              | 20.50                                              | 11.02            | 6.84              |
| ESR 9                                                                                                                                                                  | 32.90                                                      | 11.71            | 7.42              | 24.41                                              | 11.23            | 6.97              |
| ESR 10                                                                                                                                                                 | 35.34                                                      | 11.88            | 7.52              | 26.04                                              | 11.40            | 7.06              |
| ESR 11                                                                                                                                                                 | 25.42                                                      | 14.31            | 8.23              | 19.45                                              | 13.84            | 7.80              |

**Table 7: Predicted Adjusted NO<sub>2</sub> and Unadjusted PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 1 and 2**

| Receptor                                                                                                                                                                                                                                                                                                         | Calculated Annual Mean Concentrations (µg/m <sup>3</sup> ) |                  |                   |                                                    |                  |                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------|-------------------|----------------------------------------------------|------------------|-------------------|
|                                                                                                                                                                                                                                                                                                                  | Scenario 1: 2018 Base Year                                 |                  |                   | Scenario 2: 2023 Opening Year, Without Development |                  |                   |
|                                                                                                                                                                                                                                                                                                                  | NO <sub>2</sub>                                            | PM <sub>10</sub> | PM <sub>2.5</sub> | NO <sub>2</sub>                                    | PM <sub>10</sub> | PM <sub>2.5</sub> |
| ESR 12                                                                                                                                                                                                                                                                                                           | 22.34                                                      | 10.68            | 7.01              | 17.49                                              | 10.21            | 6.59              |
| ESR 13                                                                                                                                                                                                                                                                                                           | 25.03                                                      | 10.91            | 7.14              | 19.29                                              | 10.44            | 6.72              |
| ESR 14*                                                                                                                                                                                                                                                                                                          | <u>46.83</u>                                               | 15.68            | 9.59              | 34.76                                              | 15.17            | 9.04              |
| ESR 15*                                                                                                                                                                                                                                                                                                          | <u>53.42</u>                                               | 16.40            | 10.02             | 39.64                                              | 15.87            | 9.43              |
| ESR 16*                                                                                                                                                                                                                                                                                                          | 32.58                                                      | 14.18            | 8.68              | 24.42                                              | 13.70            | 8.20              |
| 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 <sup>7</sup> in accordance with LAQM.TG (16)<br>*Sensitive receptors located within the AQMA<br><u>Indicates an exceedance of the Air Quality Objective</u> |                                                            |                  |                   |                                                    |                  |                   |

- 4.3.3 An NO<sub>2</sub> exceedance is predicted to occur at ESRs 14 and 15 within the Base Year. These two sensitive receptors are both located at the A628 AQMA No.2. Local air quality monitors nearest the two sensitive receptors are showing exceedance, therefore this modelled exceedance at the sensitive receptors was to be expected.

**Table 8: Predicted Adjusted NO<sub>2</sub> and Unadjusted PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenario 4**

| Receptor | Calculated Annual Mean Concentrations (µg/m <sup>3</sup> ) |                  |                   |
|----------|------------------------------------------------------------|------------------|-------------------|
|          | Scenario 4: 2026 Future Year, Without Development          |                  |                   |
|          | NO <sub>2</sub>                                            | PM <sub>10</sub> | PM <sub>2.5</sub> |
| ESR 1    | 16.83                                                      | 10.20            | 6.53              |
| ESR 2    | 18.95                                                      | 10.84            | 6.69              |
| ESR 3    | 18.39                                                      | 10.77            | 6.65              |
| ESR 4    | 15.65                                                      | 10.54            | 6.52              |
| ESR 5    | 15.35                                                      | 10.71            | 6.53              |
| ESR 6    | 15.71                                                      | 10.89            | 6.62              |
| ESR 7    | 16.01                                                      | 10.61            | 6.55              |

<sup>7</sup> Defra Local Air Quality Management webpages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

**Table 8: Predicted Adjusted NO<sub>2</sub> and Unadjusted PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenario 4**

| Receptor                                                                                                                                                                                                                                                | Calculated Annual Mean Concentrations (µg/m <sup>3</sup> ) |                  |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------|-------------------|
|                                                                                                                                                                                                                                                         | Scenario 4: 2026 Future Year, Without Development          |                  |                   |
|                                                                                                                                                                                                                                                         | NO <sub>2</sub>                                            | PM <sub>10</sub> | PM <sub>2.5</sub> |
| ESR 8                                                                                                                                                                                                                                                   | 17.83                                                      | 10.96            | 6.74              |
| ESR 9                                                                                                                                                                                                                                                   | 20.77                                                      | 11.12            | 6.85              |
| ESR 10                                                                                                                                                                                                                                                  | 22.17                                                      | 11.30            | 6.95              |
| ESR 11                                                                                                                                                                                                                                                  | 16.85                                                      | 13.71            | 7.68              |
| ESR 12                                                                                                                                                                                                                                                  | 15.35                                                      | 10.08            | 6.46              |
| ESR 13                                                                                                                                                                                                                                                  | 16.84                                                      | 10.32            | 6.60              |
| ESR 14*                                                                                                                                                                                                                                                 | 29.07                                                      | 15.10            | 8.92              |
| ESR 15*                                                                                                                                                                                                                                                 | 33.04                                                      | 15.82            | 9.32              |
| ESR 16*                                                                                                                                                                                                                                                 | 20.77                                                      | 13.59            | 8.08              |
| <p>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<sup>8</sup> in accordance with LAQM.TG (16)</p> <p>*Sensitive receptors located within the AQMA</p> |                                                            |                  |                   |

- 4.3.4 Except for the 2018 NO<sub>2</sub> concentrations at ESR 14 and 15, the results show that all predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are below the relevant objectives and limit values.

<sup>8</sup> Defra Local Air Quality Management webpages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

## 5 IMPACT ASSESSMENT

### 5.1 Construction Phase Assessment

#### *Step 1 – Requirement for Assessment*

- 5.1.1 There are sensitive receptors within 350m of the future construction activities, therefore it is necessary to proceed to Step 2.
- 5.1.2 Due to the construction timescales of the proposed development and the wider MU1, it is not anticipated there would be any cumulative effects from the two construction sites. The proposed development site is anticipated to be fully constructed by 2023.

#### *Step 2 – Impact Assessment*

- 5.1.3 In accordance with the IAQM guidance, the main activities to be considered during the construction phase of the proposed development are earthworks, construction and track out. There are no demolition activities proposed, and so no further consideration is required.
- 5.1.4 Earthworks covers the processes of soil-stripping, ground-levelling, excavation and landscaping. Construction activities will focus on the proposed buildings, access roads car parking areas. Track out is defined as the transport of dust and dirt by vehicles travelling from a construction site on to 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*

- 5.1.5 Step 2A of the assessment defines the potential dust emission magnitude from earthworks, construction and track out in the absence of site-specific mitigation.
- 5.1.6 Examples of the criteria for the dust emission classes are detailed in **Appendix B**. The results of this step are detailed in Table 9.

#### *Step 2B*

- 5.1.7 Step 2B of the construction phase dust assessment defines the sensitivity of the area, considering the significance criteria detailed in **Appendix B**, for earthworks, construction and track out. The sensitivity of the area to each activity is assessed for potential dust soiling, human health effects and ecological effects.

- 5.1.8 For earthworks and construction, there are currently between 1 to 10 receptors (residential) within 20m of where these activities may take place, which is assumed to be the site boundary for the purposes of this assessment.
- 5.1.9 The routing of construction vehicles is unknown at this stage. Therefore, for the purposes of this assessment, worst case routing scenarios have been assumed for assessment of potential track out impacts at nearby receptors.
- 5.1.10 As a result, for track out, there are between 10 and 100 receptors (mainly residential) within 20m of where track out may occur for a distance of up to 500m from the site entrance (assuming construction vehicles travel west from the site on the A635 Barugh Green Road).

### **Step 2C**

- 5.1.11 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.
- 5.1.12 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 9.

### **Summary of Step 2**

- 5.1.13 Table 9 details the results of Step 2 of the construction phase assessment for human receptors.

| <b>Table 9: Construction Phase Dust Assessment for Human Receptors</b> |                   |                    |                     |                     |
|------------------------------------------------------------------------|-------------------|--------------------|---------------------|---------------------|
|                                                                        | <b>Activity</b>   |                    |                     |                     |
|                                                                        | <b>Demolition</b> | <b>Earthworks</b>  | <b>Construction</b> | <b>Track out</b>    |
| <b>Step 2A</b>                                                         |                   |                    |                     |                     |
| Dust Emission Magnitude                                                | N/A               | Large <sup>a</sup> | Medium <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               | Medium             | Medium              | High                |
| Sensitivity of Area to Human Health Effects                            | N/A               | Low <sup>d</sup>   | Low <sup>d</sup>    | Low <sup>d</sup>    |

| Table 9: Construction Phase Dust Assessment for Human Receptors                                                                                                                                                                                                                                                                                                                                                                                                                    |            |             |              |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------|--------------|-------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Activity   |             |              |             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Demolition | Earthworks  | Construction | Track out   |
| Step 2C                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |             |              |             |
| Dust Risk: Dust Soiling                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A        | Medium Risk | Medium Risk  | Medium Risk |
| Dust Risk: Human Health                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A        | Low Risk    | Low Risk     | Low Risk    |
| <p>a. Total site area estimated to be more than 10,000m<sup>2</sup></p> <p>b. Total building volume estimated to be between 25,000 to 100,000m<sup>3</sup>, with potentially dusty construction materials</p> <p>c. Number of construction phase vehicles estimated to be between 10 and 50 movements per day</p> <p>d. Background annual mean PM<sub>10</sub> concentration is taken from the LAQM Defra default concentration maps, for the appropriate grid square for 2018</p> |            |             |              |             |

### Step 3 – Mitigation

- 5.1.14 During the construction phase, the implementation of effective mitigation measures will substantially reduce the potential for nuisance dust and particulate matter to be generated.
- 5.1.15 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 dust effects from these activities will be not significant.

### Recommendations for Site-Specific Mitigation

- 5.1.16 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-vegetate 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;

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a process, in which case ensure that appropriate additional control measures are in place;
- Avoidance of activities that generate large amounts of dust during windy conditions;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- Avoid dry sweeping of large areas;
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport;
- Implement a wheel washing system (this may include a dedicated wheel wash apparatus or by means of a handheld power wash). An area of hardstanding / or tarmac between the wheel wash and site exit should be maintained and kept clean, to limit any track out onto the public highway roads;
- Minimisation of vehicle movements and limitation of vehicle speeds – the slower the vehicle speeds, the lower the dust generation;
- Ensure 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.

5.1.17 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 BMBC on request.

5.1.18 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 skills and experience offered by the appointed contractor.

### ***Advisory Note***

- 5.1.19 The UK Government, for England only, has announced plans to allow construction sites to operate until 21:00 hours. This measure was introduced due to the COVID-19 pandemic; however, no application end date is available at the time of writing. This is subject to local authority consultation and would be decided on a case-by-case basis. It is unknown whether the Applicant would pursue this option for the proposed development site. The dust mitigation scheme has no defined hours and would be suitable for use over any period of working. It would not require any significant changes.
- 5.1.20 The Applicant is made aware herein that evening work, being unique on residential construction, could be susceptible to further scrutiny or complaint due to the increased number of people who could be present in their homes in the evening period. It may be necessary to implement the dust management mitigation more rigorously to ensure compliance, such as more frequent dampening of potential dusty surfaces / stockpiles.

### ***Step 4 – Residual Effects***

- 5.1.21 Step 4 of the construction phase dust assessment has been undertaken to determine the significance of the dust effects arising from earthworks, construction and track out associated with the proposed development.
- 5.1.22 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 particulate matter to be generated and any residual impact should be **not significant**.

## **5.2 Operational Phase Assessment**

- 5.2.1 The impact assessment has been carried out for the representative existing sensitive receptors considered (i.e. ESR 1 to ESR 13) using EFT v9.0.
- 5.2.2 The pollutant predictions for ESRs 14 to 16, which are located within the AQMA, are provided in **Appendix D**. The AQMA detailed assessment is only met in the requested 'combined proposed development flows, with spine road and MU1 Phase 1 development flows.
- 5.2.3 In accordance with national guidance, a sensitivity analysis has been undertaken. A revision to the vehicle classifications has been made to EFT v9.0 and then applied to

calculate revised vehicle emission factors for ADMS-Roads and future year scenarios. The Euro VI (d) class vehicles are all reverted to a Euro VI (c) class, producing higher vehicle emission releases as more polluting vehicles are assumed to be on the road. To ensure a robust assessment, it is also assumed there would be no improvement in background concentrations.

### **Scenarios 2 and 3: 2023 Opening Year**

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

- 5.2.4 Table 10 details the predicted NO<sub>2</sub> concentrations for the 2023 Opening Year, for both the 'Without Development' and 'With Development' scenarios, in accordance with Defra guidance (i.e. using EFT v9.0). The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| <b>Table 10: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v9.0</b> |                                                                                            |                         |                                       |                                                   |                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------|---------------------------------------|---------------------------------------------------|---------------------------|
| <b>Receptor</b>                                                                                                                                                  | <b>Calculated Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)<sup>a</sup></b> |                         |                                       |                                                   |                           |
|                                                                                                                                                                  | <b>Without Development</b>                                                                 | <b>With Development</b> |                                       | <b>Concentration Change as Percentage of AQAL</b> | <b>Impact<sup>b</sup></b> |
|                                                                                                                                                                  |                                                                                            | <b>Concentration</b>    | <b>Percentage in Relation to AQAL</b> |                                                   |                           |
| ESR 1                                                                                                                                                            | 19.31                                                                                      | 19.42                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 2                                                                                                                                                            | 22.13                                                                                      | 22.19                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 3                                                                                                                                                            | 21.50                                                                                      | 21.52                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 4                                                                                                                                                            | 17.92                                                                                      | 17.96                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 5                                                                                                                                                            | 17.45                                                                                      | 17.56                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 6                                                                                                                                                            | 17.87                                                                                      | 17.88                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 7                                                                                                                                                            | 18.29                                                                                      | 18.30                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 8                                                                                                                                                            | 20.50                                                                                      | 20.52                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 9                                                                                                                                                            | 24.41                                                                                      | 24.42                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 10                                                                                                                                                           | 26.04                                                                                      | 26.07                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 11                                                                                                                                                           | 19.45                                                                                      | 19.46                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |

**Table 10: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v9.0**

| 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 12                                                                                                                                                                                                                                                                                                                                                       | 17.49                                                                                   | 17.53            | <75%                           | <0.5%                                      | Negligible          |
| ESR 13                                                                                                                                                                                                                                                                                                                                                       | 19.29                                                                                   | 19.38            | <75%                           | <0.5%                                      | Negligible          |
| <p>a. 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)</p> <p>b. 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</p> |                                                                                         |                  |                                |                                            |                     |

5.2.5 Table 11 details the predicted NO<sub>2</sub> concentrations derived using the sensitivity analysis methodology. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

**Table 11: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Sensitivity Analysis Methodology**

| 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 1    | 23.11                                                                                   | 23.27            | <75%                           | <0.5%                                      | Negligible          |
| ESR 2    | 26.31                                                                                   | 26.39            | <75%                           | <0.5%                                      | Negligible          |
| ESR 3    | 25.55                                                                                   | 25.58            | <75%                           | <0.5%                                      | Negligible          |
| ESR 4    | 21.62                                                                                   | 21.67            | <75%                           | <0.5%                                      | Negligible          |
| ESR 5    | 21.02                                                                                   | 21.17            | <75%                           | <0.5%                                      | Negligible          |
| ESR 6    | 21.50                                                                                   | 21.61            | <75%                           | <0.5%                                      | Negligible          |
| ESR 7    | 21.97                                                                                   | 22.06            | <75%                           | <0.5%                                      | Negligible          |
| ESR 8    | 24.41                                                                                   | 24.57            | <75%                           | <0.5%                                      | Negligible          |
| ESR 9    | 28.79                                                                                   | 28.86            | <75%                           | <0.5%                                      | Negligible          |
| ESR 10   | 30.62                                                                                   | 30.74            | 76 – 94%                       | <0.5%                                      | Negligible          |
| ESR 11   | 23.38                                                                                   | 23.40            | <75%                           | <0.5%                                      | Negligible          |

**Table 11: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Sensitivity Analysis Methodology**

| 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 12                                                                                                                                                                                                                                                                                                                                                       | 21.17                                                                                   | 21.21            | <75%                           | <0.5%                                      | Negligible          |
| ESR 13                                                                                                                                                                                                                                                                                                                                                       | 23.18                                                                                   | 23.29            | <75%                           | <0.5%                                      | Negligible          |
| <p>c. 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)</p> <p>d. 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</p> |                                                                                         |                  |                                |                                            |                     |

5.2.6 Table 12 details the PM<sub>10</sub> concentrations for the 2023 Opening Year. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

**Table 12: Predicted Unadjusted PM<sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v9.0**

| Receptor | Calculated Annual Mean PM <sub>10</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 1    | 10.32                                                                       | 10.33            | <75%                           | <0.5%                                      | Negligible          |
| ESR 2    | 10.97                                                                       | 10.97            | <75%                           | <0.5%                                      | Negligible          |
| ESR 3    | 10.90                                                                       | 10.90            | <75%                           | <0.5%                                      | Negligible          |
| ESR 4    | 10.67                                                                       | 10.68            | <75%                           | <0.5%                                      | Negligible          |
| ESR 5    | 10.83                                                                       | 10.84            | <75%                           | <0.5%                                      | Negligible          |
| ESR 6    | 10.98                                                                       | 10.99            | <75%                           | <0.5%                                      | Negligible          |
| ESR 7    | 10.71                                                                       | 10.71            | <75%                           | <0.5%                                      | Negligible          |
| ESR 8    | 11.02                                                                       | 11.03            | <75%                           | <0.5%                                      | Negligible          |
| ESR 9    | 11.23                                                                       | 11.23            | <75%                           | <0.5%                                      | Negligible          |
| ESR 10   | 11.40                                                                       | 11.40            | <75%                           | <0.5%                                      | Negligible          |
| ESR 11   | 13.84                                                                       | 13.84            | <75%                           | <0.5%                                      | Negligible          |

**Table 12: Predicted Unadjusted PM<sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v9.0**

| Receptor | Calculated Annual Mean PM <sub>10</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 12   | 10.21                                                                       | 10.22            | <75%                           | <0.5%                                      | Negligible          |
| ESR 13   | 10.44                                                                       | 10.45            | <75%                           | <0.5%                                      | Negligible          |

*a. 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 Table 13 details the PM<sub>2.5</sub> concentrations for the 2023 Opening Year. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

**Table 13: Predicted Unadjusted PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v9.0**

| Receptor | Calculated Annual Mean PM <sub>2.5</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 1    | 6.65                                                                         | 6.66             | <75%                           | <0.5%                                      | Negligible          |
| ESR 2    | 6.82                                                                         | 6.82             | <75%                           | <0.5%                                      | Negligible          |
| ESR 3    | 6.78                                                                         | 6.78             | <75%                           | <0.5%                                      | Negligible          |
| ESR 4    | 6.65                                                                         | 6.65             | <75%                           | <0.5%                                      | Negligible          |
| ESR 5    | 6.64                                                                         | 6.65             | <75%                           | <0.5%                                      | Negligible          |
| ESR 6    | 6.73                                                                         | 6.73             | <75%                           | <0.5%                                      | Negligible          |
| ESR 7    | 6.66                                                                         | 6.66             | <75%                           | <0.5%                                      | Negligible          |
| ESR 8    | 6.84                                                                         | 6.84             | <75%                           | <0.5%                                      | Negligible          |
| ESR 9    | 6.97                                                                         | 6.97             | <75%                           | <0.5%                                      | Negligible          |
| ESR 10   | 7.06                                                                         | 7.06             | <75%                           | <0.5%                                      | Negligible          |
| ESR 11   | 7.80                                                                         | 7.80             | <75%                           | <0.5%                                      | Negligible          |
| ESR 12   | 6.59                                                                         | 6.59             | <75%                           | <0.5%                                      | Negligible          |
| ESR 13   | 6.72                                                                         | 6.72             | <75%                           | <0.5%                                      | Negligible          |

*a. 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*

5.2.8 The results of the assessment show that all predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations, in all scenarios considered, are below the relevant objectives and limit values. There is no air quality change above 0.5%, for all pollutants considered.

#### ***Proposed Sensitive Human Receptors***

5.2.9 Pollutant concentrations have been modelled for proposed receptors for the 2023 Opening Year 'With Development' scenario, in accordance with Defra guidance (i.e. using EFT v9.0), as detailed in Table 14.

| <b>Table 14: Predicted Adjusted NO<sub>2</sub>, and Unadjusted PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations at Proposed Sensitive Receptors for Scenario 3 – Using Emission Factor Toolkit v9.0</b> |                                                                 |                        |                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------|-------------------------|
| <b>Proposed Receptor</b>                                                                                                                                                                                   | <b>Calculated Annual Mean Concentrations (µg/m<sup>3</sup>)</b> |                        |                         |
|                                                                                                                                                                                                            | <b>NO<sub>2</sub></b>                                           | <b>PM<sub>10</sub></b> | <b>PM<sub>2.5</sub></b> |
| PSR 1                                                                                                                                                                                                      | 19.43                                                           | 10.56                  | 6.78                    |

#### ***Scenarios 4 and 5: 2026 Future Year***

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

5.2.10 Table 15 details the predicted NO<sub>2</sub> concentrations for the 2026 Future Year, for both the 'Without Development' and 'With Development' scenarios, in accordance with Defra guidance (i.e. using EFT v9.0). The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| <b>Table 15: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit v9.0</b> |                                                                                            |                         |                                       |                                                   |                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------|---------------------------------------|---------------------------------------------------|---------------------------|
| <b>Receptor</b>                                                                                                                                                  | <b>Calculated Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)<sup>a</sup></b> |                         |                                       |                                                   |                           |
|                                                                                                                                                                  | <b>Without Development</b>                                                                 | <b>With Development</b> |                                       | <b>Concentration Change as Percentage of AQAL</b> | <b>Impact<sup>b</sup></b> |
|                                                                                                                                                                  |                                                                                            | <b>Concentration</b>    | <b>Percentage in Relation to AQAL</b> |                                                   |                           |
| ESR 1                                                                                                                                                            | 16.83                                                                                      | 16.91                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 2                                                                                                                                                            | 18.95                                                                                      | 19.00                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 3                                                                                                                                                            | 18.39                                                                                      | 18.41                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 4                                                                                                                                                            | 15.65                                                                                      | 15.69                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 5                                                                                                                                                            | 15.35                                                                                      | 15.43                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 6                                                                                                                                                            | 15.71                                                                                      | 15.73                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 7                                                                                                                                                            | 16.01                                                                                      | 16.02                   | <75%                                  | <0.5%                                             | <b>Negligible</b>         |

**Table 15: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit v9.0**

| 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 8                                                                                                                                                                                                                                                                                                                                                                      | 17.83                                                                                   | 17.85            | <75%                           | <0.5%                                      | Negligible          |
| ESR 9                                                                                                                                                                                                                                                                                                                                                                      | 20.77                                                                                   | 20.78            | <75%                           | <0.5%                                      | Negligible          |
| ESR 10                                                                                                                                                                                                                                                                                                                                                                     | 22.17                                                                                   | 22.18            | <75%                           | <0.5%                                      | Negligible          |
| ESR 11                                                                                                                                                                                                                                                                                                                                                                     | 16.85                                                                                   | 16.86            | <75%                           | <0.5%                                      | Negligible          |
| ESR 12                                                                                                                                                                                                                                                                                                                                                                     | 15.35                                                                                   | 15.38            | <75%                           | <0.5%                                      | Negligible          |
| ESR 13                                                                                                                                                                                                                                                                                                                                                                     | 16.84                                                                                   | 16.91            | <75%                           | <0.5%                                      | Negligible          |
| <p><i>a. 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)</i></p> <p><i>b. 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</i></p> |                                                                                         |                  |                                |                                            |                     |

5.2.11 Table 16 details the predicted NO<sub>2</sub> concentrations derived using the sensitivity analysis methodology for the 2026 Future Year scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

**Table 16: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Sensitivity Analysis Methodology**

| 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 1    | 22.42                                                                                   | 22.55            | <75%                           | <0.5%                                      | Negligible          |
| ESR 2    | 25.20                                                                                   | 25.26            | <75%                           | <0.5%                                      | Negligible          |
| ESR 3    | 24.43                                                                                   | 24.45            | <75%                           | <0.5%                                      | Negligible          |
| ESR 4    | 21.03                                                                                   | 21.07            | <75%                           | <0.5%                                      | Negligible          |
| ESR 5    | 20.53                                                                                   | 20.65            | <75%                           | <0.5%                                      | Negligible          |
| ESR 6    | 21.02                                                                                   | 21.04            | <75%                           | <0.5%                                      | Negligible          |
| ESR 7    | 21.38                                                                                   | 21.40            | <75%                           | <0.5%                                      | Negligible          |
| ESR 8    | 23.64                                                                                   | 23.66            | <75%                           | <0.5%                                      | Negligible          |

**Table 16: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Sensitivity Analysis Methodology**

| 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 9                                                                                                                                                                                                                                                                                                                                                        | 27.39                                                                                   | 27.41            | <75%                           | <0.5%                                      | Negligible          |
| ESR 10                                                                                                                                                                                                                                                                                                                                                       | 29.10                                                                                   | 29.12            | <75%                           | <0.5%                                      | Negligible          |
| ESR 11                                                                                                                                                                                                                                                                                                                                                       | 22.61                                                                                   | 22.62            | <75%                           | <0.5%                                      | Negligible          |
| ESR 12                                                                                                                                                                                                                                                                                                                                                       | 20.68                                                                                   | 20.71            | <75%                           | <0.5%                                      | Negligible          |
| ESR 13                                                                                                                                                                                                                                                                                                                                                       | 22.55                                                                                   | 22.65            | <75%                           | <0.5%                                      | Negligible          |
| <p>c. 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)</p> <p>d. 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</p> |                                                                                         |                  |                                |                                            |                     |

5.2.12 Table 17 details the PM<sub>10</sub> concentrations for the 2026 Future Year scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

**Table 17: Predicted Unadjusted PM<sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit v9.0**

| Receptor | Calculated Annual Mean PM <sub>10</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 1    | 10.20                                                                       | 10.21            | <75%                           | <0.5%                                      | Negligible          |
| ESR 2    | 10.84                                                                       | 10.85            | <75%                           | <0.5%                                      | Negligible          |
| ESR 3    | 10.77                                                                       | 10.77            | <75%                           | <0.5%                                      | Negligible          |
| ESR 4    | 10.54                                                                       | 10.55            | <75%                           | <0.5%                                      | Negligible          |
| ESR 5    | 10.71                                                                       | 10.73            | <75%                           | <0.5%                                      | Negligible          |
| ESR 6    | 10.89                                                                       | 10.89            | <75%                           | <0.5%                                      | Negligible          |
| ESR 7    | 10.61                                                                       | 10.61            | <75%                           | <0.5%                                      | Negligible          |
| ESR 8    | 10.96                                                                       | 10.96            | <75%                           | <0.5%                                      | Negligible          |
| ESR 9    | 11.12                                                                       | 11.12            | <75%                           | <0.5%                                      | Negligible          |
| ESR 10   | 11.30                                                                       | 11.30            | <75%                           | <0.5%                                      | Negligible          |

**Table 17: Predicted Unadjusted PM<sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit v9.0**

| Receptor                                                                                                                                                  | Calculated Annual Mean PM <sub>10</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 11                                                                                                                                                    | 13.71                                                                       | 13.71            | <75%                           | <0.5%                                      | Negligible          |
| ESR 12                                                                                                                                                    | 10.08                                                                       | 10.08            | <75%                           | <0.5%                                      | Negligible          |
| ESR 13                                                                                                                                                    | 10.32                                                                       | 10.33            | <75%                           | <0.5%                                      | Negligible          |
| b. 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 |                                                                             |                  |                                |                                            |                     |

5.2.13 Table 18 details the PM<sub>2.5</sub> concentrations for the 2026 Future Year scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

**Table 18: Predicted Unadjusted PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit v9.0**

| Receptor | Calculated Annual Mean PM <sub>2.5</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 1    | 6.53                                                                         | 6.54             | <75%                           | <0.5%                                      | Negligible          |
| ESR 2    | 6.69                                                                         | 6.70             | <75%                           | <0.5%                                      | Negligible          |
| ESR 3    | 6.65                                                                         | 6.65             | <75%                           | <0.5%                                      | Negligible          |
| ESR 4    | 6.52                                                                         | 6.52             | <75%                           | <0.5%                                      | Negligible          |
| ESR 5    | 6.53                                                                         | 6.53             | <75%                           | <0.5%                                      | Negligible          |
| ESR 6    | 6.62                                                                         | 6.62             | <75%                           | <0.5%                                      | Negligible          |
| ESR 7    | 6.55                                                                         | 6.55             | <75%                           | <0.5%                                      | Negligible          |
| ESR 8    | 6.74                                                                         | 6.75             | <75%                           | <0.5%                                      | Negligible          |
| ESR 9    | 6.85                                                                         | 6.85             | <75%                           | <0.5%                                      | Negligible          |
| ESR 10   | 6.95                                                                         | 6.95             | <75%                           | <0.5%                                      | Negligible          |
| ESR 11   | 7.68                                                                         | 7.68             | <75%                           | <0.5%                                      | Negligible          |

| Table 18: Predicted Unadjusted PM <sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit v9.0   |                                                                              |                  |                                |                                            |                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------|--------------------------------|--------------------------------------------|---------------------|
| Receptor                                                                                                                                                         | Calculated Annual Mean PM <sub>2.5</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 12                                                                                                                                                           | 6.46                                                                         | 6.46             | <75%                           | <0.5%                                      | Negligible          |
| ESR 13                                                                                                                                                           | 6.60                                                                         | 6.60             | <75%                           | <0.5%                                      | Negligible          |
| <i>b. 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</i> |                                                                              |                  |                                |                                            |                     |

5.2.14 The results of the assessment show that all predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations, in all scenarios considered, are below the relevant objectives and limit values. There is no air quality change above 0.5%, for all pollutants considered.

#### ***Proposed Sensitive Human Receptors***

5.2.15 Pollutant concentrations have been modelled for proposed receptors for the 2026 Future Year 'With Development' scenario, in accordance with Defra guidance (i.e. using EFT v9.0), as detailed in Table 19.

| Table 19: Predicted Adjusted NO <sub>2</sub> , and Unadjusted PM <sub>10</sub> and PM <sub>2.5</sub> Concentrations at Proposed Sensitive Receptors for Scenario 5 – Using Emission Factor Toolkit v9.0 |                                                            |                  |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------|-------------------|
| Proposed Receptor                                                                                                                                                                                       | Calculated Annual Mean Concentrations (µg/m <sup>3</sup> ) |                  |                   |
|                                                                                                                                                                                                         | NO <sub>2</sub>                                            | PM <sub>10</sub> | PM <sub>2.5</sub> |
| PSR 1                                                                                                                                                                                                   | 17.00                                                      | 10.49            | 6.69              |

#### ***Assessment of Significance for Human Receptors***

5.2.16 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**.

5.2.17 The results of Scenario 6, which is an assessment of the combined flows from this development and the MU1 Phase 1 flows at the nearby AQMAs has been provided in **Appendix D**. The assessment of significance is concluded based on the proposed development scope. A future planning submission would be made for the wider MU1 site, which will include a modelling assessment at the AQMAs and appropriate mitigation.

5.2.18 The assessment of significance has considered several factors, including:

- Baseline pollutant concentrations in 2017, 2023 and 2026 are below the relevant annual mean objectives and limit values at all existing receptors located outside of the AQMAs. An exceedance of the NO<sub>2</sub> annual mean was predicted, in 2018, at ESRs 14 and 15. The concentrations are similar to current baseline monitoring concentrations which also exceed air quality objectives for NO<sub>2</sub>;
- Two assessment approaches have been taken, using the predictions from the Defra EFT v9.0 and a sensitivity analysis in which future vehicle uptake is reduced, and background concentrations do not improve from 2018 concentrations;
- The assessment predicts a negligible impact on concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> at all existing sensitive receptors considered, with the development in place for both assessment approaches; and
- NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations within the proposed development site are predicted to be below the relevant objectives and limit values.

5.2.19 Based on the above factors, in accordance with the EPUK/IAQM guidance, the air quality effect of the proposed development is **not significant**.

5.2.20 For Scenario 6 (**Appendix D**), the sensitivity analysis predicts that a moderate impact may occur. However, it is unlikely that the impact can be attributed to this proposed development site:

- 99 AADT would be generated at the AQMA 1 (Junction 37, M1). All these vehicles travel onto the roundabout and then exit onto the M1 southbound slipway.
- No proposed development vehicles travel onto the A628.
- The distance from the roundabout to the nearest residential property is up to 32m.
- From EPUK 2017 Guidance, the proposed development flows would ordinarily be screened out for further assessment. The 100 AADT criterion is broadly accepted as a lower threshold when an appreciable air quality change may occur. For vehicles flows below this, it is generally accepted any air quality change would automatically be very low and be a negligible change.

5.2.21 Based on the above factors, in accordance with the EPUK/IAQM guidance, the air quality effect of the proposed development is **not significant**.

***Recommendations for Mitigation***

5.2.22 BMBC has adopted the Air Quality and Emissions Good Practice Planning Guidance. This document provides a means of determining the proposed developments air quality classification, which in turn provides stipulations on the expected mitigation of that classification.

5.2.23 The proposals can be either Minor, Medium or Major. Stage 1, Table 3, of the guidance provides relevant criteria for determining the classification. The tabular list includes planning uses, development flows and proximity to an AQMA. Table 4 provides additional criteria for the Major classification (these relate to large scale changes such as a change of >5% on a road with existing flows >10,000).

5.2.24 The proposed development meets the Medium classification as follows:

- The proposals will provide more than 50 dwellings.
- The proposals will generate more than 100 two-way movements.
- The proposed development site is not near an AQMA nor will it impact upon existing sensitive receptors in an AQMA. The proposed development flows into the AQMAs are between 15 AADT (without a spine road) and 99 AADT (with a spine road); both of which fall below the 100 AADT criterion from EPUK 2017 Guidance (relevant for determining when a detailed assessment of an AQMA is required). None of the Table 4, additional triggers, are met (Major classification not met).

5.2.25 Stage 2 of the guidance requires the completion of an air quality assessment and stage 3 determines mitigation measures to be put in place, in accordance with the BMBC Guidance.

5.2.26 Suggested mitigation for 'Type 2' (which is the Medium classification) is provided on Page 13 of the guidance.

5.2.27 The following mitigation would be included for the development:

- Implementation of a green travel plan. The purpose of the travel plan is to reduce overall private vehicle usage, which would be by a named co-ordinator. Further details are provided in the Transport Assessment;

- Cycle parking is proposed in accordance with BMBC standards; and
- Provision of electric vehicle charging points. The BMBC Sustainable Travel Supplementary Planning Document & BMBC Air Quality and Emissions guidance requires 1 charging point per unit (for a dwelling with dedicated parking) or 1 charge per 10 spaces for unallocated parking. A minimum 7 kW (32 AMP) is recommended for sustainable development.

## 6 CONCLUSIONS

### 6.1 Construction Phase

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 track out 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 track out is **not significant**.

### 6.2 Operational Phase

#### *Existing Sensitive Receptors*

6.2.1 An air quality assessment has been undertaken to consider the potential impact of development generated vehicles on air quality at sixteen existing sensitive human receptors.

6.2.2 The assessment has been undertaken in accordance with Defra guidance, by using the latest vehicle emission factors from EFT v9.0. In addition, a sensitivity analysis has been undertaken for NO<sub>2</sub> concentrations, in which base year pollutant concentrations and revised vehicle emission factors have been used in the opening/future year scenarios.

6.2.3 Pollutant concentrations in 2023 and 2026, with the development in place, are below the relevant annual mean objectives and limit values at the receptors considered.

6.2.4 Both assessment methodologies predict that the development will have a negligible impact on concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> at all thirteen existing sensitive receptors considered in 2023 and 2026 (three additional receptors were considered in a separate scenario, see below at paragraph 6.2.7). The effect of the proposed development on human receptors is therefore considered to be **not significant**.

#### *Proposed Sensitive Receptors*

6.2.5 The assessment and sensitivity analysis have also predicted pollutant concentrations at one proposed receptor within the development site.

6.2.6 Predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are below the annual mean air quality objective and limit value concentrations, for 2023 and 2026, at the proposed sensitive

receptors considered in both assessment approaches. Air quality effects within the site are, therefore, considered to be **not significant**.

### ***MU1 Combined Effect***

- 6.2.7 At the request of BMBC, an additional scenario to consider the combined air quality effects of the proposed development vehicle flows and those of the MU1 Phase 1 has been undertaken. Specifically, the assessment focuses on existing sensitive receptors within the Barnsley AQMA are the M1 Junction 37 and A628.
- 6.2.8 The combined impact of both the MU1 developments is presented in Scenario 6. This does not equate to the actual air quality change arising from just this proposed development.
- 6.2.9 The proposed development will generate 99 vehicle movements at the AQMA, whereas the MU1 Phase 1 vehicle flows account for a further 626 movements. The 99 movements will not enter the A628 but would instead enter the roundabout and travel to the M1 Southbound slipway, which is some 32m from the nearest residential property in the AQMA.
- 6.2.10 A negligible impact and all concentrations below the air quality objectives was predicted by the Defra EFT v9.0 assessment methodology. A moderate impact was predicted from the sensitivity analysis methodology. However, it is considered that the contribution of this development's vehicle flows would be very low and negligible. This is due to the overall number, 99 movements, which would ordinarily have been screened out when national air quality guidance criteria are considered. Additionally, the distance of the pollutant source to the residential properties will ensure most of the proposed developments emissions are dispersed in the airflow before impacting on existing sensitive receptors.
- 6.2.11 The effect of the proposed development, in a combined scenario to impact upon residents in the nearby AQMA is **not significant**.

### ***Recommendations for Mitigation***

- 6.2.12 The proposals meet the Medium classification in accordance with the BMBC Air Quality and Emissions Good Practice Planning Guidance.
- 6.2.13 Proposed mitigation includes the implementation of a green travel plan and provision of electric vehicle charging points.

## **6.3 Summary**

- 6.3.1 The assessment has demonstrated that the proposed development will not lead to an unacceptable risk from air pollution, nor will it lead to any breach of national objectives as required by national policy. There are no material reasons in relation to air quality why the proposed scheme should not proceed.

## **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, Northern Ireland is still considering changes to LAQM and therefore works according to the previous regime.
- A.12 The Welsh Government amended the LAQM regime in Wales in 2017 by issuing new statutory policy guidance in order to bring the system into line with the Well-being of Future Generations (Wales) Act 2015<sup>8</sup>. This aims to achieve compliance with the national air quality objectives in specific hotspots and to reduce exposure to pollution more widely, so as to achieve the greatest public health benefit.
- A.13 Local authorities in England are required to produce Annual Status Reports (ASRs), and in Scotland and Wales, Annual Progress Reports (APRs). These replace all other reports which previously had to be submitted including Updating and Screening Assessments,

<sup>8</sup> Well-being of Future Generations (Wales) Act 2015 (anaw 2)

Progress Reports and Detailed Assessments (which would be produced to assist with an AQMA declaration).

- A.14 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.15 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.16 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.17 The National Planning Policy Framework (NPPF)<sup>9</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."*

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<sup>9</sup> Ministry of Housing, Communities and Local Government, National Planning Policy Framework, February 2019

### **Planning Practice Guidance**

- A.18 The Planning Practice Guidance (PPG)<sup>10</sup>, updated in March 2014, 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 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.19 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.

### **Barnsley Metropolitan Borough Council Air Quality and Emissions Good Practice Planning Guidance, 2020**

- A.20 Barnsley Metropolitan Borough Council (BMBC) has prepared and adopted an air quality guidance document. This guidance is for all developments submitted within BMBC and it provides guidance on when an air quality assessment may be required, the content required in an assessment and a means of determining mitigation based on the scale of the development proposals.

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<sup>10</sup> Department for Communities and Local Government. Planning Practice Guidance: Air Quality, March 2014

## **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>11</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>11</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.

| <b>Table B1: Determining the Dust Emission Magnitude of Construction Phase Activities</b>                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Activity</b>                                                                                                                                                                                                                                              | <b>Dust Emission Class</b>                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                              | <b>Large</b>                                                                                                                                                                                                                                                                                       | <b>Medium</b>                                                                                                                                                                                                                           | <b>Small</b>                                                                                                                                                                                                                                                     |
| <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;<br>Appearance, aesthetics or value of a property would be diminished;<br>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> ;<br>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;<br>Locations where there is a community of a particularly dust sensitive species;<br>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;<br>The appearance, aesthetics or value of their property could be diminished;<br>People or property wouldn't reasonably be expected to be continuously present or regularly for extended periods of time;<br>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> ;<br>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;<br>Locations with a national designation where the features may be affected by dust deposition;<br>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>12</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.

### 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

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

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 Sanderson Associates, the appointed transport consultants for the project.
- C.3 The extent of the study area within the Transport Assessment accounted for the nearest junctions to the proposed development site i.e. A637 / Barugh Green Road. Transport and air quality focus on different aspects (transport for junction capacity assessments), therefore the air quality model scope included the main routes to be in the local area. Traffic data has therefore been obtained from four separate sources:
- the Sanderson Associates Transport Assessment;
  - Department for Transport Traffic Counts;
  - the Dearne Hall Road planning application Transport Assessment; and
  - Planning Applications 2020/0027 & 2020/0028. These two planning applications are for the roundabouts associated with the MU1 spine road. The data sources are outlined in Table C1.
- C.4 The air quality works commenced during the COVID-19 pandemic, from March 2020, therefore further traffic surveys could not be undertaken and instead had to be sourced from the above sources which are publicly available.
- C.5 The study extent of the air quality model is illustrated in Figure C.1.

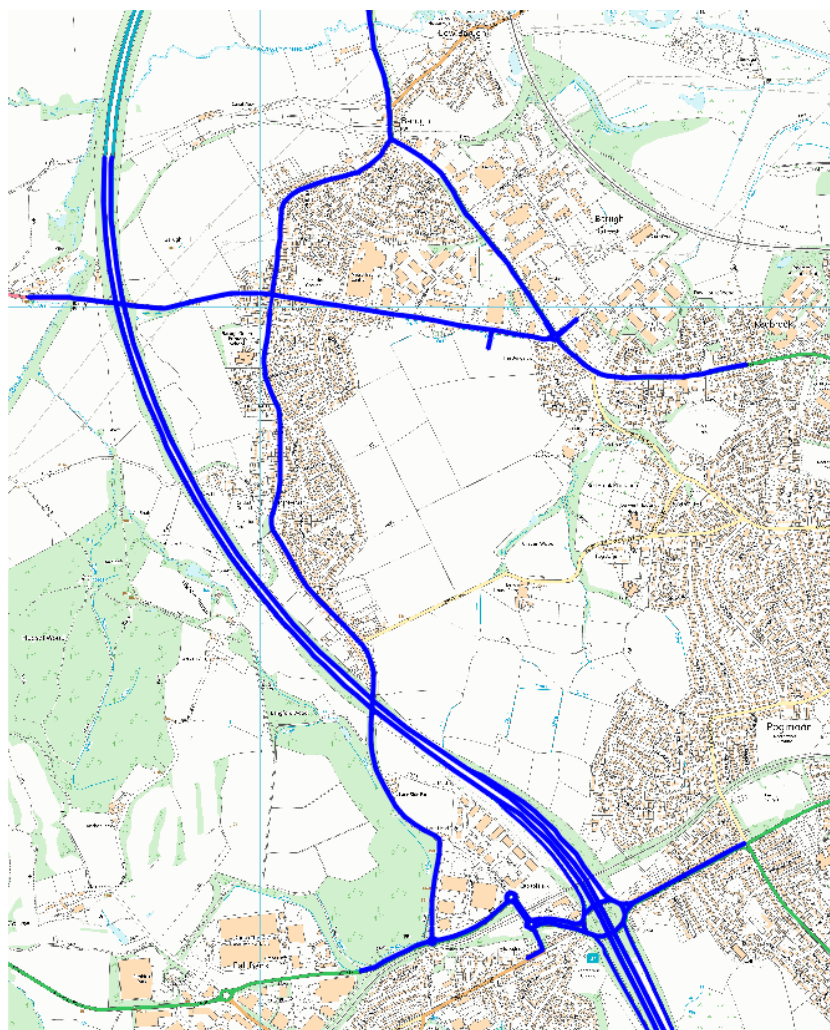


**Figure C.1:** Study Extent of Air Dispersion Model. The roads modelled in the assessment can be seen in blue ('Reproduced from Ordnance Survey Maps © Crown Copyright All Rights Reserved Licence No. 0100031673')

- C.6 Data has been provided as 24-hour Annual Average Daily Traffic (AADT) flows, with HGV percentages. No average speed information was available and therefore speed limits have been used, with a reduction to 20 km/h in locations where congestion or the slowing down of vehicles would be expected.
- C.7 The proposals are outline, therefore the site access location has yet to be finalised. To ensure a robust assessment, a T-junction was included within the site and the proposed sensitive receptor placed downwind of it. This ensures the site access vehicles flows, and the potential queue are also accounted for.
- C.8 The traffic flow data used in the assessment is included in Table C1.

| Table C1: 24-hour AADT traffic data used in the assessment |                                                                                     |                  |                                             |       |                                                    |       |                                                 |       |                                       |
|------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------|---------------------------------------------|-------|----------------------------------------------------|-------|-------------------------------------------------|-------|---------------------------------------|
| Link                                                       | Link Name (Data Source)                                                             | Speed Info (kph) | Scenario 1: 2018 Verification and Base Year |       | Scenario 2: 2023 Opening Year, Without Development |       | Scenario 3: 2023 Opening Year, With Development |       | With Development Flows, No Spine Road |
|                                                            |                                                                                     |                  | LGV                                         | HGV   | LGV                                                | HGV   | LGV                                             | HGV   | AADT (LGV)                            |
| 1                                                          | A635 (Bauagh Green Road) - East Site Access (Sanderson Associates TA)               | 64               | 9201                                        | 1236  | 9668                                               | 1298  | 10245                                           | 1298  | 577                                   |
| 2                                                          | A635 (Bauagh Green Road) - West Site Access (Sanderson Associates TA)               | 48 & 64          | 9201                                        | 1236  | 9668                                               | 1298  | 9711                                            | 1298  | 43                                    |
| 3                                                          | A637 (Claycliffe Road) (Sanderson Associates TA)                                    | 64               | 14371                                       | 414   | 15512                                              | 447   | 15654                                           | 447   | 142                                   |
| 4                                                          | A635 (Wilthorpe Road), between roundabout & Redbrook Road (Sanderson Associates TA) | 64               | 22098                                       | 683   | 23854                                              | 738   | 24290                                           | 738   | 436                                   |
| 5                                                          | A635 (Wilthorpe Road), south of Redbrook Road (DfT Traffic Count)                   | 64               | 14019                                       | 200   | 15155                                              | 217   | 15281                                           | 217   | 126                                   |
| 6                                                          | B6428 (Baraugh Lane) (Dearne Hall Road TA)                                          | 48               | 6876                                        | 392   | 7433                                               | 424   | 7433                                            | 424   | 0                                     |
| 7                                                          | A637 (Barnsley Road) (Dearne Hall Road TA)                                          | 64               | 11923                                       | 445   | 12890                                              | 481   | 13032                                           | 481   | 142                                   |
| 8                                                          | A635 (Cawthorne Road) (DfT Traffic Count)                                           | 64 & 96          | 7331                                        | 168   | 7926                                               | 182   | 7953                                            | 182   | 28                                    |
| 9                                                          | Higham Common Road (Ref. 2020/0027, 2020/0028)                                      | 48               | 8212                                        | 269   | 8878                                               | 291   | 8921                                            | 291   | 43                                    |
| 10                                                         | M1 - North Junction 37 (DfT Traffic Count)                                          | 112, 96          | 81439                                       | 9726  | 88044                                              | 10515 | 88044                                           | 10515 | 0                                     |
| 11                                                         | M1 - South Junction 37 (DfT Traffic Count)                                          | 112, 96          | 88806                                       | 10908 | 96300                                              | 11501 | 96300                                           | 11501 | 0                                     |
| 12                                                         | Whaley Road (Sanderson Associates TA)                                               | 48               | 4096                                        | 118   | 4294                                               | 124   | 4294                                            | 124   | 0                                     |

| Table C1: 24-hour AADT traffic data used in the assessment |                                                               |                  |                                             |      |                                                    |      |                                                 |      |                                       |
|------------------------------------------------------------|---------------------------------------------------------------|------------------|---------------------------------------------|------|----------------------------------------------------|------|-------------------------------------------------|------|---------------------------------------|
| Link                                                       | Link Name (Data Source)                                       | Speed Info (kph) | Scenario 1: 2018 Verification and Base Year |      | Scenario 2: 2023 Opening Year, Without Development |      | Scenario 3: 2023 Opening Year, With Development |      | With Development Flows, No Spine Road |
|                                                            |                                                               |                  | LGV                                         | HGV  | LGV                                                | HGV  | LGV                                             | HGV  | AADT (LGV)                            |
| 13                                                         | Site Access (Sanderson Associates TA)                         | 48               | 0                                           | 0    | 0                                                  | 0    | 620                                             | 0    | 620                                   |
| 14                                                         | Higham Lane (Ref. 2020/0027, 2020/0028)                       |                  | 8842                                        | 244  | 9559                                               | 264  | 9574                                            | 264  | 15                                    |
| 15                                                         | Whinby road - East of Higham Lane (Ref. 2020/0027, 2020/0028) | 96               | 17609                                       | 876  | 19037                                              | 947  | 19052                                           | 947  | 15                                    |
| 16                                                         | Whinby Road - West of Higham Lane (Ref. 2020/0027, 2020/0028) | 64               | 14116                                       | 768  | 15261                                              | 830  | 15261                                           | 830  | 0                                     |
| 17                                                         | Whinby Road - South Capitol Park (Ref. 2020/0027, 2020/0028)  | 64               | 18156                                       | 978  | 19629                                              | 1057 | 19644                                           | 1057 | 15                                    |
| 18                                                         | B6499 (Ref. 2020/0027, 2020/0028)                             | 64               | 9206                                        | 142  | 9953                                               | 154  | 9953                                            | 154  | 0                                     |
| 19                                                         | M1 Northbound Slip OFF (Ref. 2020/0027, 2020/0028)            | 64               | 11464                                       | 547  | 12394                                              | 591  | 12394                                           | 591  | 0                                     |
| 20                                                         | M1 Northbound Slip ON (Ref. 2020/0027, 2020/0028)             | 96               | 7448                                        | 250  | 8052                                               | 270  | 8052                                            | 270  | 0                                     |
| 21                                                         | M1 Southbound Slip OFF (Ref. 2020/0027, 2020/0028)            | 96               | 7101                                        | 233  | 7677                                               | 252  | 7677                                            | 252  | 0                                     |
| 22                                                         | M1 Southbound Slip ON (Ref. 2020/0027, 2020/0028)             | 96               | 11913                                       | 450  | 12879                                              | 487  | 12894                                           | 487  | 15                                    |
| 23                                                         | A628 Dodworth Road (Ref. 2020/0027, 2020/0028)                | 96               | 25929                                       | 943  | 28032                                              | 1020 | 28047                                           | 1020 | 15                                    |
| 24                                                         | Whinby Road - West of Junction 37 (Ref. 2020/0027, 2020/0028) | 48               | 24278                                       | 1035 | 26247                                              | 1119 | 26262                                           | 1119 | 15                                    |

| Table C2: 24-hour AADT traffic data used in the assessment |                                                                                     |                        |                                                            |      |                                                                                                                       |      |                                                                                                     |      |                                                                                         |
|------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------|------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------|
| Link                                                       | Link Name<br>(Data Source)                                                          | Speed<br>Info<br>(kph) | Scenario 4:<br>2026 Future<br>Year, Without<br>Development |      | Scenario 5:<br>2026 Future<br>Year, With<br>Development<br>(With<br>development<br>flows are those<br>as in Table C1) |      | Scenario 6:<br>2026 Future<br>Year: With<br>Development,<br>With MU1 Phase<br>1, With Spine<br>Road |      | With<br>Development<br>Flows, With<br>Spine Road<br>(Applied for<br>Scenario 6<br>only) |
|                                                            |                                                                                     |                        | LGV                                                        | HGV  | LGV                                                                                                                   | HGV  | LGV                                                                                                 | HGV  | AADT (LGV)                                                                              |
| 1                                                          | A635 (Bauagh Green Road) - East Site Access (Sanderson Associates TA)               | 64                     | 10922                                                      | 1467 | 11499                                                                                                                 | 1467 | 11499                                                                                               | 1467 | 577                                                                                     |
| 2                                                          | A635 (Bauagh Green Road) - West Site Access (Sanderson Associates TA)               | 48 & 64                | 10922                                                      | 1467 | 10965                                                                                                                 | 1467 | 11049                                                                                               | 1467 | 127                                                                                     |
| 3                                                          | A637 (Claycliffe Road) (Sanderson Associates TA)                                    | 64                     | 16233                                                      | 468  | 16375                                                                                                                 | 468  | 16375                                                                                               | 468  | 142                                                                                     |
| 4                                                          | A635 (Wilthorpe Road), between roundabout & Redbrook Road (Sanderson Associates TA) | 64                     | 25346                                                      | 784  | 25782                                                                                                                 | 784  | 25782                                                                                               | 784  | 436                                                                                     |
| 5                                                          | A635 (Wilthorpe Road), south of Redbrook Road (DfT Traffic Count)                   | 64                     | 15799                                                      | 226  | 15925                                                                                                                 | 226  | 15925                                                                                               | 226  | 126                                                                                     |
| 6                                                          | B6428 (Baraugh Lane) (Dearne Hall Road TA)                                          | 48                     | 7749                                                       | 442  | 7749                                                                                                                  | 442  | 7749                                                                                                | 442  | 0                                                                                       |
| 7                                                          | A637 (Barnsley Road) (Dearne Hall Road TA)                                          | 64                     | 13437                                                      | 502  | 13579                                                                                                                 | 502  | 13579                                                                                               | 502  | 142                                                                                     |

| Table C2: 24-hour AADT traffic data used in the assessment |                                                                              |                        |                                                            |       |                                                                                                                       |       |                                                                                                     |       |                                                                                         |
|------------------------------------------------------------|------------------------------------------------------------------------------|------------------------|------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------|
| Link                                                       | Link Name<br>(Data Source)                                                   | Speed<br>Info<br>(kph) | Scenario 4:<br>2026 Future<br>Year, Without<br>Development |       | Scenario 5:<br>2026 Future<br>Year, With<br>Development<br>(With<br>development<br>flows are those<br>as in Table C1) |       | Scenario 6:<br>2026 Future<br>Year: With<br>Development,<br>With MU1 Phase<br>1, With Spine<br>Road |       | With<br>Development<br>Flows, With<br>Spine Road<br>(Applied for<br>Scenario 6<br>only) |
|                                                            |                                                                              |                        | LGV                                                        | HGV   | LGV                                                                                                                   | HGV   | LGV                                                                                                 | HGV   | AADT (LGV)                                                                              |
| 8                                                          | A635<br>(Cawthorne<br>Road)<br>(DfT Traffic<br>Count)                        | 64 &<br>96             | 8262                                                       | 189   | 8290                                                                                                                  | 189   | 8290                                                                                                | 189   | 28                                                                                      |
| 9                                                          | Higham<br>Common<br>Road<br>(Ref.<br>2020/0027,<br>2020/0028)                | 48                     | 9255                                                       | 303   | 9270                                                                                                                  | 303   | 9255                                                                                                | 303   | 0                                                                                       |
| 10                                                         | M1 - North<br>Junction 37<br>(DfT Traffic<br>Count)                          | 112,<br>96             | 91782                                                      | 10961 | 91782                                                                                                                 | 10961 | 91782                                                                                               | 10961 | 0                                                                                       |
| 11                                                         | M1 - South<br>Junction 37<br>(DfT Traffic<br>Count)                          | 112,<br>96             | 100084                                                     | 12293 | 100084                                                                                                                | 12293 | 100084                                                                                              | 12293 | 0                                                                                       |
| 12                                                         | Whaley Road<br>(Sanderson<br>Associates TA)                                  | 48                     | 4504                                                       | 130   | 4504                                                                                                                  | 130   | 4504                                                                                                | 130   | 0                                                                                       |
| 13                                                         | Site Access<br>(Sanderson<br>Associates TA)                                  | 48                     | 0                                                          | 0     | 620                                                                                                                   | 0     | 620                                                                                                 | 0     | 620                                                                                     |
| 14                                                         | Higham Lane<br>(Ref.<br>2020/0027,<br>2020/0028)                             |                        | 9964                                                       | 275   | 9979                                                                                                                  | 275   | 10690                                                                                               | 275   | 726                                                                                     |
| 15                                                         | Whinby road -<br>East of<br>Higham Lane<br>(Ref.<br>2020/0027,<br>2020/0028) | 96                     | 19845                                                      | 987   | 19860                                                                                                                 | 987   | 20571                                                                                               | 987   | 726                                                                                     |
| 16                                                         | Whinby Road<br>- West of<br>Higham Lane<br>(Ref.<br>2020/0027,<br>2020/0028) | 64                     | 15909                                                      | 866   | 15909                                                                                                                 | 866   | 15909                                                                                               | 866   | 0                                                                                       |

| Table C2: 24-hour AADT traffic data used in the assessment |                                                                             |                        |                                                            |      |                                                                                                                       |      |                                                                                                     |      |                                                                                         |
|------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------|------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------|
| Link                                                       | Link Name<br>(Data Source)                                                  | Speed<br>Info<br>(kph) | Scenario 4:<br>2026 Future<br>Year, Without<br>Development |      | Scenario 5:<br>2026 Future<br>Year, With<br>Development<br>(With<br>development<br>flows are those<br>as in Table C1) |      | Scenario 6:<br>2026 Future<br>Year: With<br>Development,<br>With MU1 Phase<br>1, With Spine<br>Road |      | With<br>Development<br>Flows, With<br>Spine Road<br>(Applied for<br>Scenario 6<br>only) |
|                                                            |                                                                             |                        | LGV                                                        | HGV  | LGV                                                                                                                   | HGV  | LGV                                                                                                 | HGV  | AADT (LGV)                                                                              |
| 17                                                         | Whinby Road<br>- South<br>Capitol Park<br>(Ref.<br>2020/0027,<br>2020/0028) | 64                     | 20462                                                      | 1102 | 20477                                                                                                                 | 1102 | 21188                                                                                               | 1102 | 726                                                                                     |
| 18                                                         | B6499<br>(Ref.<br>2020/0027,<br>2020/0028)                                  | 64                     | 10375                                                      | 160  | 10375                                                                                                                 | 160  | 10375                                                                                               | 160  | 0                                                                                       |
| 19                                                         | M1<br>Northbound<br>Slip OFF<br>(Ref.<br>2020/0027,<br>2020/0028)           | 64                     | 12920                                                      | 616  | 12920                                                                                                                 | 616  | 12920                                                                                               | 616  | 0                                                                                       |
| 20                                                         | M1<br>Northbound<br>Slip ON<br>(Ref.<br>2020/0027,<br>2020/0028)            | 96                     | 8394                                                       | 282  | 8394                                                                                                                  | 282  | 8394                                                                                                | 282  | 0                                                                                       |
| 21                                                         | M1<br>Southbound<br>Slip OFF<br>(Ref.<br>2020/0027,<br>2020/0028)           | 96                     | 8003                                                       | 263  | 8003                                                                                                                  | 263  | 8102                                                                                                | 263  | 99                                                                                      |
| 22                                                         | M1<br>Southbound<br>Slip ON<br>(Ref.<br>2020/0027,<br>2020/0028)            | 96                     | 13426                                                      | 507  | 13441                                                                                                                 | 507  | 13525                                                                                               | 507  | 99                                                                                      |

| Table C2: 24-hour AADT traffic data used in the assessment |                                                                              |                        |                                                            |      |                                                                                                                       |      |                                                                                                     |      |                                                                                         |
|------------------------------------------------------------|------------------------------------------------------------------------------|------------------------|------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------|
| Link                                                       | Link Name<br>(Data Source)                                                   | Speed<br>Info<br>(kph) | Scenario 4:<br>2026 Future<br>Year, Without<br>Development |      | Scenario 5:<br>2026 Future<br>Year, With<br>Development<br>(With<br>development<br>flows are those<br>as in Table C1) |      | Scenario 6:<br>2026 Future<br>Year: With<br>Development,<br>With MU1 Phase<br>1, With Spine<br>Road |      | With<br>Development<br>Flows, With<br>Spine Road<br>(Applied for<br>Scenario 6<br>only) |
|                                                            |                                                                              |                        | LGV                                                        | HGV  | LGV                                                                                                                   | HGV  | LGV                                                                                                 | HGV  | AADT (LGV)                                                                              |
| 23                                                         | A628<br>Dodworth<br>Road<br>(Ref.<br>2020/0027,<br>2020/0028)                | 96                     | 29222                                                      | 1063 | 29237                                                                                                                 | 1063 | 29848                                                                                               | 1063 | 626                                                                                     |
| 24                                                         | Whinby Road<br>- West of<br>Junction 37<br>(Ref.<br>2020/0027,<br>2020/0028) | 48                     | 27361                                                      | 1167 | 27376                                                                                                                 | 1167 | 28087                                                                                               | 1167 | 725                                                                                     |

### Vehicle Emission Factors

- C.9 The air quality assessment has used vehicle emission factors calculated using the Emissions Factor Toolkit (EFT) version 9.0, released in May 2019. This is the most up-to-date version of the EFT currently available.
- C.10 As discussed in the section 3.4 of the report, there are uncertainties involved with the prediction of future NO<sub>2</sub> concentrations. However, a recent study provides evidence that EFT v9.0 may be relied upon to predict the ‘most likely’ future emissions reductions as long as model verification has been undertaken using monitored data from 2016 or later<sup>13</sup>. The IAQM has yet to comment on this study.
- C.11 To ensure a robust assessment, a sensitivity analysis has also been undertaken whereby revisions are made to the future vehicle class percentages. The base year background pollutant concentrations were also applied to the future scenarios.
- C.12 It is considered that the results of the sensitivity analysis provide a conservative upper-bound to the assessment. The results are included in the report and within Appendix D.
- C.13 The proposed sensitivity test includes the revision of Euro VI (d) class vehicles to a Euro VI (c) class emission standard. The changes are made to the diesel categories as

<sup>13</sup> Air Quality Consultants, Performance of Defra’s Emission Factor Toolkit 2013 – 2019, February 2020

there is much uncertainty associated with diesel emission releases. The three categories revised include 'Diesel Car', 'Taxi (Black Cab)' and 'Diesel LGV' categories.

- C.14 The vehicle fleet changes applied for 2023 and 2026 are outlined in Tables C3 and C4. These values can be viewed in the Defra EFT v9.0 Excel sheet, by selecting the Euro Compositions selection in the spreadsheets Input Data Tab.

| <b>Table C3: 2023 Vehicle Fleet Percentage Changes Applied in the Sensitivity Test*</b>                                                                                 |                                                    |                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------|
| <b>Euro Composition</b>                                                                                                                                                 | <b>Default EFT v9.0 Default Fleet for 2023 (%)</b> | <b>Revised EFT v9.0 Fleet for 2023 Sensitivity Test (%)</b> |
| 1.Pre-Euro 1                                                                                                                                                            | -                                                  | -                                                           |
| 2.Euro 1                                                                                                                                                                | -                                                  | -                                                           |
| 3.Euro 2                                                                                                                                                                | -                                                  | -                                                           |
| 4.Euro 3                                                                                                                                                                | 0.00                                               | 0.00                                                        |
| 5.Euro 4                                                                                                                                                                | 0.04                                               | 0.04                                                        |
| 6.Euro 5                                                                                                                                                                | 0.16                                               | 0.16                                                        |
| 7.Euro 6                                                                                                                                                                | 0.11                                               | 0.11                                                        |
| 8.Euro 6c                                                                                                                                                               | 0.25                                               | 0.69                                                        |
| 9.Euro 6d                                                                                                                                                               | 0.44                                               | -                                                           |
| *This table shows the amendments to the 'Diesel LGV' category. The fleet percentages within the three categories being amended are all relatively similar (within 0.07) |                                                    |                                                             |

| <b>Table C4: 2026 Vehicle Fleet Percentage Changes Applied in the Sensitivity Test*</b>                                                                                 |                                                    |                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------|
| <b>Euro Composition</b>                                                                                                                                                 | <b>Default EFT v9.0 Default Fleet for 2026 (%)</b> | <b>Revised EFT v9.0 Fleet for 2026 Sensitivity Test (%)</b> |
| 1.Pre-Euro 1                                                                                                                                                            | -                                                  | -                                                           |
| 2.Euro 1                                                                                                                                                                | -                                                  | -                                                           |
| 3.Euro 2                                                                                                                                                                | -                                                  | -                                                           |
| 4.Euro 3                                                                                                                                                                | -                                                  | -                                                           |
| 5.Euro 4                                                                                                                                                                | 0.01                                               | 0.01                                                        |
| 6.Euro 5                                                                                                                                                                | 0.08                                               | 0.08                                                        |
| 7.Euro 6                                                                                                                                                                | 0.07                                               | 0.07                                                        |
| 8.Euro 6c                                                                                                                                                               | 0.17                                               | 0.84                                                        |
| 9.Euro 6d                                                                                                                                                               | 0.67                                               | -                                                           |
| *This table shows the amendments to the 'Diesel LGV' category. The fleet percentages within the three categories being amended are all relatively similar (within 0.07) |                                                    |                                                             |

### ***Street Canyons***

C.15 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 being channelled along the canyon;
- Pollution being dispersed across the canyon by circulating flow at road height;
- Pollutants being trapped in recirculation regions;
- Pollutants leaving the canyon between gaps in the buildings;
- Pollutants leaving the canyon from the canyon top; and
- Pollutants leaving the canyon from the downstream end of the canyon.

C.16 The model has not included any street canyons as there are none along the roads included in the study network.

### ***Meteorological Data***

C.17 The meteorological data used in the air quality modelling has been obtained from ADM Limited and is from the Emley Moor recording station, covering the period between 1<sup>st</sup> January and 31<sup>st</sup> December 2018. This has complete data capture for wind and temperature.

C.18 The Emley Moor recording station is located approximately 10.4km 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.19 The 2018 wind rose for the Emley Moor Meteorological Recording Station is shown in Figure C.2.

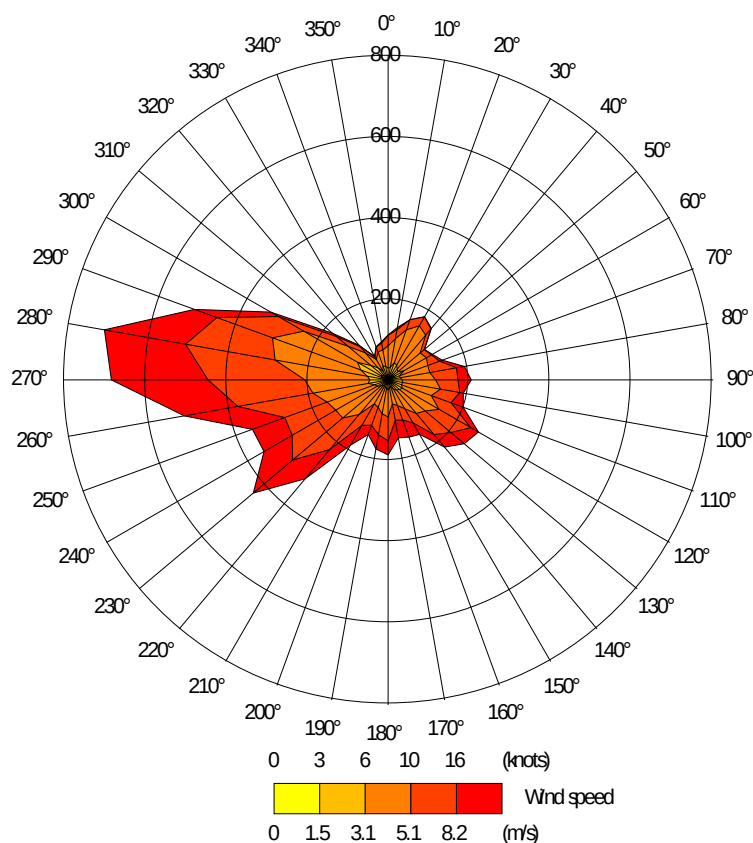


Figure C.2: 2018 Wind Rose for the Emley Moor Meteorological Station

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

- C.20 The characteristics for the dispersion site and meteorological sites, included in the ADMS-Roads model, are detailed in Table C5.

| Table C5: Dispersion and Meteorological Site Characteristics |                 |                     |
|--------------------------------------------------------------|-----------------|---------------------|
| Setting                                                      | Dispersion Site | Meteorological Site |
| Surface Roughness                                            | 0.5m            | 0.02m               |
| Surface Albedo                                               | 0.23            | 0.23                |
| Minimum Monin-Obukhov Length                                 | 30m             | 30m                 |
| Priestley-Taylor Parameter                                   | 1               | 1                   |

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

- C.21 In accordance with the guidance within LAQM.TG(16), the ADMS-Roads model has been run to predict the road-contribution NO<sub>x</sub> concentrations for 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.22 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.23 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.24 The verification procedure included the use of a previous AECOM local air quality monitoring study. This study was commissioned during a previous schedule of work for MU1.
- C.25 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.26 The monitoring data that has been used in the model verification procedure is detailed in Table C6.

| Table C6: NO <sub>2</sub> Monitoring Data Used for Verification Purposes |          |                            |          |                                                                                      |
|--------------------------------------------------------------------------|----------|----------------------------|----------|--------------------------------------------------------------------------------------|
| Monitoring Location Reference                                            | Type     | Approximate Grid Reference |          | 2018 Bias Adjusted NO <sub>2</sub> Annual Average Concentration (µg/m <sup>3</sup> ) |
|                                                                          |          | Easting                    | Northing |                                                                                      |
| Verification 1 – Outside AQMA                                            |          |                            |          |                                                                                      |
| DT9                                                                      | Kerbside | 431468                     | 408579   | 27.7                                                                                 |
| AECOM 1                                                                  | Roadside | 431453                     | 407966   | 21.15                                                                                |
| AECOM 2A                                                                 | Roadside | 431073                     | 408139   | 25.21                                                                                |
| AECOM 2B                                                                 | Roadside | 431158                     | 408046   | 27.87                                                                                |
| AECOM 9                                                                  | Roadside | 431447                     | 406356   | 29.21                                                                                |

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

| Table C6: NO <sub>2</sub> Monitoring Data Used for Verification Purposes |          |                            |          |                                                                                      |
|--------------------------------------------------------------------------|----------|----------------------------|----------|--------------------------------------------------------------------------------------|
| Monitoring Location Reference                                            | Type     | Approximate Grid Reference |          | 2018 Bias Adjusted NO <sub>2</sub> Annual Average Concentration (µg/m <sup>3</sup> ) |
|                                                                          |          | Easting                    | Northing |                                                                                      |
| AECOM 10                                                                 | Roadside | 431510                     | 405804   | 24.47                                                                                |
| Verification 2 – Barnsley AQMA No.2A                                     |          |                            |          |                                                                                      |
| DT19                                                                     | Roadside | 432481                     | 406068   | 25.7                                                                                 |
| DT20                                                                     | Roadside | 432535                     | 406071   | 37                                                                                   |
| DT21                                                                     | Roadside | 432402                     | 406013   | 45.8                                                                                 |
| DT22                                                                     | Roadside | 432351                     | 405985   | 44.2                                                                                 |
| DT23                                                                     | Roadside | 432281                     | 405951   | 43.4                                                                                 |

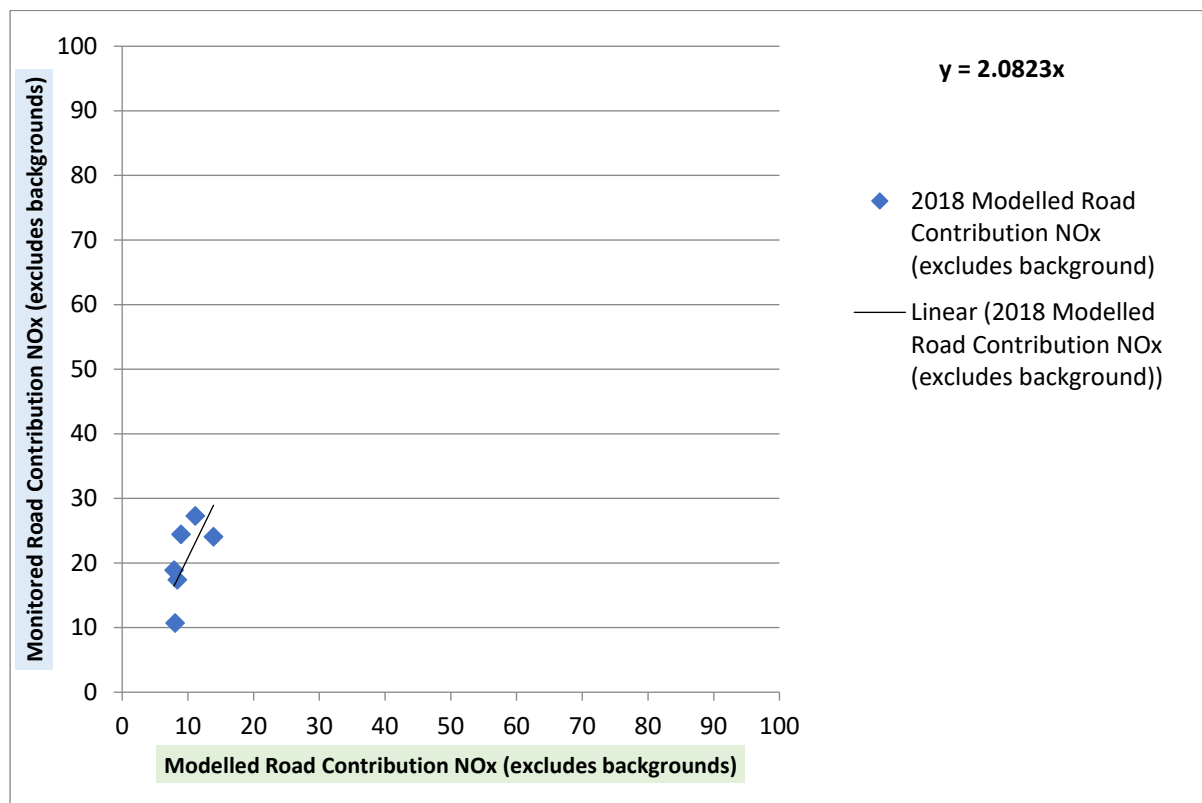
- C.27 The modelled road-contribution NO<sub>x</sub> concentration for the diffusion tube has been compared against the measured road-contribution NO<sub>x</sub> concentration for the same location. The measured concentrations have been derived using the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator, taking into account the background NO<sub>x</sub> concentration for the local area.
- C.28 The available air quality monitoring data is representative of two individual air quality areas. Those within the AQMA which are exceeding and those outside the AQMA which are well below the air quality objectives. With the exception of DT9 in North Barnsley, the AQMA verification is all made up of BMBC diffusion tubes.
- C.29 During the methodology discussions it was discussed that a separate verification factor may be required at DT9, the kerbside site to the north of the proposed development site. LAQM.TG(16) does not recommend including kerbside sites unless there is a specific representative exposure. This is due to the kerbside sites often recording significantly higher concentrations than as roadside site, due to their proximity to the pollutant source.
- C.30 DT9 was initially modelled to calculate an individual verification factor. The model to monitored accuracy was good, therefore DT9 was included within the remainder of the 'outside AQMA' verification factor. The inclusion of DT9, with the AECOM diffusion tubes, did not significantly alter the overall verification accuracy. In fact, the verification accuracy at DT9 was within 3%, which is good. DT9 was therefore included within the overall verification and a separate DT9-only verification factor was not

required in this instance as the kerbside site was deemed to not be monitoring elevated concentrations.

- C.31 Two AECOM monitors were not included in the verification procedure; AECOM 5 and AECOM 8. Both monitors were located more than 15m from the roadside and their inclusion in the model verification procedure deteriorated the overall model verification accuracy. The grid references were taken from the MU1 planning portal reports.
- C.32 In reference to AECOM 5, which was located along Barugh Green Road, the NO<sub>2</sub> concentration recorded at AECOM 5 is well below AECOM 1 and AECOM 2B which are also located on Barugh Green Road. Removing AECOM 5 has also provide a more robust and worst case assessment, as the verification factor has increased. This is due to the statistical average not being lowered by the inclusion of the lower concentration.

#### *Verification 1 – Outside AQMA*

- C.33 The comparison is shown in the below graph. The equation of the trend line is based on linear regression through zero, which provides an overall adjustment factor of 2.0823.



- C.34 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.35 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 C7. Following adjustment, modelled concentrations are within 25% of measured concentrations.

| Table C7: 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 (%) |
| DT9                                                                                | 27.70                                                             | 29.99                                                             | 8.27           |
| AECOM 1                                                                            | 21.15                                                             | 24.18                                                             | 14.35          |
| AECOM 2A                                                                           | 25.21                                                             | 24.01                                                             | -4.77          |
| AECOM 2B                                                                           | 27.87                                                             | 25.09                                                             | -9.99          |
| AECOM 9                                                                            | 29.21                                                             | 27.25                                                             | -6.72          |
| AECOM 10                                                                           | 24.47                                                             | 24.51                                                             | 0.15           |

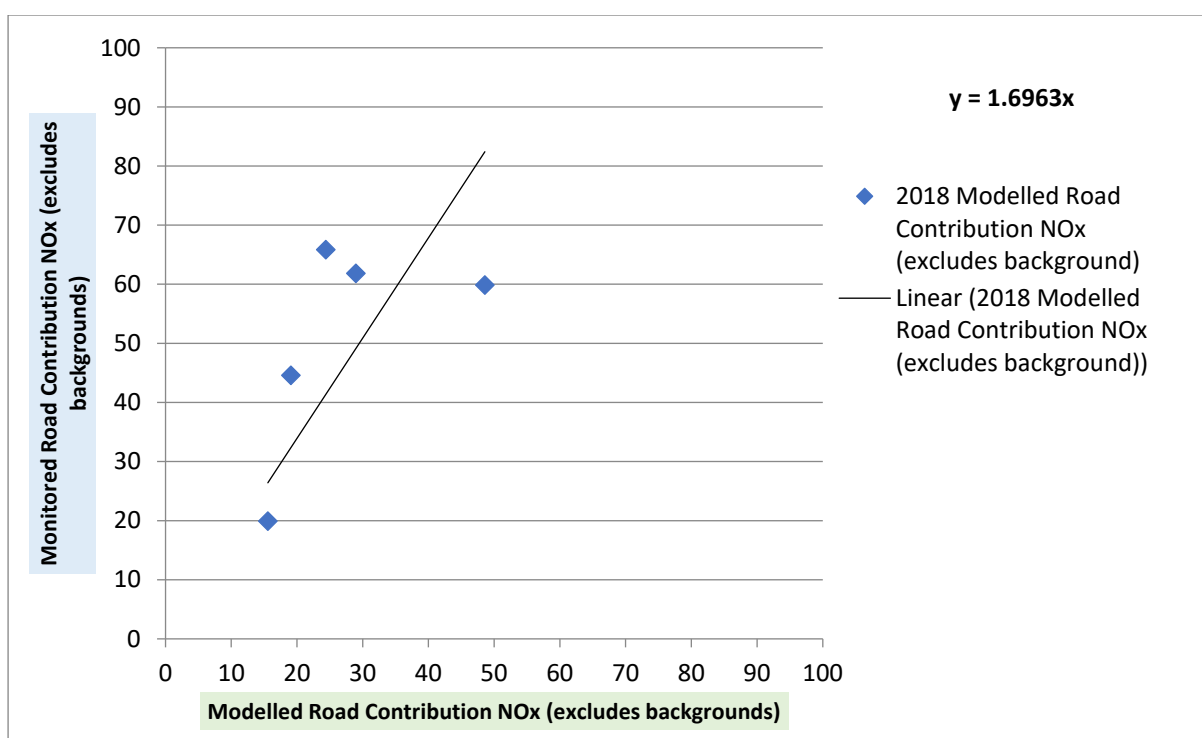
- C.36 A Root Mean Square Error (RMSE) calculation has been undertaken as part of the model verification for NO<sub>2</sub> concentrations. This has been carried out for the monitoring location included within the model verification, in accordance with the guidance detailed in LAQM.TG(16).
- C.37 The RMSE calculation following adjustment is detailed in Table C8.

| Table C8: RMSE Calculation for Nitrogen Dioxide Concentrations |                    |                 |            |      |
|----------------------------------------------------------------|--------------------|-----------------|------------|------|
| Diffusion Tube Location                                        | After Verification |                 |            |      |
|                                                                | Observed Value     | Predicted Value | Difference | RMSE |
| DT9                                                            | 27.70              | 29.99           | 2.29       | 2.14 |
| AECOM 1                                                        | 21.15              | 24.18           | 3.03       |      |
| AECOM 2A                                                       | 25.21              | 24.01           | -1.20      |      |
| AECOM 2B                                                       | 27.87              | 25.09           | -2.78      |      |
| AECOM 9                                                        | 29.21              | 27.25           | -1.96      |      |
| AECOM 10                                                       | 24.47              | 24.51           | 0.04       |      |

- C.38 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 results of the calculation show that following model verification, the RMSE value is within 10% (i.e.  $4\mu\text{g}/\text{m}^3$ ) of the objective (i.e.  $40\mu\text{g}/\text{m}^3$ ). Therefore, the model is considered to be performing to an acceptable standard.

#### Verification 2 – Outside AQMA

- C.39 The comparison is shown in the below graph. The equation of the trend line is based on linear regression through zero, which provides an overall adjustment factor of 1.6963.



- C.40 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.41 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 C9. Following adjustment, modelled concentrations are within 25% of measured concentrations.

| Table C9: 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 (%) |
| BMBC DT19                                                                          | 25.70                                                             | 28.81                                                             | 12.10          |
| BMBC DT20                                                                          | 37.00                                                             | 31.56                                                             | -14.70         |
| BMBC DT21                                                                          | 45.80                                                             | 35.59                                                             | -22.29         |
| BMBC DT22                                                                          | 44.20                                                             | 38.96                                                             | -11.86         |
| BMBC DT23                                                                          | 43.40                                                             | 52.18                                                             | 20.23          |

C.42 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 location included within the model verification, in accordance with the guidance detailed in LAQM.TG(16).

C.43 The RMSE calculation following adjustment is detailed in Table C10.

| Table C10: RMSE Calculation for Nitrogen Dioxide Concentrations |                    |                 |            |      |
|-----------------------------------------------------------------|--------------------|-----------------|------------|------|
| Diffusion Tube Location                                         | After Verification |                 |            |      |
|                                                                 | Observed Value     | Predicted Value | Difference | RMSE |
| BMBC DT19                                                       | 25.70              | 28.81           | -3.11      | 7.04 |
| BMBC DT20                                                       | 37.00              | 31.56           | 5.44       |      |
| BMBC DT21                                                       | 45.80              | 35.59           | 10.21      |      |
| BMBC DT22                                                       | 44.20              | 38.96           | 5.24       |      |
| BMBC DT23                                                       | 43.40              | 52.18           | -8.78      |      |

C.44 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 results of the calculation show that following model verification, the RMSE value is within 10% (i.e. 4µg/m<sup>3</sup>) of the objective (i.e. 40µg/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.45 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 and their significance.
- C.46 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.47 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.48 Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as either 'significant' or 'not significant'.
- C.49 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;

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

- 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 – Scenario 6**

- D.1 This appendix provides the results of the Scenario 6 assessment. This additional scenario was requested by BMBC.
- D.2 Scenario 6 considers the combined vehicle flows of the proposed development and the MU1 vehicle flows. Specifically, the assessment considers the impact upon the AQMA as this is the most sensitive location and one of interest to BMBC due to concerns of the MU1 allocation impacts upon existing adverse air quality locations.
- D.3 Scenario 6 includes the following assumptions:
- The proposed developments 99 AADT, on all roads travelling south from the spine road to the AQMAs;
  - The MU1 Phase 1 development 626 AADT, on all roads travelling south from the spine road to the AQMAs;
  - The spine road is included in the model, modelled with 725 AADT. The specific details of the spine road are unknown, therefore an estimate of the route has been made for this assessment. The inclusion of the spine road will provide changes to the existing routing patterns of vehicles; however, this has already been assessed in the existing planning applications. Scenario 6 focuses on the air quality change at the AQMA, and not in the local Barugh Green locality, therefore, the total flows are not detrimental to the overall predictions made as the distance of the spine road to the AQMA is significant.
  - The proposed development flows (99 AADT) all travel into the Junction 37 roundabout, but then onto the M1 Southbound slipway. None of the proposed development vehicles enter the A628.
  - The MU1 Phase 1 application is yet to be submitted, therefore details of routing are not known. To provide a robust assessment, it is assumed the 626 AADT all travel onto the A628.
- D.4 This scenario has been requested by the BMBC Technical Officer to consider the cumulative impact of the two developments, but as a total air quality change rather than as two separate submissions. The air quality change from this development is presented in the report. The air quality change from MU1 Phase 1 would be submitted at a later date under a different Applicant.

- D.5 The individual impact of this proposed development is not considered to be significant at the AQMA. This is considered as the proposed development flows will only exit onto the roundabout and M1 slipway, which is up to 32m from the nearest existing residential property. At this distance, the pollution would be low. Additionally, at 99 AADT, the proposed scheme would have ordinarily been scoped out in accordance with the EPUK 2017 Guidance, 100 AADT criterion for when a detailed air quality assessment is required at an AQMA.

#### **Scenarios 4 and 6: 2026 Future Year**

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

- D.6 Table D1 details the predicted NO<sub>2</sub> concentrations for the 2026 Future Year, for both the 'Without Development' and 'With Development' scenarios, in accordance with Defra guidance (i.e. using EFT v9.0). The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| <b>Table D1: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 6 – Using the Emission Factor Toolkit v9.0</b>                                                                                                                                                                                                          |                                                                                            |                         |                                       |                                                   |                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------|---------------------------------------|---------------------------------------------------|---------------------------|
| <b>Receptor</b>                                                                                                                                                                                                                                                                                                                                                           | <b>Calculated Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)<sup>a</sup></b> |                         |                                       |                                                   |                           |
|                                                                                                                                                                                                                                                                                                                                                                           | <b>Without Development</b>                                                                 | <b>With Development</b> |                                       | <b>Concentration Change as Percentage of AQAL</b> | <b>Impact<sup>b</sup></b> |
|                                                                                                                                                                                                                                                                                                                                                                           |                                                                                            | <b>Concentration</b>    | <b>Percentage in Relation to AQAL</b> |                                                   |                           |
| ESR 14                                                                                                                                                                                                                                                                                                                                                                    | 29.07                                                                                      | 29.22                   | <75%                                  | <0.5%                                             | Negligible                |
| ESR 15                                                                                                                                                                                                                                                                                                                                                                    | 33.04                                                                                      | 33.24                   | 76 – 94%                              | 1%                                                | Negligible                |
| ESR 16                                                                                                                                                                                                                                                                                                                                                                    | 20.77                                                                                      | 20.87                   | <75%                                  | <0.5%                                             | Negligible                |
| <p><i>a. 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)</i></p> <p><i>b. 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</i></p> |                                                                                            |                         |                                       |                                                   |                           |

- D.7 Table D2 details the predicted NO<sub>2</sub> concentrations derived using the sensitivity analysis methodology for the 2026 Future Year scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| Table D2: Predicted Adjusted NO <sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 6 – Using the Emission Factor Toolkit v9.0                                                                                                                                                                                                                                                              |                                                                                         |                  |                                |                                            |                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|--------------------------------|--------------------------------------------|---------------------|
| 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 14                                                                                                                                                                                                                                                                                                                                                                                                                  | 38.01                                                                                   | 38.21            | 95 – 102%                      | 1%                                         | Slight              |
| ESR 15                                                                                                                                                                                                                                                                                                                                                                                                                  | <u>42.89</u>                                                                            | <u>43.16</u>     | 103 – 109%                     | 1%                                         | Moderate            |
| ESR 16                                                                                                                                                                                                                                                                                                                                                                                                                  | 27.57                                                                                   | 27.70            | <75%                           | <0.5%                                      | Negligible          |
| <p>c. 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)</p> <p>d. 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</p> <p><u>Indicates an Air Quality Objective Exceedance</u></p> |                                                                                         |                  |                                |                                            |                     |

D.8 Table D3 details the PM<sub>10</sub> concentrations for the 2026 Future Year scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| Table D3: Predicted Unadjusted PM <sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 6 – Using the Emission Factor Toolkit v9.0    |                                                                             |                  |                                |                                            |                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------|--------------------------------|--------------------------------------------|---------------------|
| Receptor                                                                                                                                                         | Calculated Annual Mean PM <sub>10</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 14                                                                                                                                                           | 15.10                                                                       | 15.13            | <75%                           | <0.5%                                      | Negligible          |
| ESR 15                                                                                                                                                           | 15.82                                                                       | 15.86            | <75%                           | <0.5%                                      | Negligible          |
| ESR 16                                                                                                                                                           | 13.59                                                                       | 13.61            | <75%                           | <0.5%                                      | Negligible          |
| <p>a. 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</p> |                                                                             |                  |                                |                                            |                     |

D.9 Table D4 details the PM<sub>2.5</sub> concentrations for the 2026 Future Year scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

| <b>Table D4: Predicted Unadjusted PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 6 – Using the Emission Factor Toolkit v9.0</b> |                                                                                  |                         |                                       |                                                   |                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------|---------------------------------------|---------------------------------------------------|---------------------------|
| <b>Receptor</b>                                                                                                                                                      | <b>Calculated Annual Mean PM<sub>2.5</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 14                                                                                                                                                               | 8.92                                                                             | 8.94                    | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 15                                                                                                                                                               | 9.32                                                                             | 9.34                    | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| ESR 16                                                                                                                                                               | 8.08                                                                             | 8.09                    | <75%                                  | <0.5%                                             | <b>Negligible</b>         |
| <i>a. 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</i>     |                                                                                  |                         |                                       |                                                   |                           |

- D.10 The results of the assessment show that all predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations in the Defra EFT v9.0 assessment methodology will remain below the air quality objectives and negligible impacts would be predicted.
- D.11 The sensitivity analysis assessment indicates that NO<sub>2</sub> concentrations would continue to remain above the air quality objectives, this assumes there would be little air quality improvements between 2018 to 2026 which is unlikely to be the case. The assessment predicts that a slight and moderate air quality impact would be predicted at existing sensitive receptors within AQMA No.2A.
- D.12 The planning application for the remaining parts of MU1 have yet to be submitted to planning. The majority of the vehicles considered in this Scenario 6 are attributed to the wider development proposals. An assessment of the air quality change specific to that development would be provided at a future date.

## 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:

**Philip Walton**

**BSc (Hons), MIAQM, AEnvSc**

**Senior Environmental  
Scientist (Air Quality)**

Philip has over five years' experience in the air quality field in both regulatory and consultancy roles, having prepared numerous air quality technical reports and involvement and managing of air quality monitoring schemes.

Philip has prepared air quality assessments and environmental statement chapters for developments across the UK for a range of schemes including residential uses in urban and city localities (including developments exceeding 1,000 dwellings), commercial and industrial uses, link roads and quarries. Philip's dust experience includes; preparation of dust management plans for quarries and construction schemes, dust monitoring, dust audits and preparation of the IAQM construction reports. Philip has also prepared several odour reports covering a wide range of odorous sources.

**Mark Dawson**

**BSc (Hons) MA (Env Law) Dip (Air Pollution Control,  
Acoustics & Noise Control) CEnv MEnvSc 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 Masters 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 expert witness evidence to over forty planning inquiries. 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 residential, commercial, industrial and retail developments and mineral and waste operations. 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 Receptor

Proposed Sensitive Receptor

Notes:

Boundaries are indicative.

Aerial imagery shown for context purposes only.

|                              |         |             |       |                 |      |
|------------------------------|---------|-------------|-------|-----------------|------|
|                              |         |             |       |                 |      |
| REVISION                     | DETAILS | DATE        | DRAWN | CHKD            | APPD |
| CLIENT                       |         |             |       |                 |      |
| COUNTRYSIDE                  |         |             |       |                 |      |
| PROJECT                      |         |             |       |                 |      |
| BARUGH GREEN, BARNSELY       |         |             |       |                 |      |
| DRAWING TITLE                |         |             |       |                 |      |
| SENSITIVE RECEPTOR LOCATIONS |         |             |       |                 |      |
| DRG No.                      |         | LD10092/001 |       | REV A           |      |
| DRG SIZE                     |         | A3          |       | SCALE 1:12,500  |      |
| DRAWN BY                     |         | SW          |       | DATE 26/05/2020 |      |
| CHECKED BY                   |         | PW          |       | APPROVED BY SU  |      |

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