# BELLWAY HOMES

# CRAIG Y PARCAU, BRIDGEND

# AIR QUALITY ASSESSMENT

Client: Bellway Homes

Report Ref: ADO25103-R1-V1

Issue Date: 28/10/2025

Document Status: Version 1

AIR
DUST
ODOUR

## DATE ISSUED: 28/10/2025

## REPORT REFERENCE: ADO25103-R1-V1

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## REPORT VERSION CONTROL

| Document Reference | Date | Author | Signed |
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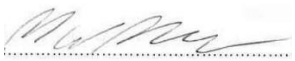
| ADO25103-R1-V1 | 28/10/2025 | M W Pounder<br>BSc(Hons) PGDip CEnv<br>MIEnvSc MIAQM AFOH |  |

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# 1. INTRODUCTION

1.0.1 By instruction from Bellway Homes, Air Dust Odour were instructed to undertake an Air Quality Assessment (AQA) to support a planning application for a new residential development at Craig Y Parcau, Bridgend, situated within Bridgend County Borough Councils (BCBC) administrative area.

1.0.2 The proposals are for the construction of 120 residential dwellings (24 affordable) and associated infrastructure at the Site.

1.0.3 The operational phase assessment is pending completion, traffic data to complete the assessment is pending.

1.0.4 Report limitations are outlined in **Appendix A**.

## 1.1 SITE LOCATION AND CONTEXT

1.1.1 The Site is located to the south of the Bridgend bypass road, at approximate National Grid Reference (NGR): 288935, 178695. **Figure 1** details the location of the Site.

1.1.2 The Site is located in an area where air quality is mainly influenced by road traffic emissions along the local road and regional road network and, as such, elevated pollutant concentrations may be experienced both at and around the Site. The Proposed Development may lead to adverse impacts at nearby existing sensitive receptors as a result of fugitive dust emissions during construction and road vehicle exhaust emissions during operation. Therefore, an AQA is required to determine potential impacts associated with the Proposed Development in accordance with the requirements of The National Planning Policy Framework (NPPF)[1]. The AQA will therefore consider dust deposition as well as ambient pollutant concentrations of nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$ and $PM_{2.5}$) at and around the Site.

1.1.3 The main potential sources of air pollution were identified as emissions from road transport using the local road network. There are no significant combustion sources identified within the immediate vicinity of the Site that will influence local air quality.

[1] Ministry of Housing, Communities & Local Government (2024) National Planning Policy Framework.

# 2. LEGISLATION & POLICY

## 2.1 AIR QUALITY LEGISLATION AND POLICY

### *UK Air Quality Strategy*

2.1.1 The government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)[2]. The revised AQS[3] which replaces the previous volume 2, provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union Legislation.

2.1.2 The AQS also sets standards and objectives for nine key pollutants to protect health, vegetation and ecosystems. These are benzene (C6H6), 1,3 butadiene ($C_4H_6$), carbon monoxide (CO), lead (Pb), $NO_2$, $PM_{10}$ and (non-statutory) $PM_{2.5}$, sulphur dioxide ($SO_2$), ozone ($O_3$) and polycyclic aromatic hydrocarbons (PAHs).

2.1.3 The air quality standards are levels recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) with regards to current scientific knowledge and the effects of each pollutant on health and the environment.

2.1.4 The Air Quality Objectives (AQOs) are medium-term policy-based targets set by Government. They take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a number of permitted exceedances of standards over a given period.

2.1.5 **APPENDIX B** presents the AQOs for pollutants considered within this assessment.

2.1.6 For the pollutants considered in this assessment, there are both long-term (annual mean) and short-term standards. For $NO_2$, the short-term standard is for a 1-hour averaging period, whereas for $PM_{10}$ it is a 24-hour averaging period. The periods reflect the varying impacts on health from differing pollutant exposure, e.g., temporary exposure on the pavement adjacent to a busy road compared with the exposure of residential properties adjacent to a road.

2.1.7 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[4] came into force on 31st January 2023 and adopted into UK law a Target Value for $PM_{2.5}$.

[2] Department for Environment, Food and Rural Affairs (Defra) and Devolved Administrations (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2).
[3] Defra Policy paper – Air quality strategy: framework for local authority delivery (28th April 2023).
[4] The Environmental Targets (Fine Particulate Matter (England) Regulations 2023 – Statutory

## *Air Quality (Wales) Regulations*

2.1.8 Many of the objectives in the AQS were made statutory in Wales with the Air Quality (Wales) Regulations 2000[5] and the Air Quality (Wales) (Amendment) Regulations 2002 (the Regulations)[6] for the purpose of Local Air Quality Management (LAQM).

2.1.9 The Environmental Target (Fine

## *Environmental Protection Act 1990*

2.1.10 Section 79 of the Environmental Protection Act 1990[7] gives the following definitions of statutory nuisance relevant to dust and particulates:

> *"Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance."*
> *"Any accumulation or deposit which is prejudicial to health or a nuisance."*

2.1.11 Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and, if necessary, the local authority may abate the nuisance and recover expenses.

2.1.12 There is no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is a subjective concept, and its perception is highly dependent upon the existing conditions and the change which has occurred.

## *Clean Air Strategy*

2.1.13 In 2019 the UK Government released its Clean Air Strategy[8], which forms part of its 25 Year Environment Plan[9]. The Strategy sets out the comprehensive action that is considered to be required from across all parts of government and society.

[5] The Air Quality (Wales) Regulations 2000 – Welsh Statutory Instrument 2000. No. 1940 (W.138)
[6] The Air Quality (Wales) (Amendment) Regulations 2002 – Welsh Statutory Instrument 2002. No 3182 (W. 298)
[7] Environmental Protection Act. London 1990 HMSO.
[8] Department for Environment, Food and Rural Affairs (Defra, 2019) Clean Air Strategy 2019.
[9] Department for Environment, Food and Rural Affairs (Defra, 2018) A Green Future Our 25 Year Plan to Improve the Environment.

2.1.14 The primary focus of air quality management is related to $NO_2$ and its principal source in the UK – road traffic. The Strategy aims to broaden the focus to include others areas, including actions on clean growth and emissions from domestic wood burning stoves, industry and agriculture.

## *Reducing Emissions from Road Transport: Road to Zero Strategy*

2.1.15 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper[10] outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This Policy asserts the governments pledge to end the new sale of Internal Combustion petrol and diesel cars and vans by 2040. It further states the governments expectation that the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. The government wants to see at least 50% - 70% of new car sales, and up to 40% of vans sales being ultra low emission by 2030.

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

## *Environment Act 2021*

2.1.17 The UK's new legal framework for protection of the natural environment, the Environment Act (2021) gives the government the power to set long-term, legally binding environmental targets. It establishes an Office for Environmental Protection (OEP), responsible for holding the government to account, ensuring compliance with these targets.

## *Environmental Improvement Plan 2023*

2.1.18 Defra published its 25 Year Environment Plan in 2018[11]. The Environment Act (2021) required Defra to review this Plan at least every five years. The Environmental Improvement Plan 2023[12] is the first revision. It outlines

[10] Department for Transport (DfT, 2018) The Road to Zero: Next Steps towards cleaner road transport and delivering our Industrial Sources.
[11] Defra (2018). A Green Future: Our 25 Year Plan to Improve the Environment. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf [Accessed 28/10/2025]
[12] Defra (2023) Environment Improvement Plan 2023. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1168372/environmental-improvement-plan-2023.pdf [Accessed 28/10/2025].

progress since 2018, adding detail to goals which were defined in the 2018 Plan, including that of achieving clean air.

2.1.19 The Plan sets out the new air quality targets set for $PM_{2.5}$ concentrations. The targets include long-term targets in the Statutory Instrument and interim targets to be achieved by 2028.

2.1.20 The Plan outlines the role of local authorities in helping it meet both its targets and existing commitments. It notes that and Air Quality Strategy will be published to provide guidance on how local authorities should assist. The Plan makes clear that this will focus on reducing emissions from sources within a local authority's control, including through traffic management and planning powers. This focus on emissions, as opposed to directly requiring local authorities to assess $PM_{2.5}$ concentrations against the new targets, recognises that $PM_{2.5}$ is a cross-boundary issue; most $PM_{2.5}$ within a Local Authority's area is not, for the most part, emitted by that particular local authority. The Plan also outlines the respective roles of industry, agricultural sectors, and the Department for Transport in providing the coordinated action required to meet both its new, and pre-existing targets and commitments.

## 2.2 PLANNING POLICY

2.2.1 A summary of the national and local planning policy relevant to the Proposed Development and air quality is provided below.

### *Planning Policy Wales*

2.2.2 Planning Policy Wales (PPW) sets out the land use policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars and policy clarification letters. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

2.2.3 In dealing specifically with air quality PPW (paragraph 6.76 states:

> *"In proposing new development, planning authorities and developers must:*
>
> - *Address any implications arising as a result of its association with, or location within, air quality management areas where there are sensitive receptors;*
> - *Not create areas of poor air quality or inappropriate soundscape;*
> - *Seek to incorporate measures which reduce overall exposure to air pollution.'*

2.2.4 Paragraph 6.715 states:

*"Potentially polluting development should be located in areas where there is low potential for public exposure, or where its impact can be minimised."*

## *Bridgend County Borough Local Development Plan*

2.2.5 The replacement Local Development Plan[13] was adopted in March 2024. The following policy was identified as being relevant to both air quality and the Proposed Development:

*"**SP6: Sustainable Housing Strategy***

*The plan makes provision for 8,628 homes to promote the creation and enhancement of sustainable communities and meet the housing requirement of 7,575 homes for the plan period, of which 1,711 of these homes will be affordable. Development will be distributed in accordance with Strategic Policy SP1, based on the Sustainable Housing Strategy that will:*

1) *Prioritise the re-use of previously developed (Brownfield) land;*
2) *Enable delivery of Strategic Sites, including Regeneration Sites within existing settlement boundaries and Sustainable Urban Extensions (SUEs) on the edge of established settlements;*
3) *Enable Edge of Settlement Sites within, and on the edge of, established settlements;*
4) *Support windfall residential development at appropriate sites within the settlement, focusing on the re-use of previously developed land;*
5) *Enable exception sites within or adjoining settlement boundaries to deliver affordable housing and homes that provide for an identified local need; and*
6) *"Support use of Place Plans to identify small, local development sites that reflect local distinctiveness and address local, specific community scale issues and promote self and custom build opportunities [...]"*

*"**COM1: Housing Allocations***

*In order to deliver the housing requirement identified in SP6, the following sites are allocated for residential development in the period up to 2033;"*

2.2.6 Craig Y Parcau is identified as a housing allocation under Site Ref COM1(1) to provide 108 units, 22 of which are affordable.

[13] Bridgend County Borough Council (2024). Bridgend County Borough Local Development Plan 2018 – 2033. Available at https://www.bridgend.gov.uk/residents/planning-and-building-control/local-development-plan/adopted-replacement-local-development-plan-2018-2033/ [Accessed 28/10/2025].

## 2.3 AIR QUALITY ACTION PLANS

### *National Air Quality Plan*

2.3.1 Defra has produced an Air Quality Plan[14] to tackle roadside $NO_2$ concentrations in the UK, a supplement to the 2017 plan[15] sets out steps the Government is taking in relation to another 22 local authorities where shorter-term exceedances of the limit value were identified. This is alongside national measures, with these plans supplementing those identified English Local Authorities to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to achieve the statutory limit values within the shortest time, and could include the implementation of a Clean Air Zone (CAZ). There is currently no easy way to take account the affect of the Plan or Supplement in this AQA, but consideration has been given where there currently is, or likely to be in the future, an exceedance of the limit value within the vicinity of the Proposed Development. This assessment has been carried out in relation to the Air Quality Objectives rather than the limit values that are in the Air Quality Action Plan.

### *Local Air Quality Plans*

2.3.2 The Bridgend Park Street Air Quality Action Plan (AQAP)[16] outlines the plan to reduce pollutant concentrations within the AQMA.

## 2.4 GUIDANCE

2.4.1 A summary of the publications referred to in undertaking this assessment is provided below.

### *National Guidance*

#### Guidance on the Assessment of Dust from Demolition and Construction (2024)

2.4.2 Published by the IAQM, this guidance document[17] follow previous versions in providing guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying site according to the risk of impacts

[14] Defra (2018) Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations. Available at: https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017 [Accessed 28/10/2025]
[15] Defra (2017) Air quality plan for nitrogen dioxide ($NO_2$) in the UK. Available at: https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017 [Accessed 28/10/2025]
[16] Bridgend County Borough Council. The Bridgend Park Street Air Quality Action Plan(AQAP). Available at https://democratic.bridgend.gov.uk/documents/s32275/14.03.24+DRAFT+AQAP+BCBC+Park+Street+2023+V.2.pdf [Accessed 28/10/2025]
[17] Institute of Air Quality Management (Version 2.2, January 2024) Guidance on the Assessment of Dust from Demolition and Construction.

(in terms of dust nuisance, $PM_{10}$ impacts on public exposure and impacts on relevant sensitive ecological receptors) and identify appropriate mitigation measures to the identified level of risk.

### Land-Use Planning & Development Control: Planning for Air Quality (2017)

2.4.3 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance[18] that offers comprehensive advice on: when an air quality assessment may be required along with what should be included, determining the significance of air quality impacts, if any, associated with a proposed development and mitigation measures that may be implemented to minimise these.

[18] Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017) Land Use Planning & Development Control: Planning for Air Quality.

# 3. SCOPE AND METHODOLOGY

## 3.1 SCOPE

3.1.1 The Scope of this assessment has been determined through the following:

- A review of the Proposed Development Plans;
- Desktop study to confirm the locations of nearby existing sensitive receptors that may be sensitive to changes in local air quality;
- Review of traffic data provided by the projects Transport Consultant; and
- Review of available air quality data surrounding the site, including the latest Annual Status Report[19] (ASR).

3.1.2 The assessment considers potential air quality impacts resulting from:

- Dust and particulate matter generated by on-site activities during the construction phase;
- Increases in pollutant concentrations from exhaust emissions arising from construction traffic and plant;
- Pollutant concentrations from road transport at the Site; and
- Increases in pollutant concentrations from exhaust emissions arising from traffic generated by the Proposed Development once operational and the cumulative impacts of surrounding committed developments.

## 3.2 CONSTRUCTION PHASE ASSESSMENT

3.2.1 Dust comprises of particles which typically range in size from 1-75 micrometres (µm) in aerodynamic diameter. The action of crushing and abrasive forces on materials leads to its creation. Larger dust particles fall from the atmosphere quickly following release and is therefore generally deposited in close proximity to the emission source. Therefore, dust is unlikely to cause long term or wide spread changes to air quality; however, deposition on cars and property can cause discolouration and 'soiling' which may result in nuisance complaints through amenity loss, albeit temporary, or perceived property damage.

3.2.2 Smaller dust particles are known as particulate matter (PM), with those less than 10 µm in aerodynamic diameter ($PM_{10}$) representing a small proportion of dust release. This includes the finer fraction known as $PM_{2.5}$ (with an aerodynamic diameter less than 2.5 m). Given these particles are at the smaller end of the size range of dust particles, they remain suspended in the atmosphere for a longer period of time than larger particles. Therefore, they can be transported by wind over a much wider area. $PM_{10}$ and $PM_{2.5}$ is also small

[19] Bridgend County Borough Council (August 2024) Bridgend 2024 Air Quality Progress Report. Available at https://democratic.bridgend.gov.uk/documents/s33686/App1.%20Bridgend%202024%20APR%20draft.pdf [Accessed 28/10/2025]

enough to be drawn through breathing into the lungs which, particularly in sensitive members of the public, could have an impact on health. It is worth noting that, according to the IAQM guidance, the majority of fugitive dust emissions arising from construction sites are expected to relate to coarser fractions ($PM_{2.5-10}$), with just 10-15% expected to comprise $PM_{2.5}$. For assessment purposes, the guidance therefore focusses on $PM_{10}$.

3.2.3 An assessment of the likely significant impacts on the local air quality due to the generation and dispersion of dust and $PM_{10}$ during the construction phase has been undertaken with the assessment methodology published by IAQM. Information for this phase provided by the Client and/or Project Team has been utilised along with the professional judgment of Air Dust Odour.

3.2.4 The methodology assesses the potential risk of dust and $PM_{10}$ impacts from the following sources, taking into account the nature and scale of activities undertaken for each source and the sensitivity of the surrounding area to increases in levels of $PM_{10}$ in order to assign a level of risk:

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

3.2.5 The risk of dust impact for each is described as being; low, medium or high. When the level of risk has been identified, the significance of residual effects can be determined. A summary of the IAQM assessment methodology is outlined in **Appendix C**.

3.2.6 In addition to the above, the impact on adjacent routes in the vicinity of the Site from the exhaust emissions of construction vehicles and plant accessing it have also been considered. Given the information on the number of vehicles and plant associated with the construction phase was not available at the time of writing, a qualitative assessment of the impact on local air quality using professional judgement has been undertaken, which considered the following:

- The likely number and type of construction traffic to be generated by this phase of the development;
- The proximity and number of sensitive receptors to both the application Site and along the likely routes to be used by construction vehicles; and
- The anticipated construction phase duration and the nature of the construction activities undertaken.

## 3.3 OPERATIONAL PHASE ASSESSMENT

3.3.1 The Proposed Development has the potential to expose future residents to any existing air quality issues.

3.3.2 The EPUK & IAQM guidance sets out two stages for determining when an assessment of potential impacts on air quality is likely to be necessary. The Stage 1 criteria is presented below:

A. If any of the following apply:

- 10 or more residential units or a site area of more than 0.5ha; or
- More than 1,000m$^2$ of floor space for all other uses or a site greater than 1ha.

B. Coupled with any of the following:

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

3.3.3 Should the above criteria not be met, then the EPUK & IAQM guidance considers air quality impacts associated with a scheme to be negligible, with no further assessment being required.

3.3.4 If the above criteria is met or exceeded, it is necessary to proceed to Stage 2, which states the following criteria to aid in establishing when an air quality assessment is likely to be necessary:

- Proposals that will cause a change in Light Duty Vehicle (LDV) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 elsewhere.
- Proposals that will cause a change in Heavy Duty Vehicle (HDV) flows of more than 25 AADT within or adjacent to an AQMA or more than 100 elsewhere.
- Proposals that would realign roads within an AQMA by more than 5m;
- Proposals that will introduce new junctions or remove existing junctions near relevant receptors.
- Proposals that will introduce or change a bus station or change flows of buses by more than 25 AADT within an AQMA or more than 100 AADT elsewhere.
- Proposals which will include an underground car park with extraction system which will be within 20m of a relevant receptor and have more than 100 movements per day.
- Proposals which will include either a centralised plant using biofuel, a combustion plant with single or thermal input >200KWh or a standby emergency generator associated with a centralised energy centre; and,
- Proposals which will include a combustion process of any size.

3.3.5 Should these criteria not be met, then the EPUK and IAQM guidance documents consider air quality impacts associated with a scheme to be not significant, with no further assessment being required.

3.3.6 Given the screening of traffic data indicated that the above criteria are met, potential impacts at existing sensitive receptor locations need to be assessed by calculating the predicted change in pollutant concentrations as a result of the Proposed Development.

3.3.7 Of the pollutants included in the AQS, concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ have been considered within this assessment, as road traffic is a major source of these pollutants and their concentrations tend to be close to, or in exceedance of, the objectives in urban locations.

3.3.8 In order to predict $NO_2$ and PM concentrations at surrounding sensitive receptors adjacent to roads impacted by additional vehicle movements as a result of the Proposed Development, the advanced dispersion model ADMS-Roads (version 5.0.1.3) has been used. This model uses detailed information regarding traffic flows on the local road network, surface roughness and local meteorological conditions to predict pollutant concentrations. Details of the model input parameters are presented in **APPENDIX TBC**.

## *Meteorological Data*

3.3.9 Meteorological data, such as wind speed, frequency and direction is used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model was obtained from Stansted Airport for the year 2023. This station is considered to provide representative data for the assessment. A wind rose generated from the meteorological used for the dispersion modelling of operational phase impacts is provided in **Appendix E**.

## *Traffic Data*

### Traffic Flows

3.3.10 A summary of traffic data and pollutant emission factors used in the assessment can be found in **Appendix D**. It includes details of the Annual Average Daily Trips (AADT flows, vehicle speeds (km/h) and the percentage of Heavy Duty Vehicles (HDVs) for the local road network in all assessment years considered. Traffic speeds were reduced at junctions, in line with LAQM.TG22.

3.3.11 For the assessment, three scenarios were modelled as follows:

- 2023 – Model Verification and Baseline;
- 2030 – Opening Year without Development; and
- 2025 - Opening Year with Development.

3.3.12 Reference should be given to **Figure 1**, which provides a graphical representation of the modelled road links.

### Vehicle Emission Factors

3.3.13 Emission factors for each link were calculated using the relevant traffic flows and the Emission Factor Toolkit (EFT, version 13.1). This has been produced by DEFRA and incorporates the relevant emission factors and fleet information.

3.3.14 There is current uncertainty over pollutant concentrations within the UK, with the implementation of previous new vehicle standards not resulting in the expected reduction in roadside concentrations. Therefore, 2023 emission factors were utilised throughout to provide robust concentration predictions. Given the 2023 predictions have been verified, it is considered that the results are an indication of worst case concentrations during the operational phase of the Proposed Development.

## *Background Concentrations*

3.3.15 Background pollutant data for the operational phase assessment have been taken from the national maps provided by Defra on their website[20]. Background concentrations of pollutants which are included with the AQS have been mapped to a grid resolution of 1 x 1 km for the UK. The most recent estimations are available for all years from 2021 through to 2030. The assumption is that background concentrations will reduce overtime, which is in line with predicted reductions in vehicle emissions and other sources.

3.3.16 Due to the uncertainties outlined above, and given that many local authorities have found concentrations have not reduced in line with expectations, 2023 background concentrations have been utilised for all pollutants assessed in the opening year scenario. This is considered to provide a robust assessment.

## *Model Verification and Result Processing*

3.3.17 The ADMS Roads dispersion model has been widely validated and utilised for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the Vicinity of the Site.

3.3.18 To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results, and was carried out following the methodology specified in LAQM.TG22.

[20] Defra 2024. Background concentrations. [Online] Available at https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021 [Accessed 28/05/2025]

3.3.19 Details of the verification factor are presented in **Appendix TBC**. A factor of TBC was obtained during the verification process, which indicates that the model was under predicting. This factor was applied to the mode road-$NO_X$ outputs prior to conversion to annual mean $NO_2$ concentrations utilising the $NO_X$ to $NO_2$ calculator (version 9.1) provided by DEFRA[21]. The $NO_2$ diffusion tube monitoring results provided by EFDC were subsequently used to derive an indicative baseline annual mean $NO_2$ concentration for each site in the study area. Reference should be made to **Figure TBC**, which presents the diffusion tubes in the assessment area.

3.3.20 There are no local $PM_{10}$ or $PM_{2.5}$ monitoring data against which the model could be verified. Consequently, the verification factor determined above for adjusting the road-$NO_X$ contribution has applied to the predicted road-$PM_{10}$ and $PM_{2.5}$ contributions, consistent with the guidance provided within LAQM.TG22.

3.3.21 Once processed, the predicted concentrations were compared against the AQS objective levels for $NO_2$, $PM_{10}$ and $PM_{2.5}$ and laid out in **Appendix TBC**.

3.3.22 The air quality modelling generates pollutant estimates of road source contributed $NO_X$, $PM_{10}$ and $PM_{2.5}$ at specified receptors. To allow a comparison to be drawn with the relevant air quality objectives for $NO_2$, $PM_{10}$ and $PM_{2.5}$ it has been necessary to combine the model outputs data with the background concentration.

3.3.23 To consider compliance with the 1-hour mean air quality objective for $NO_2$, DEFRA's guidance suggests that in locations where the annual mean concentration exceeds 60µg/$m^3$ then the 1-hour mean objective may be exceeded. Where annual mean concentrations are less than 60µg/$m^3$ then exceedance of the 1-hour mean objective is considered unlikely. The risk of non-compliance with the 1-hour mean objective, where up to 18 exceedances of a 1-hour mean concentration of 200µg/$m^3$ are allowed in a calendar year, is therefore considered likely when the annual mean concentrations is greater than 60µg/$m^3$ but unlikely when not. This approach has been adopted for this assessment.

3.3.24 To estimate annual mean concentrations $PM_{10}$ and $PM_{2.5}$ for comparison with annual mean air quality objectives (40 and 25µg/$m^3$ respectively) the model output concentrations are simply added to the background concentrations for these pollutants.

3.3.25 To consider compliance with the 24-hour mean air quality objective for $PM_{10}$, Defra's guidance gives the following equation that relates the annual mean concentration to the number of exceedances of the 24-hour mean concentration of 50µg/$m^3$, where up to 35 exceedances are allowed:

[21] Defra 2024. $NO_X$ to $NO_2$ Calculator. [Online] Available at https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/ [Accessed 28/05/2025]

- No. 24-hour mean exceedances = -18.5 + 0.00145 x annul mean$^3$ + (206/annual mean)

3.3.26 This approach has been adopted for $PM_{10}$ in this assessment.

## 3.4 SELECTION OF SENSITIVE RECEPTORS

3.4.1 Sensitive locations are defined as public places or sensitive ecological habitats with may be exposed to pollutants as a result of activities associated with the Proposed Development.

3.4.2 Locations include places sensitive to an increase in dust deposition and $PM_{10}$ exposure as a result of on-site construction activities, and locations sensitive to the exposure of gaseous pollutants emitted from exhaust of construction and operational phase traffic associated with the Proposed Development.

### *Construction Phase*

3.4.3 The IAQM assessment is undertaken where there are:

- 'human receptors' within 250 m. of the site boundary, all within 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrance(s); and/or
- 'ecological receptors' within 50 m of the site boundary, or within 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrance(s).

3.4.4 It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at existing sensitive receptors.

### *Operational Phase*

3.4.5 In terms of locations that are sensitive to pollutants emitted from engine exhausts, these will include places where members of the public are likely to be regularly present over the period of time prescribed in the AQS. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24-hour mean or annual mean) may be appropriate. LAQM.TG22 provides examples of the locations where the air quality objectives should/should not apply.

3.4.6 For the assessment of operational phase impacts, a number of 'receptors' representative of locations of relevant public exposure were identified at which pollution concentrations were predicted. Receptors have been identified adjacent to roads that are likely to experience the greatest change in traffic flows or

composition. Therefore, $NO_2$ and particulate matter concentrations, as a result of the Proposed Development.

3.4.7 The locations of the assessment receptors are shown in **Table 1**.

| Table 1: Receptor Locations Used in the Assessment | | | | |
|---|---|---|---|---|
| Receptor | Description/Address | Grid Reference | | Height above Ground Level (m) |
| | | X (m) | Y (m) | |
| TBC | | | | |

## 3.5 SIGNIFICANCE CRITERIA

### *Construction Phase*

3.5.1 The IAQM assessment methodology recommends significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity where appropriate mitigation measures are in place. For almost all construction sites and activities, application of effective mitigation should prevent any significant effects occurring to sensitive receptors, with the residual effects normally being negligible.

3.5.2 For the assessment of the impact of exhaust emissions for construction vehicles accessing and leaving the Site on concentrations of $NO_2$ and particulate matter; the significance of the residual effects has been determined using the principles outlined in the EPUK & IAQM guidance (used in the operational phase) and professional judgment.

### *Operational Phase*

3.5.3 The approach provided in the EPUK & IAQM guidance has been used in this assessment to assist in the description of the air quality effects of additional emissions from the traffic generated by the Proposed Development once it becomes operational.

3.5.4 The guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollutant concentrations as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion, as summarised in **Table 2**.

| Table 2: Road Vehicle Exhaust Emissions – Significance of Impact | | | | |
|---|---|---|---|---|
| **Long Term Average Concentration at Receptors in Assessment Year** | **% Change in Concentration Relative to air quality assessment Level (AQAL)** | | | |
| | **1** | **2 – 5** | **6 – 10** | **> 10** |
| 75% or less of AQO | Negligible | Negligible | Slight | Moderate |
| 76 – 94% of AQO | Negligible | Slight | Moderate | Moderate |
| 95 – 102% | Slight | Moderate | Moderate | Substantial |
| 103 – 109% | Moderate | Moderate | Substantial | Substantial |
| 110% or more of AQO | Moderate | Substantial | Substantial | Substantial |
| Notes<br>AQAL = air quality assessment Level, which for this assessment related to the UK Air Quality Strategy objectives.<br>Where the %change in concentrations is <0.5%, the change is described as 'Negligible' regardless of the concentration.<br>When defining the concentration as a percentage of the AQAL, 'without scheme' concentrations should be used where there is a decrease in pollutant concentration and the 'with scheme', concentration where there is an increase. Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial. | | | | |

3.5.5 The matrix shown in **Table 2** is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0% i.e. less than 0.5%, are described as negligible.

3.5.6 Following the prediction of impacts at discrete receptor locations, the EPUK/IAQM document provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

3.5.7 The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the impacts. The guidance does not include criteria for determining the significance of the effect on hourly mean $NO_2$ concentrations or daily mean $PM_{10}$ concentrations. The significance of effects of hourly mean $NO_2$ and daily mean $PM_{10}$ concentrations arising from the operational phase have therefore been determined qualitatively using professional judgment and the principles described above.

3.5.8 The EPUK/IAQM guidance states *"Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means. For people working at new developments in this situation, the same*

*will not be true as occupational exposure standards are different, although an assessment may wish to draw attention to the undesirability of the exposure."*

3.5.9 The EPUK/IAQM guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. It should be noted that this is a binary judgement of either it is significant, or it is not significant.

## *Future Exposure*

3.5.10 The Proposed Development use falls within the scope for an exposure assessment to be undertaken in accordance with the EPUK and IAQM guidance, and professional judgement.

# 4. BASELINE

## 4.1 INTRODUCTION

4.1.1 Existing air quality conditions in the vicinity of the Site were assessed in order to provide a baseline for the assessment, detailed in the following sections.

## 4.2 LOCAL AIR QUALITY MANAGEMENT

4.2.1 As required by the Environment Act (1995), BCBC has undertaken review and assessment within their area of jurisdiction. There is currently one AQMA declared in their administrative area. The Park Street, Bridgend AQMA was declared in 2019 for $NO_2$ exceedances.

## 4.3 AIR QUALITY MONITORING

4.3.1 Pollutant concentrations are monitored by BSBC throughout their area of jurisdiction, operating one automatic and 35 passive monitoring sites in 2023. There are no monitoring locations within 1km of the Site boundary, however, there are two monitoring locations on Ewenny Road, which can be considered most representative of Site conditions. **Table 3**.

| Table 3: Monitoring Results | | | | |
|---|---|---|---|---|
| Monitoring Site | | Monitored $NO_2$ Concentration (µg/m$^3$) | | |
| Site ID | Type | 2021 | 2022 | 2023 |
| OBC-115 | Roadside | 18.5 | 17 | 14 |
| OBC-113 | Roadside | 13.8 | 13.3 | 11.6 |

## 4.4 BACKGROUND POLLUTANT CONCENTRATIONS

4.4.1 Background pollutant concentration predictions have been produced by DEFRA for the whole of the UK, assisting local authorities in their review and assessment of air quality. The Site is located in grid square 288500, 178500. Data for this location was downloaded from the website[22] and is summarised in **Table 4**.

| Table 4: Predicted Background Pollutant Concentrations | | | | | | |
|---|---|---|---|---|---|---|
| OS Grid Reference (X, Y; m) | Predicted Concentration (µg/m$^3$) | | | | | |
| | 2023 | | | 2030 | | |
| | $NO_2$ | $PM_{10}$ | $PM_{2.5}$ | $NO_2$ | $PM_{10}$ | $PM_{2.5}$ |
| 288500, 178500 | 5.4 | 9.8 | 5.9 | 4.1 | 9.2 | 5.4 |

[22] Defra (2025) Background Mapping Data for Local Authorities. Available at: https://uk-air.defra.gov.uk/data/laqm-background-home [Accessed 28/10/2025]

| Table 4: Predicted Background Pollutant Concentrations | | | | | | |
|---|---|---|---|---|---|---|
| OS Grid Reference (X, Y; m) | Predicted Concentration (μg/m$^3$) | | | | | |
| | 2023 | | | 2030 | | |
| | $NO_2$ | $PM_{10}$ | $PM_{2.5}$ | $NO_2$ | $PM_{10}$ | $PM_{2.5}$ |
| Rounded to 1 d.p. | | | | | | |

As show in **Table 4**, background concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ are well below the AQO's.

# 5. ASSESSMENT

## 5.1 INTRODUCTION

5.1.1 The protentional air quality impacts as a result of the construction and operation of the Proposed Development are outlined in the following sections.

## 5.2 CONSTRUCTION PHASE ASSESSMENT

5.2.1 Construction activities have the potential to generate and/or re-suspend dust and $PM_{10}$ sources include:

- Site clearance and preparation including demolition activities;
- Preparation of temporary access/egress to the Site and haulage routes;
- Earthworks;
- Materials handling, storage, stockpiling, spillage and disposal;
- Movement of vehicles and construction traffic within the Site (including excavators and dumper trucks);
- Use of crushing and screening equipment/plant;
- Exhaust emissions from plant, especially when used at the extremes of their capacity and during mechanical breakdown;
- Construction of buildings, roads and areas of hard standing alongside fabrication processes;
- Internal and external finishing and refurbishment;
- Trackout whereby earth is carried from the Site on vehicle tyres, deposited on roads and later become suspended in the air as a result of vehicle movements; and
- Site landscaping following completion.

5.2.2 The majority of these releases are likely to occur during the 'working week' when Site operations take place. However, there are some potential release sources, such as exposed soil produced from significant earthwork activities. Therefore, without appropriate dust control mitigation measures, dust generation has the 24 hours per day over the period when such activities are taking place.

### *Assessment of Potential Dust Emission Magnitude*

5.2.3 The IAQM assessment methodology has been used to determine the potential dust emission magnitude for these four different dust and $PM_{10}$ sources:

- Demolition
- Earthworks

- Construction; and
- Trackout.

5.2.4 The assessment findings are presented below:

### Demolition

5.2.5 The site is currently, predominantly, open land with woodland surrounding. Demolition activities are therefore considered to be **negligible** and are not considered further in within this assessment.

### Earthworks

5.2.6 The total Site area is approximately 69,000m$^2$. Given the relatively small size of the Site, it is not anticipated that there would be more than 5-10 heavy earth moving vehicles at anyone time, nor is it expected that there will be bunds greater than 3-6m. Earthwork activities can therefore be considered **Medium**.

### Construction

5.2.7 The total volume of the houses to be constructed is report 13,385m$^3$ category. Therefore, the potential dust emission magnitude is considered to be **Medium** for construction activities.

### Trackout

5.2.8 Vehicles accessing the Site will do so via the existing road network. It is not anticipated that there would be more than 20 HDV movements per day. However, the unpaved road length could stretch to over 100m. Therefore, the potential dust emission magnitude is considered to be **Large** for trackout.

5.2.9 **Table 5** presents a summary of the potential dust emission magnitude for each construction activity considered.

**Table 5: Potential Dust Emission Magnitude**

| Activity | Dust Emission Magnitude |
|---|---|
| Demolition | N/A |
| Earthworks | Medium |
| Construction | Medium |
| Trackout | Large |

## *Assessment of the Sensitivity of the Study Area*

5.2.10 The prevailing wind direction is considered to be from the south-west, as it is the general case for the whole of the UK. Therefore, receptors situated to the north-east of the Site are more likely to experience the effects of dust and particulate matter emitted and re-suspended during the construction phase.

5.2.11 It is likely that the majority of dust would be deposited in the area immediately surrounding the Site under lower wind speed conditions.

5.2.12 No ecological receptors are within 50 m of the Site boundary or within 50 m of the access route up to 250 m from the Site entrance. The Multi Agency Geographic Information for the Countryside (MAGIC)[23] website was utilised to determine this. The closest ecological receptor is the Kenfig Special Area of conservation, Merthyr Mawr Site of Special Scientific Interest and the Merthyr Mawr Warren National Nature Reserve, located approximately 2 km south west of the Site. As such, ecological impacts have not been assessed further within this report.

5.2.13 Considering the above, and in line with the IAQM assessment methodology, the sensitivity of the area to changes in dust and $PM_{10}$ has been derived for each of the construction activities considered, with the results presented in **Table 6**.

**Table 6: Sensitivity of the Study Area**

| Potential Impact | Sensitivity of the Surrounding Area | | | |
|---|---|---|---|---|
| | Demolition | Earthworks | Construction | Trackout |
| Dust Soiling | N/A | Low | Low | Low |
| Human Health | N/A | Low | Low | Low |

## *Risk of Impacts*

5.2.14 Combining the defined sensitivity of the area with the predicted dust emission magnitude allows for the determination of the risk of dust impacts, prior to mitigation. **Table 7** presents a summary risk of dust impacts for the Proposed Development, with the risk category for each construction activity being used to determine the required level of mitigation.

[23] Department for Environment, Food and Rural Affairs (Defra, 2025) Multi-Agency Geographic Information for the Countryside (Magic) [Online] https://magic.defra.gov.uk/ [Accessed 28/10/2025]

| Table 7: Summary Dust Risk Table Defining Site Specific Mitigation | | | | |
|---|---|---|---|---|
| Potential Impact | Unmitigated Dust Risk During Construction | | | |
| | Demolition | Earthworks | Construction | Trackout |
| Dust Soiling | N/A | Low Risk | Low Risk | Low Risk |
| Human Health | N/A | Low Risk | Low Risk | Low Risk |

### *Construction Vehicles and Plant*

5.2.15 The areas immediately adjacent to the Site access road will be subject to the greatest impact on air quality from vehicles and plant associated with the Construction Phase. Given the small size of the Site, construction traffic is considered to be low in comparison to the existing traffic flows on the surrounding road network. Therefore, it is not considered necessary to consider-site construction traffic further within this assessment

5.2.16 Based on the current local air quality, the proximity of sensitive receptors to roads likely to be used by construction vehicles and their likely number, the impacts of these are considered to be **negligible** in accordance with the assessment significance criteria.

## 5.3 OPERATIONAL PHASE ASSESSMENT

5.3.1 A modelling exercise will be undertaken when the traffic data becomes available. It will include a verification and base year along with development impacts and cumulative development impacts on existing sensitive receptors.

### *Potential Future Exposure*

5.3.2 TBC through modelling.

#### Summary

5.3.3 TBC.

# 6. MITIGATION AND RESIDUAL EFFECTS

## 6.1 MITIGATION

### *Construction phase*

6.1.1 The construction phase dust impact assessment results indicate mitigation measures will be required for this phase. Highly recommended mitigation measures for a **Low** impact are presented below:

#### Communications:

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

#### Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the LA upon request.
- Record any exceptional incidents that cause dust and/or air emissions, either on or offsite., and the action taken to resolve the situation in the logbook.

#### Monitoring

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time $PM_{10}$ continuous monitoring location with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by IAM on monitoring during demolition, earthworks and construction.

#### Preparing and Maintaining the site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.

- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Avoid site runoff of water or mud.

### Operating/Vehicle Machinery and Sustainable Travel

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.
- Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel or petrol powered generators where possible and use mains electricity or battery powered equipment where practicable.

### Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays of local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust suppression, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights and use fine water sprays where appropriate.

### Waste Management

- No bonfires or burning of waste materials.

6.1.2 Detailed mitigation measured to control construction traffic should be discussed with the Local Authority to establish the most suitable access and haul routes for the site traffic. The most effective mitigation will be achieved by ensuring that construction traffic does not pass along sensitive roads (i.e., congested roads, residential roads or unsuitable junctions for large vehicles) where possible. Construction vehicles should be kept clean through the use of wheel washes and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network would also be of benefit.

### *Operational Phase*

6.1.3 TBC.

## 6.2 RESIDUAL EFFECTS

## *Construction Phase*

6.2.1 The residual effects of dust and $PM_{10}$ generated by construction activates is considered to be **not significant**.

6.2.2 The residual effects of emissions to air from construction vehicles and plant on local air quality is considered to be **not significant**.

## *Operational Phase*

6.2.3 TBC.

# 7. SUMMARY AND CONCLUSION

## 7.1 SUMMARY

7.1.1 Air Dust Odour was commissioned by Bellway Homes to undertake this air quality assessment support the planning application for a proposed residential development at Craig Y Parcau, Bridgend.

7.1.2 A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for this phase of the Proposed Development using the IAQM methodology. It identified that there is a **Low** risk of dust soiling impacts, along with a **Low** risk of increase in particulate matter concentrations as a result of unmitigated construction activities. Through good site practices and the implementation of suitable mitigation measures, the effect of dust and particulate matter releases would be significantly reduced. The residual effects of dust and particulate matter generated by construction activities on air quality are therefore considered to be **not significant**. The residual effects of emissions to air from construction vehicles and plant on local air quality is considered to be **not significant**.

7.1.3 The operational phase impacts are to be confirmed.

## 7.2 CONCLUSION

7.2.1 The assessment significance criteria indicates the residual effect for both the construction and operational phases of the Proposed Development is considered to be **not significant** for all pollutants considered.

7.2.2 The operational phase impacts are TBC.

# FIGURES

*Figure 1 Site Location*

*Figure 2 Construction Phase Buffer Zones*

# APPENDIX A – REPORT LIMITATIONS

This report is presented to Bellway Homes. It is not to be relied upon or used by any other person(s) or client in relation to any other matters not specifically covered by the cope of this report.

Air Dust Odour is obliged to exercise reasonable skill, care and diligence in the performance of the services provided to Bellway Homes. Air Dust Odour shall not be liable except where it has failed to exercise reasonable care, diligence and skill with this report being read and construed accordingly.

The conclusions and recommendations within this report are based upon information provided by others and upon the assumption that all relevant information which has been provided by these parties is accurate. Information obtained and retrieved by Air Dust Odour has not been independently verified by Air Dust Odour unless otherwise stated, and should be treated as such.

**DISCLAIMER:** This report was prepared by Air Dust Odour and contains its best judgment in light of the information available at the time of its preparation. Any use by a third party or any reliance on, or decisions based on it are the responsibility of such parties. Air Dust Odour accept no responsibility whatsoever for any damages suffered by any third party as a result of decisions made or actions based on the contents of this report.

# APPENDIX B – AIR QUALITY OBJECTIVES

| Table B1: National air quality objectives and European Directive Limit and target values for the protection of human health | | | | | | |
|---|---|---|---|---|---|---|
| **Pollutant** | **Applies** | **Objective** | **Concentration measured as** | **Date to be achieved by (and maintained thereafter)** | **European Obligations** | **Date to be achieved by (and maintained thereafter)** |
| $NO_2$ | UK | 18 µg/m$^3$ not to be exceeded more than 18 times in a single year | Hourly mean | 31 December 2004 | 18 µg/m$^3$ not to be exceeded more than 18 times in a single year | 1 January 2005 |
| | | 40 µg/m$^3$ | Annual Mean | | 40 µg/m$^3$ | |
| Particles ($PM_{10}$) | UK | 50 µg/m$^3$ not to be exceeded more than 35 times per year | 24 hour mean | 31 December 2004 | 50 µg/m$^3$ not to be exceeded more than 35 times per year | 1 January 2005 |
| | | 40 µg/m$^3$ | Annual mean | | 40 µg/m$^3$ | |
| | Indicative 2010 objectives for $PM_{10}$ (from the 2000 strategy and Addendum) have been replace by an exposure reduction approach for $PM_{2.5}$ (except in Scotland – see below) | | | | | |
| | Scotland | 50 µg/m$^3$ not to be exceeded more than 35 times per year | 24 hour mean | 31 December 2010 | 50 µg/m$^3$ not to be exceeded more than 35 times per year | 1 January 2005 |
| | | 18 µg/m$^3$ | Annual mean | | 40 µg/m$^3$ | |
| Particles ($PM_{2.5}$) Exposure Reduction | UK (except Scotland) | 20 µg/m$^3$ | Annual mean | 1 January 2020 | Stage 1 Limit – 25 µg/m$^3$ | 1 January 2015 |
| | Scotland | 10 µg/m$^3$ | | 31 December 2020 | Stage 2 limit 20 µg/m$^3$ | 1 January 2020 |
| | UK urban areas | Target 15 % reduction in concentrations at urban background | | Between 2010 and 2020 | Target of 20% reduction in concentrations at urban background | Between 2010 and 2020 |
| Particles ($PM_{2.5}$) (Population Exposure Reduction Target | England | Target of 35% reduction in population exposure compared with the | Population exposure reduction | 31$^{st}$ December 2040 | | |

| Table B1: National air quality objectives and European Directive Limit and target values for the protection of human health | | | | | | |
|---|---|---|---|---|---|---|
| **Pollutant** | **Applies** | **Objective** | **Concentration measured as** | **Date to be achieved by (and maintained thereafter)** | **European Obligations** | **Date to be achieved by (and maintained thereafter)** |
| | | average population exposure baseline period (2016-2018) | | | | |
| Particles ($PM_{2.5}$) (Annual Mean Concentration Target) | England | 10 µg/$m^3$ not to be exceeded at any relevant monitoring station | Annual mean | 31st December 2040 | | |

# APPENDIX C – IAQM CONSTRUCTION DUST ASSESSMENT METHODOLOGY

# IAQM CONSTRUCTION DUST ASSESSMENT METHODOLOGY

**Step 1 – Screening the Need for a Detailed Assessment.**

An assessment will normally be required where there are:

- 'human receptors' within 250m of the site boundary; all within 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s); and/or
- 'ecological receptors' within 50m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway up to 250m from the site entrance(s).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is 'negligible'.

**Step 2a – Define the Potential Dust Emission Magnitude**

The following are examples of how the potential dust emission magnitude for different activities can be defined. Note that not all criteria need to be met for a particular class. Other criteria can be justified within the assessment.

| Table C1: Construction Dust – Magnitude of Emission | | |
|---|---|---|
| **Magnitude** | **Activity** | **Criteria** |
| Large | Demolition | - Total building volume >75,000 $m^3$.<br>- Potentially dusty construction material (e.g. concrete).<br>- On-site crushing and screening.<br>- Demolition activities >12 m above ground level. |
| | Earthworks | - Total site area <110,000 $m^2$.<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 <6 m in height. |
| | Construction | - Total building volume <75,000 $m^3$.<br>- On site concrete batching.<br>- Sandblasting. |
| | Trackout | - <50 HDV (,3.5t) outward movements in any one day.<br>- Potentially dusty surface material (e.g. high clay content).<br>- Unpaved road length >100 m. |
| Medium | Demolition | - Total building volume 12,000 $m^3$ – 75,000 $m^3$.<br>- Potentially dusty construction material.<br>- Demolition activities 6 – 12 m above ground level. |
| | Earthworks | - Total site area 18,000 $m^2$ – 110,000 $m^2$.<br>- Moderately dusty soil type (e.g. silt).<br>- 5 – 10 heavy earth moving vehicles active at any one time.<br>- Formation of bunds 3 m – 6 m in height. |
| | Construction | - Total building volume 12,000 $m^3$ – 75,000 $m^3$.<br>- Potentially dusty construction material (e.g. concrete).<br>- On site concrete batching. |

| Table C1: Construction Dust – Magnitude of Emission | | |
|---|---|---|
| **Magnitude** | **Activity** | **Criteria** |
| | Trackout | - 20 – 50 HDV (>3.5t) outward movements in any one day.<br>- Moderately dusty surface material (e.g. high clay content).<br>- Unpaved road length 50 m – 100 m. |
| Small | Demolition | - Total building volume <12,000 $m^3$.<br>- Construction material with low potential for dust release (e.g. metal cladding or timber).<br>- Demolition activities <6 m above ground, demolition.<br>- Demolition during wetter months. |
| | Earthworks | - Total site area <18,000 $m^2$.<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 <3 m in height. |
| | Construction | - Total building volume <12,000 $m^3$.<br>- Construction material with low potential for dust release (e.g. metal cladding or timber). |
| | Trackout | - <20 HDV (<3.5t) outward movements in any one day.<br>- Surface material with low potential for dust release.<br>- Unpaved road length <50 m. |

**Step 2b – Define the Sensitivity of the Area**

The tables below present the IAQM assessment methodology to determine the sensitivity of the area to soiling, human heal and ecological impacts respectively. The IAQM guidance provides guidance to allow the sensitivity of individual receptors to assess dust soiling and health effects to assist in the assessment of the overall study area.

| Table C2: Sensitivity of the Area to Dust Soiling Effects on People and Property | | | | | |
|---|---|---|---|---|---|
| **Receptor Sensitivity** | **Number of Receptors** | **Distance from Source (m)** | | | |
| | | **<20** | **<50** | **<100** | **<250** |
| High | >100 | High | High | Medium | Low |
| | 10 – 100 | High | Medium | Low | Low |
| | 1 – 10 | Medium | Low | Low | Low |
| Medium | >1 | Medium | Low | Low | Low |
| Low | >1 | Low | Low | Low | Low |

| Table C3: Sensitivity of the Area to Huma Health Impacts | | | | | | |
|---|---|---|---|---|---|---|
| **Receptor Sensitivity** | **Annual mean $PM_{10}$ concentrations** | **Number of Receptors** | **Distance from Source (m)** | | | |
| | | | **<20** | **<50** | **<100** | **<250** |
| High | | >100 | High | High | High | Medium |

| Table C3: Sensitivity of the Area to Huma Health Impacts | | | | | | |
|---|---|---|---|---|---|---|
| Receptor Sensitivity | Annual mean $PM_{10}$ concentrations | Number of Receptors | Distance from Source (m) | | | |
| | | | <20 | <50 | <100 | <250 |
| | >32 μg/m³ (>18μg/m³ in Scotland) | 10-100 | High | High | Medium | Low |
| | | 1-10 | High | Medium | Low | Low |
| | 28-32 μg/m³ (16-18 μg/m³ in Scotland) | >100 | High | High | Medium | Low |
| | | 10-100 | High | Medium | Low | Low |
| | | 1-10 | High | Medium | Low | Low |
| | 24-28 μg/m³ (14-16 μg/m³ in Scotland) | >100 | High | Medium | Low | Low |
| | | 10-100 | High | Medium | Low | Low |
| | | 1-10 | Medium | Low | Low | Low |
| | <24 μg/m³ (<14 μg/m³ in Scotland) | >100 | Medium | Low | Low | Low |
| | | 10-100 | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low |
| Medium | >32 μg/m³ (>18μg/m³ in Scotland) | >100 | High | Medium | Low | Low |
| | | 10-100 | Medium | Low | Low | Low |
| | | 1-10 | Medium | Low | Low | Low |
| | 28-32 μg/m³ (16-18 μg/m³ in Scotland) | >100 | Low | Low | Low | Low |
| | | 10-100 | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low |
| | 24-28 μg/m³ (14-16 μg/m³ in Scotland) | >100 | Low | Low | Low | Low |
| | | 10-100 | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low |
| | <24 μg/m³ (<14 μg/m³ in Scotland) | >100 | Low | Low | Low | Low |
| | | 10-100 | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low |
| Low | - | >1 | Low | Low | Low | Low |

| Table C4: Sensitivity of the Area to Ecological Impacts | | |
|---|---|---|
| Receptor Sensitivity | Distance from Source (m) | |
| | <20 | <50 |
| High | High | Medium |
| Medium | Medium | Low |
| Low | Low | Low |

**Step 2c – Define the Risk of Impacts**

The dust emission magnitude determined in Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts without mitigation applied. For those cases, where the risk category is 'negligible' no mitigation measures beyond those required by legislation will be required.

| Table C5: Risk of Dust Impacts | | | |
|---|---|---|---|
| Sensitivity of Area | Dust Emission Magnitude | | |
| | Large | Medium | Small |
| Demolition | | | |
| High | High Risk | Medium Risk | Medium Risk |
| Medium | High Risk | Medium Risk | Low Risk |
| Low | Medium Risk | Low Risk | Negligible |
| Earthworks and Construction | | | |
| High | High Risk | Medium Risk | Medium Risk |
| Medium | High Risk | Medium Risk | Low Risk |
| Low | Medium Risk | Low Risk | Negligible |
| Trackout | | | |
| High | High Risk | Medium Risk | Low Risk |
| Medium | High Risk | Low Risk | Negligible |
| Low | Low Risk | Low Risk | Negligible |

**Step 3 – Site Specific Mitigation**

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is considered to be a low, medium or high risk site. The IAQM guidance details the mitigation measures required for low, medium and high risk sites as determined in Step 2C.

**Step 4 – Determine Significant Effects**

Once the risk of dust impacts has been determined in Step 2C under the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant effects arising from the construction phase. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore, residual effects will normally be negligible.

# APPENDIX D – MODEL INPUT PARAMETERS

# MODEL INPUT PARAMETERS

**Traffic Data**

2023 is the most recent year for which both monitoring and meteorological data is available to enable verification of the model results, and so this year has been used as the baseline year for this assessment. 2030 is the anticipated opening year of the Proposed Development.

Baseline traffic data for use in the assessment, including 24-hour Annual Average Daily Trips (AADT) flows and fleet composition as HDV percentage was obtained from the Projects Transport Consultant.

| Table D1: Verification/Baseline Traffic Data | | | | | |
|---|---|---|---|---|---|
| Road Link | Name | AADT (Total Vehicles) | %HDV | Speed (km/h) | $NO_X$ Emission Factor |
| | | | | | |

| Table D2: 2030 Without Development | | | | | | |
|---|---|---|---|---|---|---|
| Road Link | AADT (Total Vehicles) | %HDV | Speed (km/h) | $NO_X$ Emission Factor | $PM_{10}$ Emission Factor | $PM_{2.5}$ Emission Factor |
| | | | | | | |

| Table D3: 2030 With Development | | | | | | |
|---|---|---|---|---|---|---|
| Road Link | AADT (Total Vehicles) | %HDV | Speed (km/h) | $NO_X$ Emission Factor | $PM_{10}$ Emission Factor | $PM_{2.5}$ Emission Factor |
| | | | | | | |

**Roughness Length**

The roughness length (z0) is a modelling parameter applied to allow consideration of surface height roughness elements. A z0 of 1m was used to describe the modelling extents at the Proposed Development, verification site(s) and for the meteorological site. The values of z0 is considered appropriate for the morphology of the area and are suggested within ADMS-Roads as being suitable for 'small towns'.

**Monin-Obukhov Length**

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 10m was used to describe the modelling extents and meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-Roads as being suitable for 'small towns'.

**Model Verification**

Introduction

The comparison of modelled concentrations with local monitoried concentrations is a process termed 'verification'. Model verification investigates the discrepancies between modelled and measured concentrations, which car arise due

to the presence of inaccuracies and/or uncertainties in model input data, modelling and monitoring data assumptions. The following are examples of such discrepancy:

- Estimates of background pollutant concentrations;
- Meteorological data uncertainties;
- Traffic data uncertainties;
- Model input parameters, such as 'roughness length'; and
- Overall limitations of the dispersion model.

Nitrogen Dioxide

Most nitrogen dioxide is produced in the atmosphere by the reaction of nitric oxide (NO) with Ozone. It is therefore most appropriate to verify the model in terms of the primary pollutant emissions of nitrogen oxides ($NO_X$ = NO + $NO_2$), in line with the guidance provided within LAQM.TG22.

The model has been run to predict the 2023 annual mean road- $NO_X$ contribution at a number of roadside diffusion tubes within the modelled road network, at the verification location. The model outputs of road- $NO_X$ diffusion tubes within the 'measured' road- $NO_X$, which was determined from the $NO_2$ concentrations measured using diffusion tubes at the monitoring locations, utilising the $NO_X$ from $NO_2$ calculator provided by Defra and the $NO_2$ background concentration (from the Defra background map). As discussed in the methodology section, the most recent suitable data available for model verification purposes is 2023 data.

**Table D4: Model Verification**

| Site ID | 2023 Monitored Total $NO_2$ ($\mu g/m^3$) | 2023 Background $NO_2$ ($\mu g/m^3$) | 2023 Monitored Road Contribution $NO_X$ ($\mu g/m^3$) | 2023 Modelled Contribution $NO_X$ ($\mu g/m^3$) | Ratio |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

The road- $NO_X$ adjustment factor was determined as the slope of best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero, as presented below. This resulted in a factor of TBC, indicating that the model was underpredicting. This road- $NO_X$ adjustment factor was applied to the modelled road- $NO_X$ concentrations and background $NO_2$ concentration into the $NO_X$ to $NO_2$ calculator.

$PM_{10}$ and $PM_{2.5}$

There are no local $PM_{10}$ or $PM_{2.5}$ monitoring data against which the model could be verified. Consequently, the verification factor determined above for adjusting the road-$NO_X$ contribution has applied to the predicted road-$PM_{10}$ and $PM_{2.5}$ contributions, consistent with the guidance provided within LAQM.TG22.

Model Uncertainty

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG22 identifies a number of statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. These include:

a) Root mean square error (RMSE);
b) Fractional bias (FB); and
c) Correlation coefficient (CC)

These parameters estimate how the model results agree or diverge from observations. These calculations can be carried out prior to, and after adjustment, or based on different options for adjustment, and can provide useful information on model improvement.

**Table D5: Methods for Describing Model Uncertainty**

| Statistical Parameter | Comments |
|---|---|
| RMSE | RMSE is used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared.<br>If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements, For example, the model predictions are for the annual mean $NO_2$ objective of 40µg/$m^3$, if an RMSE of 10µg/$m^3$, or above, is determined for a model it is advised to revisit the model parameters and model verification.<br>Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4µg/$m^3$ for the annual mean $NO_2$ objective. |
| Fractional Bias | It is used to identify it the model shows a systematic tendency to over or under predict.<br>FB values vary between +2 and -2 and has an ideal value of zero. A negative value suggests a model over prediction and positive values suggest a model under prediction. |
| Correlation Coefficient | It is used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship. |

To assess the uncertainty of a model, the RMSE is the simplest parameter to calculate providing an estimate of the average error of the model in the same units as the modelled predictions. It is also often easier to interpret the RMSE than the other statistical parameters and therefore it has been calculated in this assessment to understand the model uncertainty.

The overall weighted RMSE value calculated after verification was 0.63 and therefore the final predictions are considered to be robust.

## APPENDIX E – 2023 CARDIFF AIRPORT