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ACOUSTICS AND AIR QUALITY

# AIR QUALITY ASSESSMENT

**on behalf of**

## DUNELM GEOTECHNICAL & ENVIRONMENTAL LTD

**for**

## ESKDALE DRIVE, SOUTH SHIELDS, NE32 4AB

## REPORT DATE: 17TH FEBRUARY 2017

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# Summary

This air quality report is submitted in support of a planning application for a proposed residential development of 36 dwellings at Eskdale Drive, South Shields, NE32 4AB.

A road traffic emissions assessment was undertaken to consider the impact of vehicle exhaust emissions associated with the proposed residential development, on identified receptor locations within the study area.

Annual concentrations of $NO_2$ and $PM_{10}$ were predicted to be well below the respective air quality objectives for both '*without development*' and '*with development*' scenarios in 2018 at all modelled receptor locations. Predicted annual mean $NO_2$ and $PM_{10}$ concentrations in the 'with development' scenario are all less than 90% of the AQAL.

No exceedance of the short term 1 hour $NO_2$ and 24 hour $PM_{10}$ air quality objectives were predicted at sensitive receptor locations.

In accordance with EPUK and IAQM guidance on air quality significance criteria, the local air quality impact of emissions from traffic associated with the proposed development on the road network surrounding the site is predicted to be ***negligible***.

The suitability of the site for residential receptors with regards to air quality was also considered. The results of the dispersion modelling assessment indicate that annual mean and short term concentrations of $NO_2$ and $PM_{10}$ would be below the respective objectives in 2018 at proposed residential receptors with the development in place.

The assessment also considered whether the proposed development could significantly change air quality during the construction phase. With the implementation of mitigation measures the dust impacts from the construction are considered to be not significant, in accordance with IAQM guidance.

There is, therefore no reason for this application to be refused on the ground of air quality.

| | | | |
|---|---|---|---|
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| Date | 17th February 2017 | Date | 17th February 2017 |

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# Contents

# 1 Introduction

1.1 This air quality report is submitted in support of a~~n~~ planning application for a proposed residential development of 36 dwellings at Eskdale Drive, South Shields, NE32 4AB. The site lies within the administrative boundary of South Tyneside Council (STC).

1.2 The report provides a review of the existing air quality in proximity to the proposed development site and assesses the potential impact of the proposed development on local air quality, in accordance with Local Air Quality Management Technical Guidance[1].

1.3 Air pollution in urban areas is generally dominated by emissions from road vehicles. The quantity and composition of vehicle emissions is dependent on the type of fuel used, engine type, size and efficiency, vehicle speeds and the type of exhaust emissions abatement equipment employed.

1.4 The main pollutants of health concern from road traffic exhaust releases are nitrogen dioxide ($NO_2$) and fine particulates – normally assessed as the fraction of airborne particles of mean aerodynamic diameter less than ten micrometres ($PM_{10}$), since these pollutants are most likely to approach their respective air quality objectives in proximity to major roads and in congested areas. This assessment has therefore focused on the impact of the proposed development on concentrations of $NO_2$ and $PM_{10}$.

# 2 Site Description

2.1 The site is located approximately 1.8 km to the south of Jarrow town centre and is currently an empty parcel of land surrounded by existing residential properties. Plan reference LP-01 shows the site location.

2.2 The site is a small parcel of land enclosed by houses off Eskdale Drive, Coniston Drive and Kirkstone Avenue. The A194 runs along the northern boundary beyond Eskdale Drive and the A19 runs along the eastern boundary beyond Coniston Drive. More residential properties lie to the west and south.

# 3 Proposed Development

3.1 The proposed development consists of the erection of 36 affordable homes on the parcel of land, with site access off Eskdale Drive. Plan reference AL-01 Rev A shows the proposed site layout.

[1] Department for the Environment Food and Rural Affairs (2016) '*Local Air Quality Management Technical Guidance Document LAQM.TG (16)*', London: Defra.

# 4 Policy Context

## 4.1 The Air Quality Strategy

4.1.1 European Union (EU) legislation forms the basis for current UK air quality policy. The EU Air Quality Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management came into force in September 1996[2]. This is a framework for tackling air quality through European-wide air quality limit values in a series of daughter directives, prescribing how air quality should be assessed and managed by the Member States. Directive 96/62/EC and the first three daughter objectives were combined to form the new EU Directive 2008/50/EC[3] on Ambient Air Quality and Cleaner Air for Europe, which came into force June 2008.

4.1.2 The Environment Act 1995 required the preparation of a national Air Quality Strategy (AQS) which set air quality standards and objectives for specified pollutants. The Act also outlined measures to be taken by local planning authorities (LPAs) in relation to meeting these standards and objectives (the Local Air Quality Management (LAQM) system).

4.1.3 The UK AQS was originally adopted in 1997 and has been reviewed and updated since then to take account of changing EU Legislation, technical and policy developments and the latest information on health effects of air pollution. The strategy was revised and reissued in 2000 as the AQS for England, Scotland, Wales and Northern Ireland. This was subsequently amended in 2003 and was last updated in July 2007[4].

4.1.4 The standards and objectives relevant to the LAQM framework have been prescribed through the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations 2002; the Air Quality Standards Regulations 2010 set out the combined Daughter Directive limit values and interim targets for Member State compliance.

4.1.5 The current air quality standards and objectives (for the purpose of LAQM) are presented in **Table 1**. Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health. Pollutant objectives, however, incorporate target dates and averaging periods which take into account economic considerations, practicability and technical feasibility.

[2] European Parliament (1996) Council Directive 96/62/EC on Ambient Air Quality Assessment and Management.

[3] European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe.

[4] Department for Environment, Food and Rural Affairs (DEFRA) (2007) 'The Air Quality Strategy for England, Scotland, Wales and Northern Ireland'

**Table 1: Air Quality Strategy Objectives (England) for the Purposes of Local Air Quality Management**

| Pollutant | Air Quality Objective | | To be Achieved by |
|---|---|---|---|
| | Concentration | Measured As* | |
| Benzene | 5 µg/m³ | Annual mean | 31/12/2010 |
| 1,3 Butadiene | 2.25 µg/m³ | Running annual mean | 31/12/2003 |
| Carbon monoxide | 10 mg/m³ | Maximum daily running 8-hour mean | 31/12/2003 |
| Lead | 0.25 µg/m³ | Annual mean | 31/12/2008 |
| Nitrogen dioxide ($NO_2$) | 200 µg/m³ | 1-hour mean not to be exceeded more than 18 times per year | 31/12/2005 |
| | 40 µg/m³ | Annual mean | 31/12/2005 |
| Particles ($PM_{10}$) | 50 µg/m³ | 24-hour mean not to be exceeded more than 35 per year | 31/12/2004 |
| | 40 µg/m³ | Annual mean | 31/12/2004 |
| Particles ($PM_{2.5}$) | 25 µg/m³ | Annual mean (target) | 2020 |
| | 15% cut in annual mean (urban background exposure) | | 2010-2020 |
| Sulphur Dioxide ($SO_2$) | 350 µg/m³ | 1-hour mean not to be exceeded more than 24 times a year | 31/12/2004 |
| | 125 µg/m³ | 24-hour mean not to be exceeded more than 3 times a year | 31/12/2004 |
| | 266 µg/m³ | 15-minute mean not to be exceeded more than 35 times a year | 31/12/2005 |

Note:*how the objectives are to be measured is set out in the UK Air Quality (England) Regulations (2000).

4.1.6 Where an air quality objective is unlikely to be met by the relevant deadline, local authorities must designate those areas as Air Quality Management Areas (AQMAs) and take action to work towards meeting the objectives. Following the designation of an AQMA, local authorities are required to develop an Air Quality Action Plan (AQAP) to work towards meeting the objectives and to improve air quality locally.

4.1.7 Possible exceedances of air quality objectives are generally assessed in relation to those locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective.

## 4.2 National Planning Policy Framework

4.2.1 National planning policy is now set by the National Planning Policy Framework (NPPF). The NPPF places a general presumption in favour of sustainable development, stressing the importance of local development plans. One of its 12 Core Planning Principles states that planning should:

*"contribute to conserving and enhancing the natural environment and reducing pollution", by (paragraph 109) "preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability".*

4.2.2 It goes on to state (paragraphs 120 and 124) that:

*"To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account.*

*Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with local air quality action plans".*

4.2.3 Planning Practice Guidance (PPG) for the NPPF has been issued in respect of Air Quality[5]. It explains 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 an air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife). The steps a local planning authority might take in considering air quality are shown in **Appendix A**.

4.2.4 When deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

- Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;
- Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area;

[5] http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/

- Expose people to existing sources of air pollutants, for example by building new homes, workplaces or other development in places with poor air quality;
- Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations; and
- Affect biodiversity.

4.2.5 The PPG goes on to state that where there are concerns about air quality, the local planning authority may want to know about:

- The 'baseline' local air quality;
- Whether the proposed development could significantly change air quality during the construction and operational phases; and/or
- Whether there is likely to be a significant increase in the number of people exposed to a problem with air quality, such as when new residential properties are proposed in an area known to experience poor air quality.

4.2.6 The PPG advises that air quality assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be location specific and should be agreed between the local planning authority and applicant before it is commissioned.

## 4.3 Local Planning Policy

4.3.1 The South Tyneside Core Strategy was adopted by STC in 2007. Policy EA5 of the Core Strategy states:

*"To complement the regeneration of the Borough, the Council will control new development so that it:*

*A- acts to reduce levels of pollution, environmental risk and nuisance throughout the Borough;*

*B- minimises adverse impacts on the Magnesian Limestone Aquifer and its associated groundwater protection zones;*

*C- focuses the treatment of contaminated and derelict land so as to achieve a balance between: i) the management of risk approach in its Contaminated Land Strategy; and ii) the regeneration of the riverside corridor;*

*D- ensures that the individual and cumulative effects of development do not breach noise, hazardous substances or pollution limits; and*

*E- does not permit unsustainable schemes to be located in those areas of the coast, Tyne corridor and Don Valley where flood risk is unacceptably high."*

# 5 Methodology

## 5.1 Data Sources

5.1.1 The air quality assessment of the proposed development was undertaken with reference to information from a number of sources, as detailed in **Table 2**.

**Table 2: Key Information Sources**

| Data Source | Reference |
|---|---|
| South Tyneside Council (STC) | STC 2016 Air Quality Annual Status Report (ASR) |
| Department for Environment Food and Rural Affairs (Defra) | Defra (2016) *Local Air Quality Management Technical Guidance TG(16)* |
| Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) | EPUK and IAQM (May 2015) Land Use Planning and *Development Control: Planning for Air Quality* |
| Defra's LAQM Support Tools | Local Air Quality Management 1 km x 1 km grid background pollutant maps |
| Institute of Air Quality Management (IAQM) | IAQM (2014) Assessment of Dust from Demolition and Construction |

## 5.2 Consultation

5.2.1 Consultation in respect of the scope of this assessment and the methodology to be used was undertaken with Samantha Jobson at STC. Samantha confirmed that the proposed methodology was suitable[6]. It was agreed that both a construction phase assessment and an assessment of road traffic emissions across the site would be undertaken for the proposed development. The types of assessments to be undertaken, meteorological data to be used, assessment roads, approach to verification and baseline data sources were also agreed and are detailed in the following sections.

[6] Email Miller Goodall Ltd. to Samantha Jobson (STC) 7 February 2017. Emails Samantha Jobson (STC) to Miller Goodall Ltd. on 9 February 2017.

## 5.3 Baseline Air Quality Conditions.

5.3.1 STC has published a series of air quality Review and Assessment documents in accordance with the local air quality management (LAQM) process. The STC 2016 ASR, was obtained and reviewed in order to establish the existing conditions at, and in proximity to, the site.

## 5.4 Road Traffic Emissions Assessment

*Air Dispersion Model*

5.4.1 The Atmospheric Dispersion Modelling System for Roads (ADMS-Roads) v4.0.1.0 was used to assess the local air quality impact of development-generated vehicle exhaust emissions, on concentrations of $NO_2$ and $PM_{10}$, at existing receptors located adjacent to the assessed road network, and to assess the suitability of the site for residential use.

5.4.2 The ADMS-Roads model is a comprehensive tool for investigating air pollution in relation to road networks. The model uses algorithms for the height-dependence of wind speed, turbulence and stability to produce improved predictions. It can predict long-term and short-term concentrations, as well as calculations of percentile concentrations.

5.4.3 The ADMS-Roads model has been comprehensively validated in a large number of studies by the software manufacturer CERC (Cambridge Environmental Research Consultants). This includes comparisons with data from the UK's Automatic Urban Network (AUN) and specific validation exercises using standard field, laboratory and numerical data sets. CERC is also involved in European programmes on model harmonisation, and their models have been compared favourably against other EU and US EPA systems. Further information in relation to this is available from the CERC web site at www.cerc.co.uk.

*Assessment Scenarios*

5.4.4 The assessment considered the following scenarios:

- Scenario 1: 2015 - base year;
- Scenario 2: 2018 - opening year ‘without development’;
- Scenario 3: 2018- opening year ‘with development’;

*Traffic Data*

5.4.5 24 hour annual average daily traffic (AADT) flow data are required for input into the air quality assessment. Traffic data was provided by SK Transport Planning Ltd (the transport consultants for the project), for use in the assessment.

5.4.6 The spatial scope for the assessment focused on those routes affected by the proposed development. The study area therefore included the following road links:

- A194 Newcastle Road;
- A1300 John Reid Road;
- A194 Leam Lane;
- A19;
- Kirkstone Avenue;

- Hedworth Lane; and
- Auckland Terrace.

5.4.7 The traffic data used in the assessment are detailed in **Appendix B**.

5.4.8 Vehicles within the study area were assumed to travel at the speed limit on roads apart from the approach to junctions and roundabouts where queuing traffic sections were included in the model at 5 kph where appropriate, in accordance with Defra guidance (Defra, 2016).

*Meteorological Data*

5.4.9 Meteorological data for 2015 from the Newcastle Airport recording station was used in the ADMS-Roads model. This is the most representative recording station for the development site.

*Model Verification*

5.4.10 Model verification is the process of adjusting model outputs to improve the consistency of modelling results with respect to available monitored data. In this study, model uncertainty was minimised following Defra and EPUK guidance. The verification of the ADMS model output was achieved by modelling concentrations at existing monitoring locations within the study area and comparing the modelled concentration with measured concentrations.

*Sensitive Receptors*

5.4.11 Sensitive receptor locations were selected based on their proximity to road links affected by the proposed development, where the potential effect of development-related traffic emissions on local air pollution would be most significant.

5.4.12 Onsite sensitive receptor locations were selected based on the proposed site layout shown in the masterplan.

*Conversion of NOx to $NO_2$*

5.4.13 Oxides of nitrogen ($NO_x$) concentrations were predicted using the ADMS-Roads model. The modelled road contribution of $NO_x$ at the identified receptor locations was then converted to $NO_2$ using the $NO_x$ to $NO_2$ calculator (v5.1, 2016)[7] in accordance with Defra guidance[1].

*Emission Factors*

5.4.14 DEFRA's Emission Factor Toolkit (EFT), which is used within the ADMS model to predict emissions from road vehicles, was updated in August 2016 to version V7.0. There appears to be large uncertainty over the accuracy of these emission factors, and in general, they are reported to under predict emissions from vehicles more than the previous emissions factors within the previous version of EFT (for example V6.02).

5.4.15 To overcome this issue, the Air Quality Consultants CURED V2A spreadsheet was used to calculate vehicle emissions. CURED V2A uses the same information on vehicle fleet compositions as EFT V7.0. It also uses

[7] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

same shaped speed-emissions curves as EFT V7.0; albeit that these have been uplifted to give higher predicted emissions of $NO_x$. The emissions output from CURED V2A were utilised within the ADMS model.

*Background Concentrations*

5.4.16 The ADMS model requires the derivation of background pollutant concentration data that are factored to the year of assessment, to which the model adds contributions from the assessed roads.

5.4.17 There are no background monitoring locations in the vicinity of the proposed development and receptor locations, therefore background $NO_x$, $NO_2$ and $PM_{10}$ concentrations were obtained from the Defra LAQM support tools for the 1 km x 1 km grid squares covering the proposed development site and receptor locations for the years of assessment (2015 and 2018).

*Assessment Significance Criteria*

5.4.18 Guidance is provided by EPUK and IAQM on criteria for determining the significance of a developments impact on local air quality[8]. **Table 3** details the impact descriptors used for individual receptors in relation to annual mean pollutant concentrations. The overall significance of impacts was determined using professional judgement.

**Table 3: Impact descriptors for individual receptors**

| Long term average Concentration at receptor in assessment year | % 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 |

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

[8] EPUK (May 2015) Land Use Planning and Development Control: *Planning for Air Quality*

# 6 Baseline Air Quality

## 6.1 Local Air Quality Management

6.1.1 There are several locations along major roads within the South Tyneside area where air quality does not meet the national objectives that aim to protect people's health and the environment. STC have two air quality management areas (AQMAs) which were declared in 2006. The first AQMA encompasses parts of Bolden Lane and Stanhope Rd in South Shields. The second AQMA encompasses sections of Leam Lane, either side of Lindisfarne Roundabout and the A19 also either side of the roundabout. The development site lies adjacent to the second AQMA. The location of the AQMA is shown in **Appendix C.**

6.1.2 The 2016 ASR concluded that STC will continue to monitor $NO_2$ and $PM_{10}$ levels across South Tyneside. Consideration will be given to revoking both AQMAs if $NO_2$ levels continue to meet the national objectives.

## 6.2 Air Quality Monitoring

*Nitrogen Dioxide ($NO_2$)*

6.2.1 STC undertake diffusion tube monitoring of $NO_2$ across its authority. There are a number of diffusion tubes within the study area. The locations and results of these tubes are shown in **Appendix C** and **Table 4** below. Three of these tubes (Tube 17,18 and 19) is co-located with an automatic monitor, also shown in **Appendix C** and **Table 4**, however, the automatic monitor does not have results for 2015.

**Table 4: Annual Mean $NO_2$ Concentrations From Diffusion Tube Monitoring Sites Within The Study Area.**

| Site ID and Type | Location | | Annual Mean $NO_2$ Concentrations (µg/m$^3$) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2011 | 2012 | 2013 | 2014 | 2015 |
| Tube 12 (Roadside) | 433716 | 563540 | 27.03 | 30.48 | 37.33 | 30.43 | 32.50 |
| Tube 13 (Roadside) | 433708 | 563805 | 22.99 | 20.07 | 35.88 | 25.73 | 30.15 |
| Tube 17 (Roadside) *co-located with CM2* | 434068 | 563695 | 21.15 | 20.62 | 34.95 | 24.01 | 26.20 |
| Tube 18 (Roadside) *co-located with CM2* | 434068 | 563695 | 22.71 | 23.49 | 32.98 | 27.21 | 27.08 |
| Tube 19 (Roadside) *co-located with CM2* | 434068 | 563695 | 19.59 | 20.86 | 35.25 | 30.22 | 28.02 |
| Tube 21 (Roadside) | 434313 | 563963 | 34.21 | 32.56 | 32.80 | 34.84 | 32.30 |
| Tube 22 (Roadside) | 434402 | 563976 | 30.30 | 30.71 | 34.14 | 26.97 | 29.19 |
| Tube 16 (Urban Background) | 433471 | 563393 | 20.49 | 19.82 | 22.80 | 24.88 | 26.20 |
| CM2 (Automatic Monitor) | 434068 | 563695 | - | 27.2 | - | 25.5 | - |
| **Annual Mean $NO_2$ air quality objective** | | | | | **40 µg/m$^3$** | | |

6.2.2 The monitoring results in **Table 4** indicate that annual mean concentrations of $NO_2$ have not been close to the $NO_2$ annual mean objective at any of these monitoring sites since 2011. The results also indicate that the short term objective for $NO_2$ is unlikely to be exceeded at the monitoring sites as annual mean concentrations are less than 60 µgm$^3$ [1]. Additionally, available data[9] shows that there were no hourly mean $NO_2$ exceedances observed at the automatic station.

*Particulate Matter ($PM_{10}$)*

6.2.3 STC undertakes monitoring of $PM_{10}$ the automatic monitoring station, CM2. The monitoring results are shown in **Table 5** and the location in **Appendix C.**

**Table 5: Annual Mean $PM_{10}$ Monitoring Data from the nearest Automatic Monitoring Site to the Study Area**

| Site ID and Type | Location | | Annual Mean $PM_{10}$ Concentrations (µg/m$^3$) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2011 | 2012 | 2013 | 2014 | 2015 |
| CM2 (Automatic Monitor) | 434068 | 563695 | 19.98 | - | 18.9 | 16.8 | - |
| **Annual Mean $PM_{10}$ air quality objective** | | | **40 µg/m$^3$** | | | | |

6.2.4 The results in **Table 5** indicate that concentrations of $PM_{10}$ have not been close to the annual mean objective since 2011. Available data[9] shows that there are no daily mean exceedances of the $PM_{10}$ objective.

## 6.3 Background Concentrations

6.3.1 There is one urban background monitoring location within the vicinity of the site, Tube 16, as shown in **Table 4.** This tube is, however, heavily influenced by road traffic emissions due to its location, as it only lies approximately 20m from the A194. This is shown in **Table 4** where the measured concentrations at Tube 16 are not much lower than roadside diffusion tube locations. Background concentrations of $NO_x$, $NO_2$ and $PM_{10}$ were therefore obtained from the background concentration maps provided by Defra for the grid squares covering the proposed development and receptor locations[10]. These are shown in **Table 6** below.

**Table 6: Background Pollutant Concentrations Obtained for the 1km x 1km Grid Squares Covering the Site and Receptor Locations***

| Receptor | Grid Square | Pollutant | 2015 (µg/m$^3$) | 2018 (µg/m$^3$) |
|---|---|---|---|---|
| R1,R2,R3,R4,R5,R6,R7,R12<br>Tube 12, Tube 13 | 433500,563500 | $NO_x$ | 27.3 | 23.1 |
| | | $NO_2$ | 18.9 | 16.3 |
| | | $PM_{10}$ | 14.1 | 13.8 |
| R8,R9,R10,R11<br>Tube 17, Tube 18, Tube 19, Tube 21, Tube 22 | 434500,563500 | $NO_x$ | 25.8 | 22.2 |
| | | $NO_2$ | 18.0 | 15.7 |
| | | $PM_{10}$ | 13.5 | 13.2 |

[9] Data provided by Samantha Jobson at STC

[10] http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013

** Background concentrations obtained from the latest 2013 based background maps*

## 6.4 Existing Receptor Locations

6.4.1 Existing sensitive receptor locations were identified within the study area for consideration in the assessment. Predicted changes in $NO_2$ and $PM_{10}$ concentrations, as a result of development-generated traffic, were calculated at these locations. The sensitive receptor locations are detailed in **Table 7** and **Appendix D**.

**Table 7: Sensitive Receptor Locations**

| Receptor | Grid Ref | |
|---|---|---|
| R1 | 433947 | 563156 |
| R2 | 433918 | 563318 |
| R3 | 433892 | 563462 |
| R4 | 433922 | 563539 |
| R5 | 433820 | 563630 |
| R6 | 433741 | 563615 |
| R7 | 433778 | 563735 |
| R8 | 434192 | 563751 |
| R9 | 434308 | 563851 |
| R10 | 434194 | 563893 |
| R11 | 434170 | 563880 |
| R12 | 433502 | 563327 |
| R13 | 433758 | 563469 |

## 6.5 Proposed Receptor Locations

6.5.1 Three proposed residential receptor locations were considered within the development site. $NO_2$ and $PM_{10}$ concentrations were calculated at these locations to determine whether future site users may be exposed to elevated pollutant levels. These receptor locations were chosen as worst case scenario due to being on the eastern section of the site, therefore, closest to the A19. **Table 8** below and **Appendix D** shows the locations.

**Table 8: Proposed Receptor Locations**

| Receptor | Grid Ref | |
|---|---|---|
| OS1 | 433750 | 563360 |
| OS2 | 433774 | 563308 |
| OS3 | 433787 | 563248 |

## 6.6 Summary of Existing Air Quality

6.6.1 The development site is located adjacent to an AQMA. Available monitoring data within the study area indicates that annual mean concentrations of $NO_2$ and $PM_{10}$ are not close to the annual mean objective within the study area. It is also unlikely that the short term objectives are being exceeded.

# 7 Model Verification

7.1 Monitoring is undertaken by STC at a number of monitoring sites within the study area using a number diffusion tubes as shown in **Appendix C**. Concentrations of $NO_2$ at seven of these sites were predicted for use in the verification process as detailed in **Table 9**.

7.2 A comparison of modelled total $NO_2$ and monitored total $NO_2$ suggests that the adjusted model is performing well, as the difference between modelled and monitored concentrations are within 15% of each other, with the majority of results are within 7.2% of each other.

7.3 LAQM TG(16) states that a model does not necessarily need adjusting if:

- there is no systematic under or over prediction;
- predictions at sites where monitoring shows concentrations are close to the objective show good comparison; and
- the majority of results are within 25% (as a minimum - preferably within 10%) of monitored concentrations.

7.4 The model has not, therefore, been adjusted in this instance.

7.5 There is no $PM_{10}$ monitoring undertaken in 2015 within the study area, therefore it was not possible to undertake verification of $PM_{10}$ concentrations.

**Table 9: $NO_2$ Model Verification Procedure**

| Monitor | 2015 Monitored Total $NO_2$ | 2015 Monitored Road NOx | 2015 Background $NO_2$ | 2015 Background NOx | Monitored Road Contribution $NO_2$ (total - background) | Monitored Road Contribution NOx (total - background) | Modelled Road Contribution NOx (excludes background) | Ratio of Monitored Road Contribution NOx / Modelled Road Contribution NOx | Adjustment Factor | Adjusted Road Contribution NOx | Adjusted Modelled Total NOx (including background NOx) | Modelled Total $NO_2$ (based on empirical NOx / $NO_2$ relationship) | Monitored Total $NO_2$ | % Difference [(modelled - monitored) / monitored] x 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tube 12 | 32.5 | 34.5 | 15.7 | 22.2 | 16.8 | 34.5 | 45.09 | 0.8 | 1.00 | 45.1 | 67.3 | 37.14 | 32.5 | 14.3 |
| Tube 13 | 30.2 | 29.3 | 15.7 | 22.2 | 14.5 | 29.3 | 20.29 | 1.4 | 1.00 | 20.3 | 42.5 | 25.93 | 30.2 | -14.0 |
| Tube 19 | 28.0 | 23.3 | 16.4 | 23.3 | 11.6 | 23.3 | 19.14 | 1.2 | 1.00 | 19.1 | 42.4 | 26.04 | 28.0 | -7.1 |
| Tube 21 | 32.3 | 32.6 | 16.4 | 23.3 | 15.9 | 32.6 | 34.80 | 0.9 | 1.00 | 34.8 | 58.1 | 33.3 | 32.3 | 3.1 |
| Tube 22 | 29.2 | 25.8 | 16.4 | 23.3 | 12.8 | 25.8 | 21.96 | 1.2 | 1.00 | 22.0 | 45.3 | 27.39 | 29.2 | -6.2 |
| Tube 17 | 26.2 | 19.5 | 16.4 | 23.3 | 9.8 | 19.5 | 19.14 | 1.0 | 1.00 | 19.1 | 42.4 | 26.04 | 26.2 | -0.6 |
| Tube 18 | 27.1 | 21.3 | 16.4 | 23.3 | 10.7 | 21.3 | 19.14 | 1.1 | 1.00 | 19.1 | 42.4 | 26.04 | 27.1 | -3.8 |

# 8 Baseline Assessment

8.1 The ADMS model was used to estimate contributions of vehicle exhaust emissions to annual and short term $NO_2$ and $PM_{10}$ concentrations for the '*baseline*' and '*without development'* scenarios considered in the assessment.

8.2 The 24 hour AADT flows used in the assessment for *'without development'* scenarios are detailed in **Appendix B. Table 10** details the results of the baseline assessment.

8.3 The baseline air quality assessment for the base year (2015) and opening year *'without development' (*2018) scenarios show that concentrations of $NO_2$ and $PM_{10}$ are below the respective annual mean air quality Objective of 40 µg/m$^3$ at all receptors for all '*without development'* scenarios, except at R5 in 2015, where the $NO_2$ air quality objective is exceeded. The objective is not, however, predicted to be exceeded at this location in 2018.

8.4 In accordance with Defra guidance[1], it may be assumed that exceedences of the 1-hour mean Objective for $NO_2$ are unlikely as the predicted annual mean concentrations are less than 60 µg/m$^3$. The short term $PM_{10}$ Objective is predicted to be met at all identified receptor locations with no exceedences of the daily mean Objective of 50 µg/m$^3$.

**Table 10: Predicted Baseline $NO_2$ and $PM_{10}$ Annual Mean Concentrations (µg/m$^3$) at Sensitive Receptor Locations**

| Receptor | Receptor Height above Ground Level (m) | Scenario 1: Base Year (2015) | | Scenario 2: Without Development (2018) | |
|---|---|---|---|---|---|
| | | $NO_2$ (µg/m$^3$) | $PM_{10}$ (µg/m$^3$) | $NO_2$ (µg/m$^3$) | $PM_{10}$ (µg/m$^3$) |
| T12 | 2.4 | 37.14 | 16.21 | 31.54 | 15.72 |
| T13 | 2.2 | 25.93 | 15.55 | 22.22 | 15.15 |
| T17/T18/T19 | 2.9 | 26.04 | 14.71 | 22.42 | 15.53 |
| T21 | 2.4 | 33.30 | 15.17 | 28.61 | 15.92 |
| T22 | 2.4 | 27.39 | 14.77 | 23.63 | 15.58 |
| R1 | 1.5 | 25.36 | 15.59 | 21.78 | 15.21 |
| R2 | 1.5 | 23.80 | 15.30 | 20.47 | 14.94 |
| R3 | 1.5 | 24.96 | 15.33 | 21.40 | 14.95 |
| R4 | 1.5 | 24.91 | 15.20 | 21.34 | 14.82 |
| R5 | 1.5 | **41.68** | 17.26 | 35.54 | 16.72 |
| R6 | 1.5 | 31.23 | 15.98 | 26.53 | 15.54 |
| R7 | 1.5 | 33.05 | 16.58 | 28.29 | 16.12 |
| R8 | 1.5 | 24.21 | 14.40 | 20.89 | 15.23 |
| R9 | 1.5 | 26.07 | 14.60 | 22.55 | 15.42 |
| R10 | 1.5 | 30.71 | 15.12 | 26.38 | 15.90 |

| Receptor | Receptor Height above Ground Level (m) | Scenario 1: Base Year (2015) | | Scenario 2: Without Development (2018) | |
|---|---|---|---|---|---|
| | | $NO_2$ (µg/m³) | $PM_{10}$ (µg/m³) | $NO_2$ (µg/m³) | $PM_{10}$ (µg/m³) |
| R11 | 1.5 | 27.97 | 14.80 | 19.43 | 14.60 |
| R12 | 1.5 | 22.30 | 14.96 | 23.83 | 15.01 |
| R13 | 1.5 | 27.96 | 15.42 | 19.43 | 14.60 |
| **Annual Mean $NO_2$ & $PM_{10}$ Air Quality Objective** | | | | **40 (µg/m³)** | |

# 9 Road Traffic Impact Assessment

*Existing Receptors*

9.1 Predicted $NO_2$ and $PM_{10}$ concentrations for the opening year (2018) *'with development'* scenario are detailed in **Table 11**. Predicted concentrations for *'without development'* scenario and the predicted change in $NO_2$, and $PM_{10}$ concentrations, as a result of the proposed development, are also shown for comparison purposes.

9.2 Changes in predicted pollutant concentrations between the without development scenario and the with development scenario were compared to the significance criteria detailed in EPUK and IAQM guidance[8] and contained within **Table 3** above.

9.3 All receptors are expected to have an increase of less than 0.08 µg/m³ for both $NO_2$ and $PM_{10}$.

9.4 The results of the ADMS modelling assessment for 2018 indicate that annual mean concentrations of $NO_2$ and $PM_{10}$ would be below the respective annual objectives in 2018, at all existing sensitive receptor locations within the study area, both '*with*' and '*without*' the development.

9.5 In accordance with Defra guidance[1], it may be assumed that exceedances of the 1-hour mean objective for $NO_2$ are unlikely as the predicted annual mean concentrations are less than 60 µg/m³. The 24 hour $PM_{10}$ objective of 50 µg/m³ is predicted to be met at all modelled locations.

**Table 11: Dispersion Modelling Results and Significance of Development for the Opening Year (2018) Scenario at Existing Receptor Locations**

| Receptor name | Difference in opening year without and with development | Annual average $NO_2$ (µg/m³) | Significance | Annual average $PM_{10}$ (µg/m³) | Significance |
|---|---|---|---|---|---|
| T12 | Without Development | 31.48 | Negligible | 15.72 | Negligible |
| | With Development | 31.54 | | 15.72 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.06) | | 0 (+0.00) | |
| | % of AQAL with Development | 79 | | 39 | |
| T13 | Without Development | 22.21 | Negligible | 15.15 | Negligible |
| | With Development | 22.22 | | 15.15 | |

| Receptor name | Difference in opening year without and with development | Annual average $NO_2$ (µg/m³) | Significance | Annual average $PM_{10}$ (µg/m³) | Significance |
|---|---|---|---|---|---|
| | % Change relative to AQAL & (Impact) | 0 (+0.01) | | 0 (+0.00) | |
| | % of AQAL with Development | 56 | | 38 | |
| T17 T18 T19 | Without Development | 22.39 | Negligible | 14.33 | Negligible |
| | With Development | 22.42 | | 14.33 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.03) | | 0 (+0.00) | |
| | % of AQAL with Development | 56 | | 36 | |
| T21 | Without Development | 28.56 | Negligible | 14.72 | Negligible |
| | With Development | 28.61 | | 14.72 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.05) | | 0 (+0.00) | |
| | % of AQAL with Development | 72 | | 37 | |
| T22 | Without Development | 23.59 | Negligible | 14.38 | Negligible |
| | With Development | 23.63 | | 14.38 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.04) | | 0 (+0.00) | |
| | % of AQAL with Development | 59 | | 36 | |
| R1 | Without Development | 21.74 | Negligible | 15.20 | Negligible |
| | With Development | 21.78 | | 15.21 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.04) | | 0 (+0.01) | |
| | % of AQAL with Development | 54 | | 38 | |
| R2 | Without Development | 20.44 | Negligible | 14.93 | Negligible |
| | With Development | 20.47 | | 14.94 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.03) | | 0 (+0.01) | |
| | % of AQAL with Development | 51 | | 37 | |
| R3 | Without Development | 21.37 | Negligible | 14.95 | Negligible |
| | With Development | 21.40 | | 14.95 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.03) | | 0 (+0.00) | |
| | % of AQAL with Development | 54 | | 37 | |
| R4 | Without Development | 21.31 | Negligible | 14.81 | Negligible |
| | With Development | 21.34 | | 14.82 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.03) | | 0 (+0.01) | |
| | % of AQAL with Development | 53 | | 37 | |
| R5 | Without Development | 35.47 | Negligible | 16.71 | Negligible |
| | With Development | 35.54 | | 16.72 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.07) | | 0 (+0.01) | |
| | % of AQAL with Development | 89 | | 42 | |
| R6 | Without Development | 26.50 | Negligible | 15.53 | Negligible |
| | With Development | 26.53 | | 15.54 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.03) | | 0 (+0.01) | |

| Receptor name | Difference in opening year without and with development | Annual average $NO_2$ (µg/m³) | Significance | Annual average $PM_{10}$ (µg/m³) | Significance |
|---|---|---|---|---|---|
| | % of AQAL with Development | 66 | | 39 | |
| R7 | Without Development | 28.27 | Negligible | 16.11 | Negligible |
| | With Development | 28.29 | | 16.12 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.02) | | 0 (+0.01) | |
| | % of AQAL with Development | 71 | | 40 | |
| R8 | Without Development | 20.87 | Negligible | 14.03 | Negligible |
| | With Development | 20.89 | | 14.03 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.02) | | 0 (+0.00) | |
| | % of AQAL with Development | 52 | | 35 | |
| R9 | Without Development | 22.54 | Negligible | 14.22 | Negligible |
| | With Development | 22.55 | | 14.22 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.01) | | 0 (+0.00) | |
| | % of AQAL with Development | 56 | | 36 | |
| R10 | Without Development | 26.36 | Negligible | 14.70 | Negligible |
| | With Development | 26.38 | | 14.70 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.02) | | 0 (+0.00) | |
| | % of AQAL with Development | 66 | | 37 | |
| R11 | Without Development | 24.04 | Negligible | 14.40 | Negligible |
| | With Development | 24.06 | | 14.41 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.02) | | 0 (+0.01) | |
| | % of AQAL with Development | 60 | | 36 | |
| R12 | Without Development | 19.37 | Negligible | 14.59 | Negligible |
| | With Development | 19.43 | | 14.60 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.06) | | 0 (+0.01) | |
| | % of AQAL with Development | 49 | | 37 | |
| R13 | Without Development | 23.77 | Negligible | 15.00 | Negligible |
| | With Development | 23.83 | | 15.01 | |
| | % Change relative to AQAL & (Impact) | 0 (+0.06) | | 0 (+0.01) | |
| | % of AQAL with Development | 60 | | 38 | |
| **AQAL: Annual Mean $NO_2$ & $PM_{10}$ Air Quality Objective (µg/m³)** | | | | **40** | |

9.6 Predicted annual mean $NO_2$ and $PM_{10}$ concentrations in the '*with development*' scenario are all 90% or less of the AQAL. It is likely that concentrations predicted at individual receptor locations are also worst case scenario as they have been chosen due to being close to the main junctions used by the development. The proposed development is therefore predicted to have a ***negligible*** impact on concentrations of $NO_2$ and $PM_{10}$ in 2018.

*Proposed Receptors*

9.7 Predicted $NO_2$ and $PM_{10}$ concentrations for the assessment years (2018) '*with development*' scenario at proposed receptor locations are detailed in **Table 12.**

**Table 12: Predicted Annual Mean Pollutant Concentrations for 2018 at Proposed Receptor Locations**

| Receptor | Receptor Height above Ground Level (m) | 2018 With Development ($\mu g/m^3$) | |
|---|---|---|---|
| | | $NO_2$ | $PM_{10}$ |
| On Site 1 | 1.5 | 17.06 | 14.27 |
| On Site 2 | 1.5 | 16.53 | 14.22 |
| On Site 3 | 1.5 | 16.05 | 14.15 |
| **Annual Mean $NO_2$ & $PM_{10}$ Air Quality Objective ($\mu g/m^3$)** | | **40 $\mu g/m^3$** | |

9.8 The results of the dispersion modelling assessment indicate that annual mean concentrations of $NO_2$ and $PM_{10}$ would be well below the respective objectives in 2018 at proposed residential receptors once the development is operational.

9.9 All predicted $NO_2$ concentrations are well below 60 $\mu g/m^3$ and therefore, in accordance with guidance in LAQM.TG (16), the 1-hour mean objective is unlikely to be exceeded. The short term $PM_{10}$ objective is predicted to be met at all proposed receptor locations with no exceedances of the daily mean objective of 50 $\mu g/m^3$.

9.10 Concentrations of $NO_2$ and $PM_{10}$ are predicted to be well below the respective annual mean and short term objectives in 2018 at proposed residential receptors, the site is therefore considered suitable for residential use with regards to air quality.

# 10 Road Traffic Mitigation Measures

10.1 The detailed air dispersion modelling undertaken indicates that vehicle exhaust emissions associated with traffic generated by the development will have a negligible impact on local air quality at all receptor locations. Annual mean concentrations of $NO_2$ and $PM_{10}$ are predicted to be below the respective objectives in 2018 at proposed residential receptors. No specific mitigation is therefore proposed.

# 11 Dust Risk Assessment Methodology

11.1 The following section outlines criteria developed by the IAQM for the assessment of air quality impacts arising from construction and demolition activities[11]. The assessment procedure is divided into four steps and is summarised below:

*Step 1: Screen the Need for a Detailed Assessment*

11.2 An assessment will normally be required where there are human receptors within 350 m of the site boundary and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s). 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 500 m from the site entrance(s), are also identified at this stage. An ecological receptor refers to any sensitive habitat affected by dust soiling. For locations with a statutory designation, such as a Site of Specific Scientific Interest (SSSI), Special Area of Conservation (SACs) and Special Protection Areas (SPAs), consideration should be given as to whether the particular site is sensitive to dust. Some non-statutory sites may also be considered if appropriate.

11.3 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is 'negligible' and any effects will not be significant.

*Step 2: Assess the Risk of Dust Impacts*

11.4 In step two, a site is allocated to a risk category on the basis of the scale and nature of the works (Step 2A) and the sensitivity of the area to dust impacts (Step 2B). These two factors are combined in Step 2C to determine the risk of dust impacts before the implementation of mitigation measures. The assigned risk categories may be different for each of the construction activities outlined by the IAQM (construction, demolition, earthworks and trackout). A site can be divided into zones, for example on a large site where there are differing distances to the nearest receptors.

*Step 2A: Define the Potential Dust Emission Magnitude*

11.5 Dust emission magnitude is based on the scale of the anticipated works and is classified as Small, Medium or Large. The IAQM guidance recommends that the dust emission magnitude is determined separately for demolition, earthworks, construction and trackout. **Table 13** describes the potential dust emission class criteria for each outlined activity.

**Table 13: Criteria Used in the Determination of Dust Emission Magnitude**

| Activity | Criteria used to Determine Dust Emission Magnitude | | |
|---|---|---|---|
| | Small | Medium | Large |
| Demolition | Total building volume <20,000 $m^3$, construction materials with low potential for dust release. | Total building volume 20,000 $m^3$ – 50,000 $m^3$, potential dusty construction material. | Total building volume >50,000 $m^3$, potentially dusty construction material. |
| Earthworks | Total site area <2,500 $m^2$, soil type with large grain | Total site area 2,500 – 10,000 $m^2$, moderately dusty soil type | Total site area >10,000 $m^2$, potentially dusty soil type |

[11] IAQM "Assessment of dust from demolition and construction" 2014

| Activity | Criteria used to Determine Dust Emission Magnitude | | |
|---|---|---|---|
| | Small | Medium | Large |
| Construction | Total building volume <25,000 m³. | Total building volume 25,000 – 100,000 m³. | Total building volume >100,000 m³. |
| Trackout | <10 outward HDV trips in any one day.<br>Unpaved road length <50 m. | 10-50 outward HDV trips in any one day.<br>Unpaved road length 50-100 m. | >50 outward HDV trips in any one day.<br>Unpaved road length >100 m. |

*Step 2B: Define the Sensitivity of the Area*

11.6 The sensitivity of the area takes into account the following factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of receptors;
- the local background $PM_{10}$ concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of windblown dust.

11.7 The criteria detailed in **Table 14** is used to determine the sensitivity of the receptor in relation to dust soiling, health effects and ecological effects.

**Table 14: Criteria for Determining Sensitivity of Receptors**

| Sensitivity of Receptor | Criteria for Determining Sensitivity | | |
|---|---|---|---|
| | Dust Soiling Effects | Health Effects of $PM_{10}$ | Ecological Sites |
| High | Dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms | Residential properties, hospitals, schools and residential care homes | International or national designation *and* the features may be affected by dust soiling |
| Medium | Parks, places of work | Office and shop workers not occupationally exposed to $PM_{10}$ | Presence of an important plant species where dust sensitivity is uncertain or locations with a national designation with features that may be affected by dust deposition |
| Low | Playing fields, farmland, footpaths, short-term car parks and roads | Public footpaths, playing fields, parks and shopping streets | Local designation where features may be affected by dust deposition |

11.8 **Table 15** and **Table 16** are then used to define the sensitivity of the area to dust soiling and human health effects. This should be derived for each of construction, demolition, earthworks and trackout.

**Table 15: Sensitivity of the Area to Dust Soiling Effects on People and Property.**

| Receptor Sensitivity | Number of Receptors | Distance from Source (m)* | | | |
|---|---|---|---|---|---|
| | | <20 | <50 | <100 | <350 |
| High | >100 | High | High | Medium | Low |

| Receptor Sensitivity | Number of Receptors | Distance from Source (m)* | | | |
|---|---|---|---|---|---|
| | | <20 | <50 | <100 | <350 |
| | 10-100 | High | Medium | Low | Low |
| | 1-10 | Medium | Low | Low | Low |
| Medium | >1 | Medium | Low | Low | Low |
| Low | >1 | Low | Low | Low | Low |

*distances considered are to the dust source

**Table 16: Sensitivity of the Area to Human Health Impacts**

| Receptor Sensitivity | Annual Mean $PM_{10}$ Concentrations | Number of Receptors | Distance from the Source (m) | | | | |
|---|---|---|---|---|---|---|---|
| | | | <20 | <50 | <100 | <200 | <350 |
| High | >32 µg/m$^{-}$ | >100 | High | High | High | Medium | Low |
| | | 10-100 | High | High | Medium | Low | Low |
| | | 1-10 | High | Medium | Low | Low | Low |
| | 28-32 µg/m$^3$ | >100 | High | High | Medium | Low | Low |
| | | 10-100 | High | Medium | Low | Low | Low |
| | | 1-10 | High | Medium | Low | Low | Low |
| | 24-28 µg/m$^3$ | >100 | High | Medium | Low | Low | Low |
| | | 10-100 | High | Medium | Low | Low | Low |
| | | 1-10 | Medium | Low | Low | Low | Low |
| | <24 µg/m$^3$ | >100 | Medium | Low | Low | Low | Low |
| | | 10-100 | Low | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low | Low |
| Medium | - | >10 | High | Medium | Low | Low | Low |
| | - | 1-10 | Medium | Low | Low | Low | Low |
| Low | - | >1 | Low | Low | Low | Low | Low |

11.9 The sensitivity of the area is then summarised.

*Step 2C Define the Risks of Impacts*

11.10 The dust emission magnitude from Table 13 and sensitivity of the area and receptors from Table 14, Table 15 and Table 16 are combined, and the risk of impacts from each activity (demolition, earthworks, construction and trackout) before mitigation is applied, is determined using the criteria detailed in Table 17 to Table 20.

**Table 17: Risk of Dust Impacts - Demolition**

| Potential Impact Sensitivity of the 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 |

**Table 18: Risk of Dust Impacts- Earthworks**

| Potential Impact Sensitivity of the 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 |

**Table 19: Risk of Dust Impacts- Construction**

| Potential Impact Sensitivity of the 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 |

**Table 20: Risk of Dust Impacts- Trackout**

| Potential Impact Sensitivity of the Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High Risk | Medium Risk | Low Risk |
| Medium | Medium Risk | Low Risk | Low Risk |
| Low | Low Risk | Low Risk | Negligible |

*Step 3 Determine Site Specific Mitigation*

11.11 Step three of the IAQM guidance identifies appropriate site-specific mitigation. These measures are related to whether the site is a low, medium or high risk site.

*Step 4 Determine Significance of Residual Effects*

11.12 At step four the significance of residual effects is assessed. For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

11.13 There may be cases where, for example, there is inadequate access to water for dust suppression to be effective, and even with other mitigation measures in place there may be a significant effect. Therefore, it is important to consider the specific characteristics of the site and the surrounding area to ensure that a conclusion of no significant effect is robust.

# 12 Dust Impact Assessment

## 12.1 Step 1 – The Need for a Detailed Assessment

12.1.1 The site boundary is within 350 m of human receptors. In addition there are human receptors within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance. Therefore, a detailed assessment of the construction phase of the development was undertaken. The detailed assessment has not addressed ecological receptors.

## 12.2 Step 2 – Assess the Risk of Dust Impacts

*Step 2A Dust Emission Magnitude*

12.2.1 The potential dust emission magnitude in relation to the development has been determined using the criteria detailed in **Table 13**:

- Demolition: Not applicable.
- Earthworks: The total site area is 2 500-10 000 $m^2$. The dust emission magnitude for earthworks is, therefore, considered to be **Medium**.
- Construction: The total building volume to be constructed is 25 000 $m^3$-100 000 $m^3$. The dust emission magnitude for construction is, therefore, considered to be **Medium**.
- Trackout: It is conservatively assumed that there are likely to be less than 10 HDV outward movements in any one day. The unpaved road length is likely to be less than 50m. The dust emission magnitude for trackout is, therefore, considered to be **Small.**

12.2.2 The scale and nature of works onsite were considered to determine the potential dust emission magnitude for demolition, earthworks and trackout activities as outlined in **Table 21**.

**Table 21: Dust Emission Magnitudes for Each Activity**

| Activity | Dust Emission Magnitudes | Justification |
|---|---|---|
| Demolition | N/A | • Not applicable |

| | | |
|---|---|---|
| Construction | Medium | • total building volume to be constructed is 25 000 $m^3$ to 100 000 $m^3$ |
| Earthworks | Medium | • the site area is 2 500 -10 000 $m^2$ |
| Trackout | Small | • there are likely to be less than 10 HDV outward movements in any one day |

*Step 2B Sensitivity of the Receptors to Dust Soiling and Health Effects*

12.2.3 Human receptors are located in residential houses adjacent to the site within a distance of 20 m from construction, demolition and earthworks and 20 m of road edges used by traffic associated with the site construction. In accordance with the criteria in **Table 14** and the IAQM guidance, the sensitivity of human receptors to the effects of dust soiling and health effects from construction, demolition, earthwork activities, and from trackout is therefore likely to be **High**.

*Step 2B Sensitivity of the Area to Dust Soiling*

12.2.4 The sensitivity of the area to dust soiling effects has been determined using the criteria detailed in **Table 15**:

- Demolition – not applicable;
- Construction - sensitivity is considered to be **High** as construction activities take place less than 20m of 10-100 high sensitivity receptors;
- Earthworks - sensitivity is considered to be **High** as earthworks activities take place less than 20 m of 10-100 high sensitivity receptors; and
- Trackout activities – sensitivity is considered to be **High** as there are more than 100 high sensitivity receptors within 20 metres of roads which relevant vehicles are likely to use that are up to 500 metres from the site.

*Step 2B Sensitivity of People to the Health Effects of $PM_{10}$*

12.2.5 The modelled $PM_{10}$ concentrations for 2015 and 2018 *'without* development' are shown above in **Table 10 and 11.**

12.2.6 Local levels of $PM_{10}$ are therefore likely to be less than 24 µg/$m^3$ during the construction phase.

12.2.7 Using this information and **Table 16**, the sensitivity of human receptors to health impacts from dust and $PM_{10}$ for each activity were defined as:

- Demolition - not applicable;
- Construction - sensitivity is considered to be **Low** as construction activities take place less than 20 m from 10-100 high sensitivity receptors and the background $PM_{10}$ concentration is predicted to be less than 24 µg/$m^3$;
- Earthworks - sensitivity is considered to be **Low** as earthworks activities take place less than 20 m from 10-100 high sensitivity receptors and the background $PM_{10}$ concentration is predicted to be less than 24 µg/$m^3$;
- Trackout activities – sensitivity is considered to be **Medium** as there are more than 100 high sensitivity receptors within 20 metres of roads which relevant vehicles are likely to use that are up to 500 metres from the site, and the background $PM_{10}$ concentration is predicted to be less than 24 µg/$m^3$.

12.2.8 The sensitivity of the area to dust soiling and human health in each activity is summarised in **Table 22**.

**Table 22: Outcome of Defining the Sensitivity of the Area**

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

*Step 2C Risk of Impacts*

12.2.9 The dust emission magnitude and sensitivity of the area were combined and the risk of impacts determined using the criteria detailed in **Table 17** to **Table 20**.

- Demolition – not applicable;
- Earthworks – is considered to be **Medium** risk for dust soiling and **Low** risk for human health;
- Construction – is considered to be **Medium** risk for dust soiling and **Low** risk for human health; and
- Trackout activities – is considered to be **Low** risk for dust soiling and **Negligible** risk for human health;

12.2.10 A summary of the risks, before mitigation measures are applied, for dust soiling and human health are shown in **Table 23**.

**Table 23: Risk of Dust Impacts**

| Potential Impact | Dust Risk | | | |
|---|---|---|---|---|
| | Demolition | Earthworks | Construction | Trackout |
| **Dust Soiling** | N/A | Medium risk | Medium risk | Low risk |
| **Human Health** | N/A | Low risk | Low risk | Negligible risk |

## 12.3 Step 3 – Site-Specific Mitigation

12.3.1 Step 3 of the IAQM guidance identifies appropriate site-specific mitigation. These measures are related to the site risk for each activity. Good practice mitigation measures highly recommended for the proposed development taken from the IAQM guidance are detailed below.

12.3.2 The general mitigation measures (for site management, preparing and maintaining the site, operating vehicle/machinery, operations and waste management), are appropriate for a site with a ‘medium risk’ classification (in this instance the site is classified as “medium” risk due to earthworks and construction). Mitigation measures specific to earthworks, construction and trackout are proposed based on the risk classifications in **Table 23**.

***Site Management***

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Develop and implement a Dust Management Plan (DMP) which may be part of the CEMP, which may include measures to control other emissions;
- 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;
- 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 regulator when asked;
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked;
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; and
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.

***Preparing and Maintaining the Site***

- Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Consider enclosure of site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Take measures to control site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible;
- Cover, seed or fence stockpiles to prevent wind whipping; and
- Carry out regular dust soiling checks of buildings within 100 m of site boundary and cleaning to be provided if necessary.

***Operating vehicle/machinery and sustainable travel***

- Ensure all non-road mobile machinery (NRMM) comply with the standards set within the IAQM Guidance;
- Ensure all vehicles switch off engines when stationary - no idling vehicles;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable; and
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

***Operations***

- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

***Waste Management***

- Reuse and recycle waste to reduce dust from waste materials; and
- Bonfires and burning of waste materials should not be permitted.

***Measures Specific to Earthworks***

There is a “medium” risk of dust effects associated with earthworks activities onsite, it is therefore ‘highly desirable’ that the following measures are implemented:

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable; and
- Only remove the cover in small areas during work and not all at once.

***Measures Specific to Trackout***

There is a ‘low’ risk of dust effects associated with trackout, it is therefore ‘desirable’ that the following measures are implemented:

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Install a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);

***Measures Specific to Construction***

There is a 'medium' risk of dust effects associated with trackout, it is therefore 'highly desirable' that the following measures are implemented:

- Avoid scabbling (roughening of concrete surfaces) if possible;
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that the appropriate additional control measures are in place;
- 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; and
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

## 12.4 Step 4 – Determine Significant Effects

12.4.1 The characteristics of the site and the surrounding area suggest that mitigation would not be impracticable or ineffective. With the implementation of the above mitigation measures, therefore, the residual impacts from the construction are considered to be not significant, in accordance with IAQM guidance.

# 13 Summary of Impacts and Conclusion

13.1 A road traffic emissions assessment was undertaken to consider the impact of vehicle exhaust emissions associated with the proposed residential development, on identified receptor locations within the study area.

13.2 Annual concentrations of $NO_2$ and $PM_{10}$ were predicted to be well below the respective air quality objectives for both '*without development*' and '*with development*' scenarios in 2018 at all modelled receptor locations. Predicted annual mean $NO_2$ and $PM_{10}$ concentrations in the 'with development' scenario are all less than 90% of the AQAL.

13.3 No exceedance of the short term 1 hour $NO_2$ and 24 hour $PM_{10}$ air quality objectives were predicted at sensitive receptor locations.

13.4 In accordance with EPUK and IAQM guidance on air quality significance criteria, the local air quality impact of emissions from traffic associated with the proposed development on the road network surrounding the site is predicted to be ***negligible***.

13.5 The suitability of the site for residential receptors with regards to air quality was also considered. The results of the dispersion modelling assessment indicate that annual mean and short term concentrations of $NO_2$ and $PM_{10}$ would be below the respective objectives in 2018 at proposed residential receptors with the development in place.

13.6 The assessment also considered whether the proposed development could significantly change air quality during the construction phase. With the implementation of mitigation measures the dust impacts from the construction are considered to be not significant, in accordance with IAQM guidance.

13.7 There is, therefore no reason for this application to be refused on the ground of air quality.

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# APPENDICES

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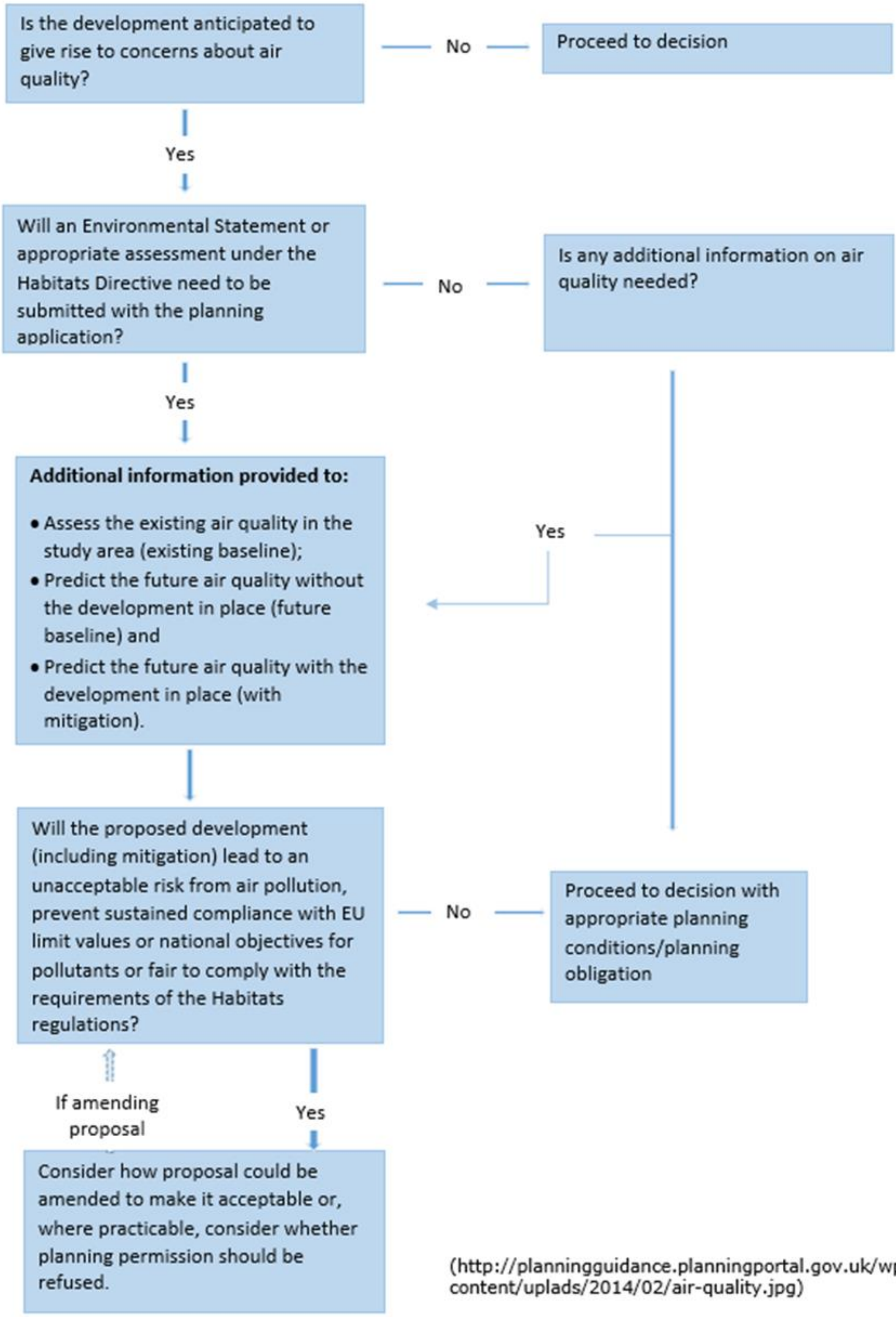
# Appendix A: Planning Practice Guidance

**How considerations about air quality fit into the development management process.**




(http://planningguidance.planningportal.gov.uk/wp-content/uplads/2014/02/air-quality.jpg)

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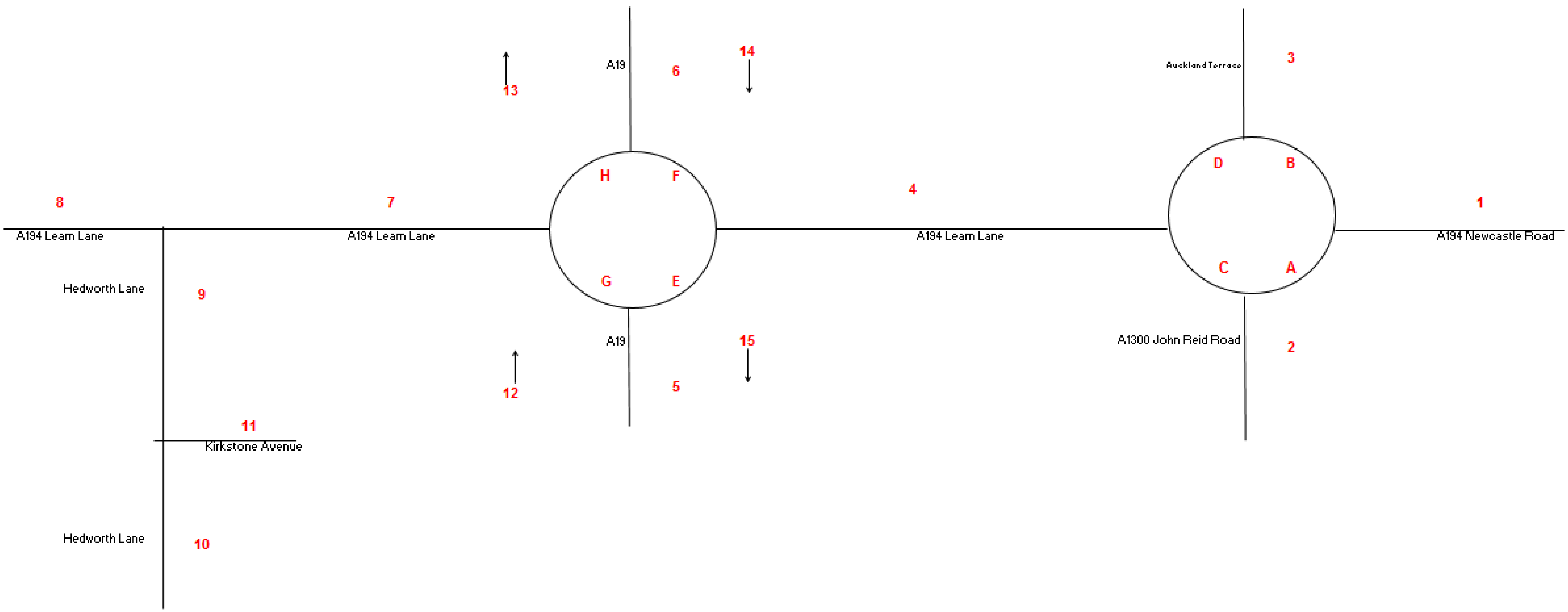
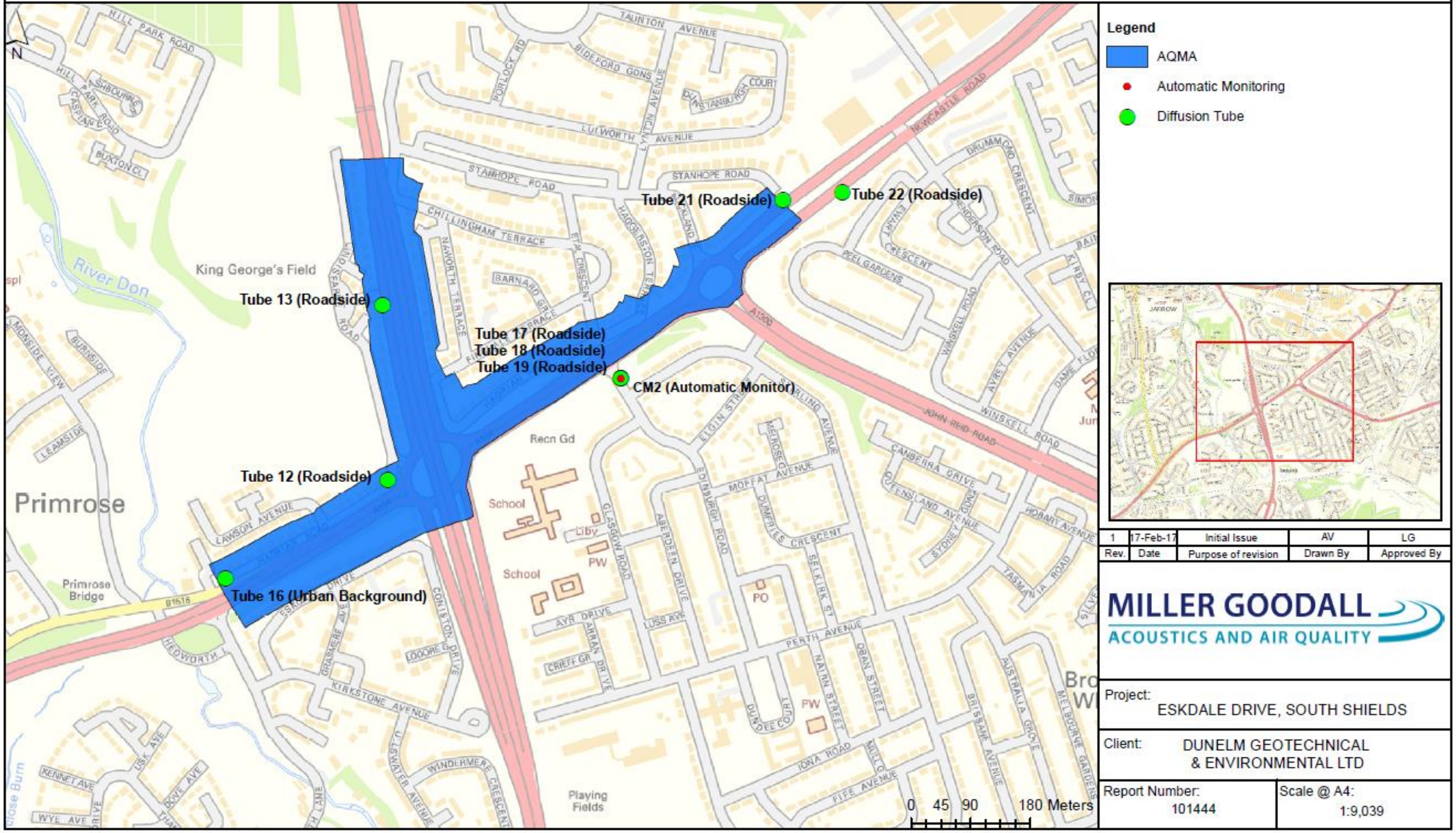
# Appendix B: Traffic Data used in the Air Quality Assessment

| Link ID* | 2015 Baseline | | 2018 Without Development | | 2018 With Development | |
|---|---|---|---|---|---|---|
| | 1 hour LGV | 1 hour HGV | 1 hour LGV | 1 hour HGV | 1 hour LGV | 1 hour HGV |
| **1** | 944 | 47 | 970 | 48 | 971 | 48 |
| **2** | 934 | 17 | 960 | 18 | 961 | 18 |
| **3** | 113 | 7 | 116 | 7 | 116 | 7 |
| **4** | 1824 | 91 | 1873 | 93 | 1876 | 93 |
| **5** | 1442 | 97 | 1482 | 99 | 1488 | 100 |
| **6** | 1145 | 87 | 1176 | 89 | 1182 | 90 |
| **7** | 1518 | 121 | 1559 | 124 | 1565 | 124 |
| **8** | 1497 | 120 | 1538 | 123 | 1544 | 124 |
| **9** | 128 | 10 | 132 | 11 | 143 | 12 |
| **10** | 73 | 6 | 75 | 6 | 82 | 6 |
| **11** | 56 | 4 | 57 | 5 | 76 | 6 |
| **12** | 237 | 13 | 237 | 13 | 238 | 13 |
| **13** | 394 | 30 | 394 | 30 | 394 | 30 |
| **14** | 338 | 26 | 338 | 26 | 339 | 26 |
| **15** | 228 | 12 | 228 | 12 | 229 | 12 |
| **A** | 945 | 48 | 970 | 49 | 972 | 49 |
| **B** | 937 | 47 | 962 | 48 | 963 | 48 |
| **C** | 976 | 34 | 1003 | 35 | 1004 | 35 |
| **D** | 920 | 45 | 945 | 46 | 946 | 46 |
| **E** | 1123 | 87 | 1154 | 89 | 1157 | 89 |
| **F** | 1086 | 76 | 1116 | 78 | 1119 | 78 |
| **G** | 1156 | 64 | 1188 | 66 | 1191 | 66 |
| **H** | 1142 | 79 | 1173 | 82 | 1176 | 82 |

*The locations of these links are shown on the next page


A19
6
14
13
3
Auckland Terrace
D
B
H
F
4
8
7
1
A194 Leam Lane
A194 Leam Lane
A194 Leam Lane
A194 Newcastle Road
C
A
G
E
Hedworth Lane
9
A19
15
A1300 John Reid Road
2
12
5
11
Kirkstone Avenue
Hedworth Lane
10

## APPENDIX C- LOCAL AUTHORITY MONITORING AND AQMA LOCATION



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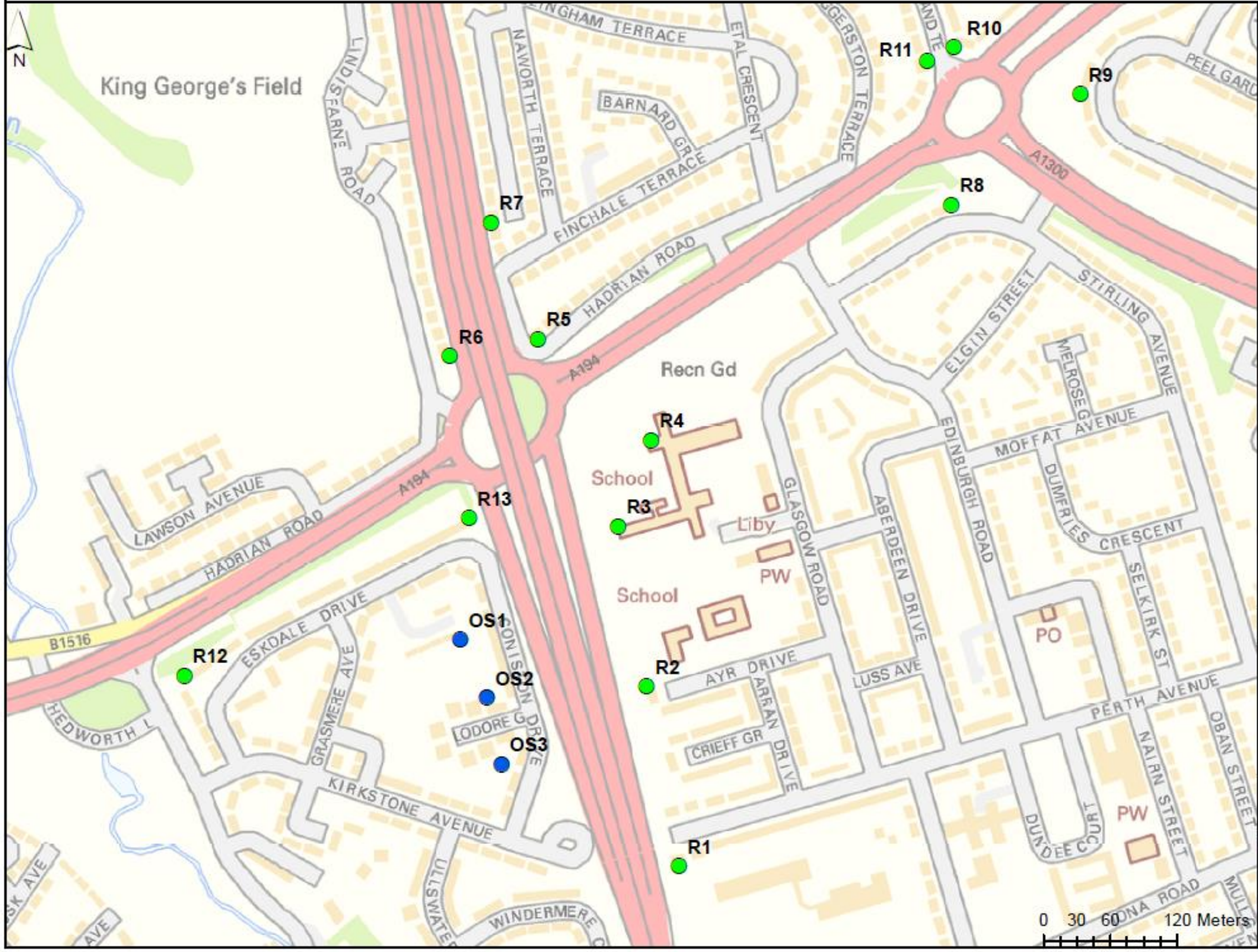
## APPENDIX D- RECEPTOR LOCATIONS




**Legend**

- Existing Receptor Location
- Proposed Receptor

| Rev. | Date | Purpose of revision | Drawn By | Approved By |
|---|---|---|---|---|
| 1 | 14-Feb-17 | Initial Issue | AV | LG |

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Project: ESKDALE DRIVE, SOUTH SHIELDS

Client: DUNELM GEOTECHNICAL & ENVIRONMENTAL LTD

Report Number: 101444

Scale @ A4: 1:6,167

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## Glossary of Terms

**AADT** Annual Average Daily Traffic flow

**Air Quality Standard** Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health and the environment

**Air Quality Objective** Pollutant Objectives incorporate future dates by which a standard is to be achieved, taking into account economic considerations, practicability and technical feasibility

**Annual Mean** A mean pollutant concentration value in air which is calculated on a yearly basis, yielding one annual mean per calendar year. In the UK air quality regulations, the annual mean for a particular substance at a particular location for a particular calendar year is:

(a) in the case of lead, the mean of the daily levels for that year;

(b) in the case of nitrogen dioxide, the mean of the hourly means for that year;

(c) in the case of $PM_{10}$, the mean of the 24-hour means for that year.

**Annoyance (Dust)** Loss of amenity due to dust deposition or visible dust plumes, often related to people making complaints, but not necessarily sufficient to be a legal nuisance.

**AQAP** Air Quality Action Plan

**AQEG** Air Quality Expert Group

**AQMA** Air Quality Management Area

**AQMP** Air Quality Management Plan

**AQO** Air Quality Objective

**AQS** Air Quality Strategy for England, Scotland, Wales and Northern Ireland

**Background Concentrations** The term used to describe pollutant concentrations which exist in the ambient atmosphere, excluding local pollution sources such as roads and stacks

**CO** Carbon monoxide

**Construction** Any activity involved with the provision of a new structure (or structures), its modification or refurbishment. A structure will include a residential dwelling, office building, retail outlet, road, etc.

**Construction Impact Assessment** An assessment of the impacts of demolition, earthworks, construction and trackout. In this Guidance, specifically the air quality impacts.

**Defra** Department for Environment, Food and Rural Affairs

**Demolition** Any activity involved with the removal of an existing structure (or structures). This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time.

**Deposited Dust** that is no longer in the air and which has settled onto a surface. Deposited dust is also sometimes called amenity dust or nuisance dust, with the term nuisance applied in the general sense rather than the specific legal definition.

**DMRB** Design Manual for Roads and Bridges

**DMP** Dust Management Plan; a document that describes the site-specific methods to be used to control dust emissions.

**Dust** Solid particles that are suspended in air, or have settled out onto a surface after having been suspended in air. The terms dust and particulate matter (PM) are often used interchangeably, although in some contexts one term tends to be used in preference to the other. In this guidance the term 'dust' has been used to include the particles that give rise to soiling, and to other human health and ecological effects. Note: this is different to the definition given in BS 6069, where dust refers to particles up to 75 µm in diameter.

**Earthworks** Covers the processes of soil-stripping, ground-levelling, excavation and landscaping.

**Effects** The consequences of the changes in airborne concentration and/or dust deposition for a receptor. These might manifest as annoyance due to soiling, increased morbidity or morality due to exposure to $PM_{10}$ or $PM_{2.5}$ or plant dieback due to reduced photosynthesis. The term 'significant effect' has a specific meaning in EIA regulations. The opposite is an insignificant effect. In the context of construction impacts any effect will usually be adverse, however, professional judgement is required to determine whether this adverse effect is significant based in the evidence presented.

**EPAQS** Expert Panel on Air Quality Standards

**EPUK** Environmental Protection UK

**HGV** Heavy Goods Vehicle

**Impacts** The changes in airborne concentrations and/or dust deposition. A scheme can have an 'impact' on airborne dust without having any 'effects', for instance if there are no receptors to experience the impact.

**LAQM** Local Air Quality Management

**LDF** Local Development Framework

**LGV** Light Goods Vehicle

**Mg/m$^3$** Microgrammes (of pollutant) per cubic metre of air. A measure of concentration in terms of mass per unit volume. A concentration of 1 µg/m$^3$ means that one cubic metre of air contains one microgramme (millionth of a gramme) of pollutant

**$NO_2$** Nitrogen Dioxide

**NOx** A collective term used to represent the mixture of nitrogen oxides in the atmosphere, as nitric oxide (NO) and nitrogen dioxide ($NO_2$)

**NPPF** National Planning Policy Framework

**Nuisance** The term nuisance dust is often used in a general sense when describing amenity dust. However, this term also has specific meanings in environmental law:

Statutory nuisance, as defined in S79(1) of the Environmental Protection Act 1990 (as amended from time to time).

Private nuisance, arising from substantial interference with a person's enjoyment and us of his land.

Public nuisance, arising from and act or omission that obstructs, damages or inconveniences the right of the community.

Each of these applying in so far as the nuisance relates to the unacceptable effects of emissions. It is recognised that a significant loss of amenity may occur at lower levels of emission than would constitute a statutory nuisance.

Note: as nuisance has a specific meaning in environmental law, and to avoid confusion, it is recommended that the term is not used in a more general sense.

**$PM_{2.5}$** The fraction of particles with a mean aerodynamic diameter equal to, or less than, 2.5 μm. More strictly, particulate matter which passes through a size selective inlet as defined in the reference method for the sampling and measurement of $PM_{2.5}$, EN 14907, with a 50% efficiency cut-off at 2.5 μm aerodynamic diameter

**$PM_{10}$** The fraction of particles with a mean aerodynamic diameter equal to, or less than, 10 μm. More strictly, particulate matter which passes through a size selective inlet as defined in the reference method for the sampling and measurement of $PM_{10}$, EN 12341, with a 50% efficiency cut-off at 10 μm aerodynamic diameter

**RSS** Regional Spatial Strategy

**Running Annual Mean** A mean pollutant concentration value in air which is calculated on an hourly basis, yielding one running annual mean per hour. The running annual mean for a particular substance at a particular location for a particular hour is the mean of the hourly levels for that substance at that location for that hour and the preceding 8759 hours

**Trackout** The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.

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