entran

# 65 Maygrove Road, London, NW6 2EH

# Air Quality Assessment


Environmental Transportation

# 65 Maygrove Road, London, NW6 2EH

# Air Quality Assessment

| Revision | Date | Notes | Author | Checked | Approved |
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## 1 INTRODUCTION

1.1 Entran Ltd has been commissioned by REP (Maygrove Road) Developments LLP to undertake an air quality assessment in relation to a proposed residential redevelopment at Maygrove Road, London, NW6 2EH.

1.2 The site falls within an Air Quality Management Area (AQMA) declared for the entire London Borough of Camden for nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$).

1.3 The proposed development comprises of a residential development of 68 units with associated parking and landscaping. The site location is shown in Figures 1 and 2. The site is bounded to the south by Maygrove Road and to the north by Brassey Road. The site currently contains a commercial three storey building which has been vacant for a number of years.

1.4 This report presents the findings of an air quality impact assessment that examines both construction and operational phases of the proposed development. The type, source and significance of potential impacts are identified and the measures that should be employed to minimise these impacts are described.

1.5 A glossary of common air quality terminology is provided in **Appendix A.**

**Figure 1: Site Location Plan**

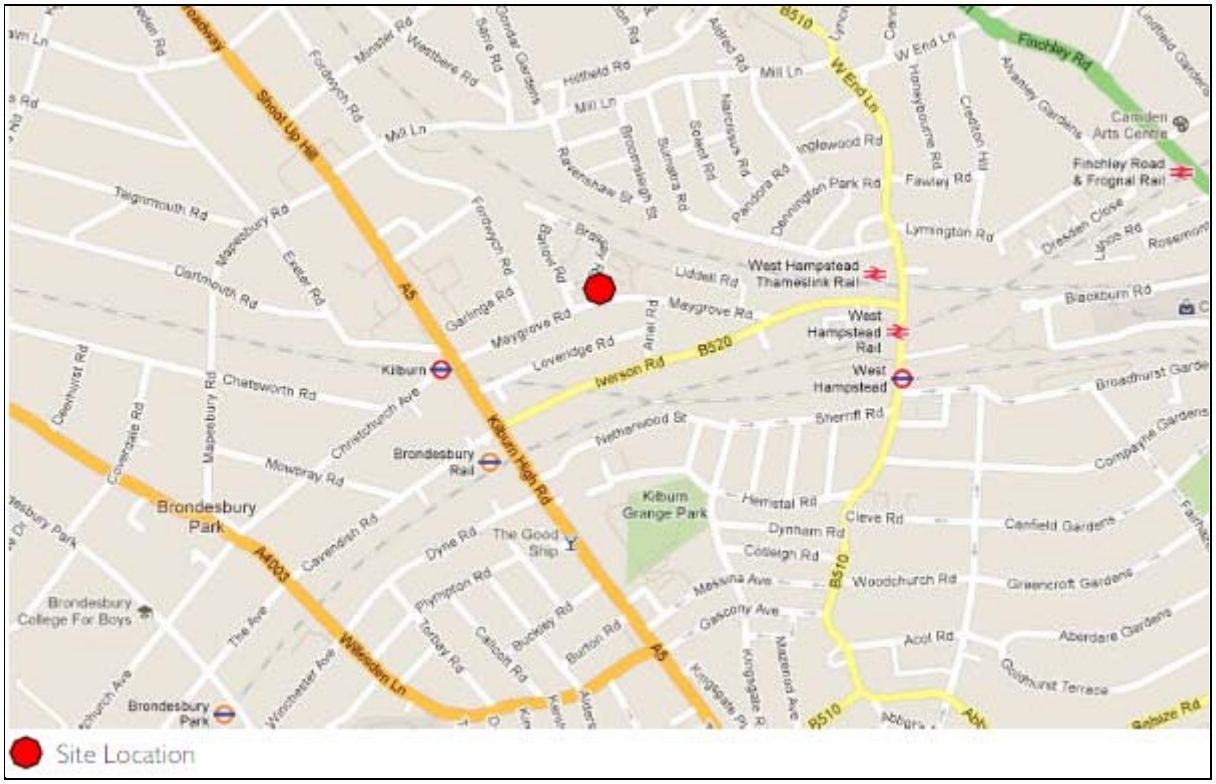
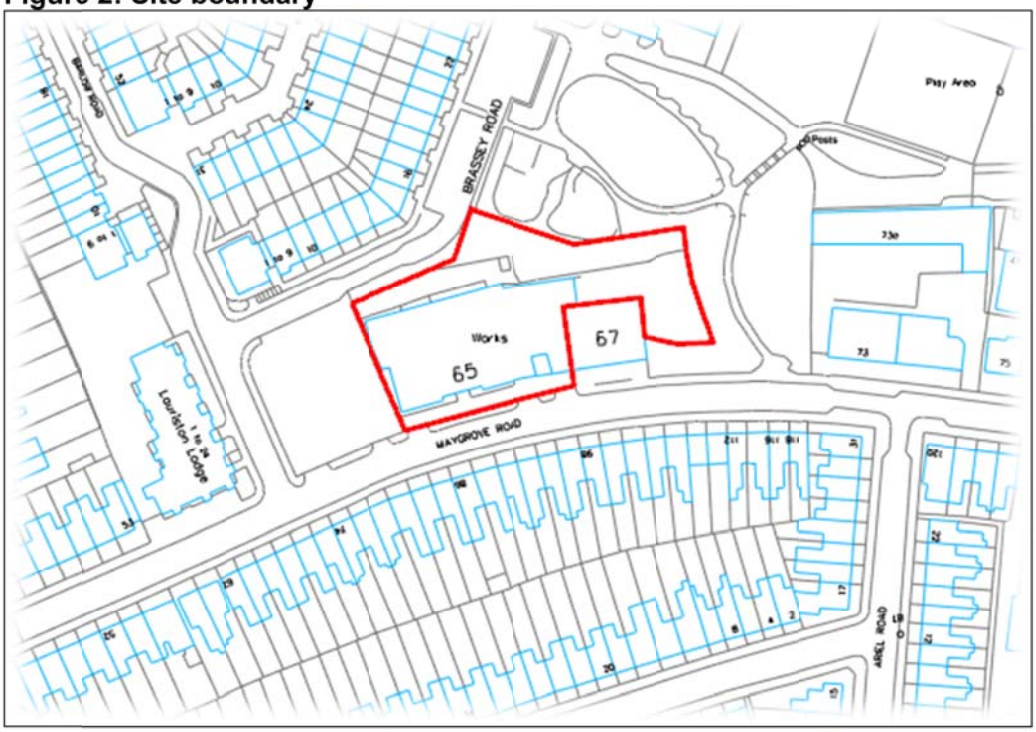


**Figure 2: Site boundary**



## 2 LEGISLATION AND POLICY

### Air Quality Strategy for England, Scotland, Wales & Northern Ireland

2.1 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) published in July 2007[1], pursuant to the requirements of Part IV of the *Environment Act 1995*. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

2.2 The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are benzene ($C_6H_6$), 1,3-butadiene ($C_4H_6$), carbon monoxide (CO), lead (Pb), nitrogen dioxide ($NO_2$), particulate matter ($PM_{10}$, $PM_{2.5}$), sulphur dioxide ($SO_2$), ozone ($O_3$) and polycyclic aromatic hydrocarbons (PAHs).

2.3 The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the WHO. These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

2.4 The air quality objectives are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedences of the standard over a given period.

2.5 For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of $NO_2$, the short-term standard is for a 1-hour averaging period, whereas for $PM_{10}$ it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

2.6 Of the pollutants included in the AQS, $NO_2$ and $PM_{10}$ will be particularly relevant to this project, as road traffic is a major source and concentrations of these pollutants tend to be close to air quality objectives in urban locations, such as the proposed development site. Local authorities

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – July 2007.

undertaking Review and Assessments of air quality are finding that, where road traffic is the dominant source of air pollution, the objectives for these pollutants are likely to be the most difficult to achieve.

**Local Air Quality Management (LAQM)**

2.7 Part IV of the Environment Act 1995 requires local authorities to review and assess existing and predict future air quality in their areas as part of a rolling 'review & assessment' process. In areas where exceedences of one or more of the air quality objectives are predicted the local authority must designate an Air Quality Management Area (AQMA). Once designated; the local authority must then draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to take in pursuit of achieving the air quality objectives in the AQMA.

**UK Policy Guidance: Planning Policy Statement 23 (PPS23)**

2.8 Planning Policy Statement PPS23 provides advice relating to issues governing whether development would be advisable. This includes development constraints and opportunities as related to air quality and was published in November 2004.

2.9 PPS23 states that the 'existing, and likely future, air quality in the area [of proposed development plans], including any AQMAs or other areas where air quality is likely to be poor' should be considered in the preparation of development plan documents and may also be material in the consideration of individual planning applications where pollution considerations arise.

2.10 This Planning Policy Statement also advises that: 'more weight will generally need to be given to air quality considerations, for example, where a development would have a significant impact on air quality inside, or adjacent to, an AQMA (Air Quality Management Area)'

2.11 However, Appendix 1G of PPS23 the same Statement also warns against the 'sterilisation' of an area due to rejection of all development on air quality grounds and states that the significance of one consideration relative to another will vary dependent upon circumstances.

**London Borough of Camden (LBC) Review and Assessment of Air Quality**

**2.12** Detailed assessments of air quality by LBC have resulted in the declaration of the entire Borough as an Air Quality Management Area (AQMA) for $NO_2$ and $PM_{10}$.

**UK Good Practice Guidance: Construction and Demolition Dust Guidance**

2.13 The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance[2] has been produced to provide guidance for dust and other air pollution from demolition and construction activities within London.

[2] The control of dust and emissions from construction and demolition – Best Practice Guidance, Greater London Authority and London Councils, November 2006

# 3 METHODOLOGY

## Scope of Assessment

3.1 The scope of the assessment has been determined in the following way:

- consultation with the Environmental Health Department of LBC;
- review of air quality data for the area surrounding the site, including data from the DEFRA background maps[3]; and
- review of the traffic flow data.

3.2 Details of the assessment methodology and the specific issues considered are provided below.

## Prediction of impacts – Construction phase

3.3 To assess the potential impacts associated with dust and $PM_{10}$ releases during the construction phase and to determine any necessary mitigation measures, a review of the following publications has been undertaken:

- GLA and London Councils 'The control dust and emissions from construction and demolition: Best Practice Guidance' (Nov 2006);
- Kukadia, V., Upton, S. L. and Hall, D. J.; Control of dust from Construction and Demolition Activities. Building Research Establishment (BRE) (Feb 2003);
- Quality of Urban Air Review Group (QUARG): Airborne Particulate Matter in the United Kingdom – Third Report of the Quality of Urban Air Review Group. Prepared for the Department of the Environment (May 1996); and

3.4 The potential risk of impact reduces with distance from the source, this is due to the effects of dispersion of dust particles and the rapid deposition of the larger particles. The very large particles usually only travel 10-20m before being deposited, whereas fine particulate ($PM_{10}$) particles are not readily deposited and can travel for long distances. The vast majority of particles responsible for annoyance are deposited within 100m of the source, and hence it is in this zone that the risk of impacts from dust deposition is greatest. The assessment therefore focuses on sensitive receptors within this zone.

[3] http://laqm.defra.gov.uk/

3.5 In particular, dust effects in the surrounding environment will be dependent on the scale of release, frequency of wind speeds capable of carrying airborne dust (i.e. greater than 3m/s[4]) and frequency of rainfall considered sufficient to effectively suppress wind-blown dust emissions (greater than 0.2 mm/day[5]).

3.6 The main receptors likely to be affected by dust creation are those receptors within approximately 100m from the site, which mainly comprise of residential receptors.

3.7 The assessment of construction phase impacts outlines the primary activities which could give rise to potential impacts from construction processes, and identifies the locations most likely to be affected by these impacts. It also sets out examples of 'best practice' measures which are recommended to be considered to ensure that they are minimised, wherever possible.

3.8 Construction traffic associated with the development will contribute to existing traffic levels on the surrounding road network. However, the nature of the traffic and the periods over which the increases may occur are considered to be localised and short term in duration over the construction period.

**Prediction of impacts – Operational phase**

3.9 The prediction of the effects of local traffic on $NO_2$ and $PM_{10}$ concentrations has been undertaken using Breeze Roads (CAL3QHCR) dispersion model. This is a commercially available dispersion model and has been widely validated for this type of assessment.

3.10 This model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollutant concentrations at specific locations selected by the user. Meteorological data from London Heathrow (2010) has been used for the assessment. It has not been possible to verify the modelled predictions as no monitoring data exists for the road links examined. In the absence of monitoring data, a cautious approach has been adopted by using very low traffic speeds. This will result in higher emission factors and will minimise the potential for the model to under-predict pollutant concentrations.

3.11 A summary of the traffic data used in the assessment can be found in **Appendix C**. The data includes details of annual average daily traffic flows (AADT), percentage HGV and speeds for the assessment years considered.

[4] K. W. Nicholson (1988) A review of particle re-suspension. Atmospheric Environment Volume 22, Issue 12, 1988, Pages 2639-2651

[5] Arup Environmental and Ove Arup and Partners (Dec 1995), The Environmental Effects of Dust from Surface Mineral Workings Volume 2. Prepared for Department of the Environment Minerals Division.

3.12 DEFRA Technical Guidance does not provide a method for the conversion of annual mean $NO_2$ concentrations to 1-hour mean $NO_2$ concentrations. However, research[6] has concluded that exceedences of the 1-hour mean objective are unlikely to occur where annual mean concentrations do not exceed 60 µg/$m^3$.

3.13 Quantitative assessment of the impacts on local air quality from road traffic emissions associated with the operation of the development have been completed against the current statutory standards and objectives set out in **Appendix B**.

**Significance Criteria**

3.14 Guidance issued by Environmental Protection UK relating to Air Quality considerations within the planning process was updated in April 2010[7]. In this guidance, criteria are detailed which identify the need for an Air Quality Assessment, the type of Air Quality assessment required, and the significance of any predicted impact.

3.15 The above guidance sets out criteria for assessing air quality impact magnitude. This updated guidance also places greater emphasis on judging overall impacts by means of professional judgement, whilst taking into account the impact magnitude descriptors.

3.16 The determination of impact significance within this assessment has considered both the impact descriptors and the professional judgement of the author. Tables 1 and 2 identify the assessment criteria from this guidance.

3.17 These criteria have been deemed suitable for use in this appraisal, as there are currently no standards or statutory significance criteria available for this purpose.

[6] D Laxen and B Marner: *Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites* (July 2003).

[7] EPUK (April 2010), *Development Control: Planning for Air Quality (2010 Update).*

**Table 1: Definition of Impact Magnitude for Changes in Ambient Annual Mean Nitrogen Dioxide and $PM_{10}$.**

| Magnitude of Change | Annual Mean |
|---|---|
| Large | Increase/ decrease >4 µg/m$^3$ |
| Medium | Increase/ decrease 2 – 4 µg/m$^3$ |
| Small | Increase/ decrease 0.4 – 2 µg/m$^3$ |
| Imperceptible | Increase/ decrease <0.4 µg/m$^3$ |

3.18 Once the magnitude of the impact is defined from the criteria in Table 1, the next step is to describe the impact. The EPUK guidance therefore presents a set of descriptors as a means of describing impacts. These are identified in Table 2 below.

**Table 2: Air Quality Impact Descriptors for Changes to Annual Mean Nitrogen Dioxide and $PM_{10}$ Concentrations at a Receptor.**

| Absolute Concentration in Relation to Objective/ Limit Value | Change in Concentration | | |
|---|---|---|---|
| | Small | Medium | Large |
| **Increase with Development** | | | |
| **Above Objective/ Limit Value *With* Scheme (>40 µg/m$^3$)** | Slight Adverse | Moderate Adverse | Substantial Adverse |
| **Just Below Objective/ Limit Value *With* Scheme (36-40 µg/m$^3$)** | Slight Adverse | Moderate Adverse | Moderate Adverse |
| **Below Objective/ Limit Value *With* Scheme (30-36 µg/m$^3$)** | Negligible | Slight Adverse | Slight Adverse |
| **Well Below Objective/ Limit Value *With* Scheme (<30 µg/m$^3$)** | Negligible | Negligible | Slight Adverse |
| **Decrease with Development** | | | |
| **Above Objective/ Limit Value *Without* Scheme (>40 µg/m$^3$)** | Slight Beneficial | Moderate Beneficial | Substantial Beneficial |
| **Just Below Objective/ Limit Value *Without* Scheme (36-40 µg/m$^3$)** | Slight Beneficial | Moderate Beneficial | Moderate Beneficial |
| **Below Objective/ Limit Value *Without* Scheme (30-36 µg/m$^3$)** | Negligible | Slight Beneficial | Slight Beneficial |
| **Well Below Objective/ Limit Value *Without* Scheme (<30 µg/m$^3$)** | Negligible | Negligible | Slight Beneficial |

3.19 Other factors taken into account in determining the significance of the impacts predicted are summarised in Box 1 below.

**Box 1: Factors Taken into Account in Determining Air Quality Significance**

| Factors |
|---|
| The number of properties affected by slight, moderate or major air quality impacts. |
| The number of people exposed to levels above the objective or limit value. |
| The magnitude of the changes and the description of the impacts at relevant receptors. |
| Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before, or an exceedence area is substantially increased. |
| Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced. |
| Uncertainty, including the extent to which worst-case assumptions have been made. |
| The extent to which an objective or limit value is exceeded, e.g. an annual mean $NO_2$ of 41 $\mu g/m^3$ should attract less significance than an annual mean of 51 $\mu g/m^3$. |

**Sensitive Receptors**

3.20 LAQM.TG(09) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations '*where members of the public are regularly present'* should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

3.21 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standards (i.e. 15 minute mean or 1 hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term (such as 24 hour mean or annual mean) standards may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time. DEFRA LAQM TG(09) states that the annual mean objectives should not apply at '*Building façades of offices or other places of work where members of the public do not have regular access'.*

3.22 Receptor locations for this assessment have been selected at both the Site and at residential receptors adjacent to the local road network as identified in Figure 3.

**Figure 3: Receptor Locations**


3.23 For the purposes of assessing construction related impacts, receptor locations have been selected at sensitive locations (residential dwellings) adjacent to the site.

## 4 BASELINE CONDITIONS

### LBC Review and Assessment of air quality

4.1 As has been described earlier, in line with their statutory obligations, LBC have undertaken a comprehensive review of air quality in the area over recent years and this has resulted in the declaration of an AQMA covering the entire Borough. The AQMA is designated for $NO_2$ and $PM_{10}$.

### Automatic Monitoring Data

4.2 Camden operate three automatic monitoring sites as identified in Table 3.

**Table 3: Automatic Monitoring Sites**

| Site Name | Site Type | Grid References | Pollutants Monitored | Distance to Kerb of Nearest Road |
|---|---|---|---|---|
| **London Bloomsbury** | Urban background | 530120, 182034 | $PM_{10}$, $PM_{2.5}$, $SO_2$, CO, $NO_2$, $O_3$ | 27m |
| **Shaftesbury Avenue** | Roadside | 530060, 181290 | $PM_{10}$, $NO_2$ | <1m |
| **Swiss Cottage** | Kerbside | 526633, 184392 | $PM_{10}$, $PM_{2.5}$, $NO_2$ | 3m |

4.3 All of these sites exceeded the $NO_2$ annual mean objective during 2010 and the 1-hour objective was also exceeded at Swiss Cottage and Shaftesbury Avenue. The $PM_{10}$ objectives were achieved at all three sites during 2010.

4.4 The above sites are all located more than 1.7km from the proposed development site and are therefore not considered representative for this specifc area.

### Non-automatic Monitoring Data

4.5 LBC carry out monitoring for nitrogen dioxide by diffusion tube at 24 locations, although none of these are in the vicinity of the Site.

**DEFRA Background Maps**

4.6 Annual mean background concentrations for inclusion in the assessment have been obtained from the National Air Quality Information Archive (NAQIA). These figures are displayed in Table 4, which provide estimated annual mean background concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ for grid square .

**Table 4: Estimated background concentrations (µg/m$^3$)**

| Pollutant | 2011 |
|---|---|
| $NO_x$ | 48.0 |
| $NO_2$ | 29.7 |
| $PM_{10}$ | 19.2 |
| $PM_{2.5}$ | 13.0 |

4.7 Table 4 shows that for all years, estimated annual mean background concentrations of $NO_2$ are below the annual average objective of 40 µg/m$^3$. Estimated annual mean background concentrations of $PM_{10}$ are also well below the annual average objective limit of 40 µg/m$^3$ and $PM_{2.5}$ concentrations are below the 25 µg/m$^3$ objective for this pollutant.

## 5 ASSESSMENT OF IMPACT, MITIGATION AND RESIDUAL EFFECTS

### IMPACT - CONSTRUCTION PHASE

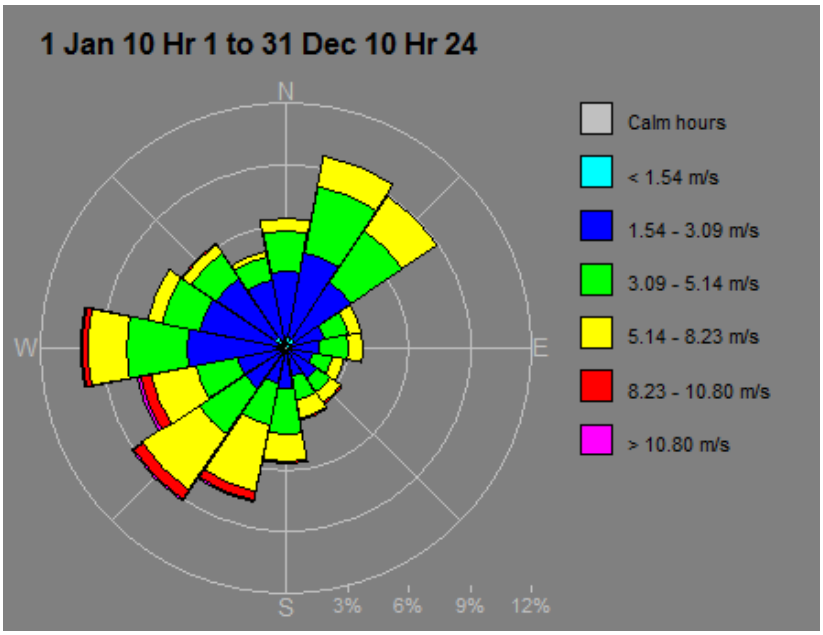
*Dust generation and other releases to air from construction activities*

5.1 There is potential for the generation and release of dust from the demolition and construction processes on the site. The impacts of these releases of dust will be localised, due to the fact that dust is relatively heavy and falls from suspension in the atmosphere within a short period of time following release.

5.2 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

5.3 Depending on wind speed and turbulence it is likely that the majority of dust will be deposited in the area immediately surrounding the source (primarily up to 100 metres away). The prevailing wind direction at the site is considered to be from the south-west (see Figure 4), therefore receptors which lie immediately to the north-east of the site are most likely to experience potential dust nuisance. These include residential receptors. There also appears to be quite a strong north-easterly component to the data. However, given the relatively small scale of the development, it is considered that such impacts would be insignificant.

**Figure 4: Windrose for London Heathrow 2010**



*$PM_{10}$ generation and release from construction activities and site plant*

5.4 During construction, concentrations of $PM_{10}$ in the locality will be elevated. Generally, the sources of $PM_{10}$ during construction and materials handling will be similar in nature to those that may give rise to dust nuisance. As the magnitude of these releases is relatively small, any adverse effects resulting from them are likely to be relatively short-term with insignificant impact outside the site boundary.

*Release of emissions to air from construction traffic*

5.5 Construction traffic will contribute to existing traffic levels on the surrounding road network, however as the development is relatively small such impacts are not anticipated to be significant. The greatest potential for impacts on air quality from traffic associated with this phase of the proposed development will be in the areas immediately adjacent to the principal means of access for construction traffic. The numbers of vehicles associated with construction are not predicted to be significant in terms of total emissions or construction duration.

**IMPACT - OPERATIONAL PHASE**

*Annual Mean $NO_2$ Concentrations*

5.6 Predicted annual mean $NO_2$ concentrations are shown in Table 5. The receptor locations are illustrated in Figure 3 earlier in Section 3 of this report.

**Table 5: Predicted Annual mean nitrogen dioxide concentrations**

| Receptor ID | 2011 Baseline Annual Mean (µg/m$^3$) | 2011 With Development Annual Mean (µg/m$^3$) | Increase attributable to proposed development |
|---|---|---|---|
| 1 | 34.1 | 34.1 | 0 |
| 2 | 31.6 | 31.6 | 0 |
| 3 | 34.2 | 34.2 | 0 |
| 4 | 30.6 | 30.6 | 0 |
| 5 | 30.3 | 30.3 | 0 |
| 6 | 30.8 | 30.8 | 0 |
| 7 | 30.4 | 30.4 | 0 |
| 8 | 34.9 | 34.9 | 0 |

5.7 The predicted concentrations displayed in Table 10 show that $NO_2$ concentrations are below the objective at all receptor locations and that impacts from the proposed development are imperceptible. This is due to the very low traffic impacts associated with the proposed development.

*1-hour Mean $NO_2$ Concentrations*

5.8 Exceedence of the 1-hour objective for $NO_2$ is unlikely based on the predicted annual mean concentrations. Guidance earlier referred to indicates that exceedance of the 1-hour objective is unlikely where the annual mean concentration is below 60 µg/m$^3$.

*Annual Mean $PM_{10}$ Concentrations*

5.9 The predicted annual mean $PM_{10}$ concentrations are also below the 40 µg/m$^3$ objective for this pollutant, as identified in Table 6.

5.10 The predicted concentrations in Table 6 show that the maximum impact on $PM_{10}$ is 0.1 µg/m$^3$ which is considered to be an imperceptible impact.

**Table 11: Predicted Annual mean $PM_{10}$ concentrations**

| Receptor ID | 2011 Baseline Annual Mean ($\mu g/m^3$) | 2011 With Development Annual Mean ($\mu g/m^3$) | Increase attributable to proposed development |
|---|---|---|---|
| 1 | 19.5 | 19.7 | 0.1 |
| 2 | 19.3 | 19.4 | 0.0 |
| 3 | 19.5 | 19.7 | 0.1 |
| 4 | 19.3 | 19.3 | 0.0 |
| 5 | 19.3 | 19.3 | 0.0 |
| 6 | 19.3 | 19.4 | 0.0 |
| 7 | 19.3 | 19.3 | 0.0 |
| 8 | 19.6 | 19.7 | 0.1 |

*24-hour mean $PM_{10}$ concentrations*

5.11 The number of exceedences of 50 $\mu g/m^3$ as a 24-hour mean $PM_{10}$ concentration has been calculated from the annual mean, following the approach set out by DEFRA in LAQM TG(09):

$$A = -18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$$

*where A is the number of exceedences of 50 $\mu g/m^3$ as a 24-hour mean $PM_{10}$ concentration.*

5.12 Based on the above approach, the maximum number of $PM_{10}$ days >50 $\mu g/m^3$ is less than 4-days with the proposed development in place. The objective for this pollutant permits up to 35-days per annum and therefore exceedence of this objective is highly unlikely.

*Annual Mean $PM_{2.5}$ Concentrations*

5.13 The predicted annual mean $PM_{10}$ concentrations are also below the 25 $\mu g/m^3$ objective for this pollutant, as identified in Table 7.

**Table 7: Predicted Annual mean $PM_{2.5}$ concentrations**

| Receptor ID | 2011 Baseline Annual Mean ($\mu g/m^3$) | 2011 With Development Annual Mean ($\mu g/m^3$) | Increase attributable to proposed development |
|---|---|---|---|
| 1 | 13.3 | 13.3 | 0 |
| 2 | 13.1 | 13.1 | 0 |
| 3 | 13.3 | 13.3 | 0 |
| 4 | 13.1 | 13.1 | 0 |
| 5 | 13.1 | 13.1 | 0 |
| 6 | 13.1 | 13.1 | 0 |
| 7 | 13.1 | 13.1 | 0 |
| 8 | 13.4 | 13.4 | 0 |

## MITIGATION

*Construction Phase*

5.14 It is recommended that the following 'best practice' measures be considered, where appropriate, during the construction phase:

- vehicles carrying loose aggregate and workings should be sheeted at all times;
- dampening of exposed soil and material stockpiles, if necessary, using sprinklers and hoses;
- observation of wind speed and direction prior to conducting dust-generating activities to determine the potential for dust nuisance to occur, avoiding potentially dust-generating activities during periods when wind direction may carry dust into sensitive areas and avoiding dust-generating operations during periods of high or gusty winds;
- stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of prevailing wind directions and seasonal variations in the prevailing wind;
- completed earthworks should be covered or vegetated as soon as is practicable;
- regular inspection and, if necessary, cleaning of local highways and site boundaries to check for dust deposits (and removal if necessary);
- visual inspection of site perimeter to check for dust deposition (evident as soiling and marking) on vegetation, cars and other objects and taking remedial measures if necessary;
- minimise surface areas of stockpiles (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up;
- use of dust-suppressed tools for all operations;

- ensuring that all construction plant and equipment is maintained in good working order; and
- no unauthorised burning of any material anywhere on site.

5.15 Construction vehicles should be kept clean and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

5.16 It is recommended that liaison with LBC be maintained throughout the construction process, and any incidents which lead to excessive elevation of dust deposition and/or $PM_{10}$ concentrations at neighbouring sensitive receptors are reported to the Environmental Health Department. If complaints are received from local residents, these will be documented in a diary or log held on site by the Site Manager. A nominated member of the construction team (e.g. Site Manager) will also act as a point of contact for residents who may be concerned about elevated deposition of dust.

5.17 Dust impacts following mitigation are considered likely to be negligible.

*Operational Phase*

5.18 No mitigation is required as impacts are considered to be insignificant due to the relatively small scale of the development.

## RESIDUAL EFFECTS

*Construction phase*

5.19 The greatest potential for dust nuisance problems to occur will be immediately next to the construction site perimeter. There may be limited incidences of increased dust deposited on property beyond this distance.

5.20 The potential for short term releases of $PM_{10}$ from demolition, materials handling and site plant will remain following mitigation. However, by following the mitigation measures outlined within this appraisal the impact will be substantially minimised and controlled.

*Operational Phase*

5.21 The residual effects associated with the operational phase are considered to be imperceptible.

## 6 CONCLUSIONS

6.1 An air quality impact assessment has been carried out to assess both the construction and operational phases of the proposed development.

6.2 A qualitative assessment of the potential impacts during the construction phase has been carried out. This has showed that during this phase of the proposed development releases of dust and $PM_{10}$ are likely to occur during site activities. Through good site practice and the implementation of suitable mitigation measures, the impact of dust and $PM_{10}$ releases may be effectively mitigated.

6.3 Pollutant concentrations have been predicted using Breeze Roads dispersion model to assess both existing air quality constraints at the site and impacts associated with the operational phase of the proposed development. This assessment has shown that existing air quality at the Site is below objectives for both nitrogen dioxide, $PM_{10}$ and $PM_{2.5}$. Operational phase impacts are predicted to be imperceptible and therefore no mitigation is considered necessary.

6.4 Based on the above information, it is considered that air quality does not pose a constraint to redevelopment of the site as proposed.

## APPENDIX A - AIR QUALITY TERMINOLOGY

| Term | Definition |
|---|---|
| **Accuracy** | A measure of how well a set of data fits the true value. |
| **Air quality objective** | Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard). |
| **Air quality standard** | The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective). |
| **Ambient air** | Outdoor air in the troposphere, excluding workplace air. |
| **Annual mean** | The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months. |
| **AQMA** | Air Quality Management Area. |
| **DEFRA** | Department for Environment, Food and Rural Affairs. |
| **Exceedence** | A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard. |
| **Fugitive emissions** | Emissions arising from the passage of vehicles that do not arise from the exhaust system. |
| **LAQM** | Local Air Quality Management. |
| **NO** | Nitrogen monoxide, a.k.a. nitric oxide. |
| **$NO_2$** | Nitrogen dioxide. |
| **$NO_x$** | Nitrogen oxides. |
| **$O_3$** | Ozone. |
| **Percentile** | The percentage of results below a given value. |
| **$PM_{10}$** | Particulate matter with an aerodynamic diameter of less than 10 micrometres. |
| **ppb parts per billion** | The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion ($10^9$) units of air, there is one unit of pollutant present. |
| **ppm parts per million** | The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every billion ($10^6$) units of air, there is one unit of pollutant present. |
| **Ratification (Monitoring)** | Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation). |
| **µg/$m^3$ micrograms per cubic metre** | A measure of concentration in terms of mass per unit volume. A concentration of 1ug/m3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant. |
| **UKAS** | United Kingdom Accreditation Service. |
| **Uncertainty** | A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation. |
| **USA** | Updating and Screening Assessment. |
| **Validation (modelling)** | Refers to the general comparison of modelled results against monitoring data carried out by model developers. |
| **Validation (monitoring)** | Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification). |
| **Verification (modelling)** | Comparison of modelled results versus any local monitoring data at relevant locations. |

## APPENDIX B - AIR QUALITY STANDARDS AND OBJECTIVES

A summary of the current air quality objectives for the pollutants relevant to this assessment and as detailed in the *Air Quality Regulations 2000 and (Amendment) Regulations 2002* for the purpose of Local Air Quality Management is provided below.

| **Air Quality Objectives currently included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM)** | | | | | | |
|---|---|---|---|---|---|---|
| **Pollutant** | **Applies to** | **Standard** | | **Objective** | | **EU AQ Daughter Directive** |
| | | ***Concentration*** | ***Measured as*** | ***Annual exceedences allowed*** | **Target date** | |
| Carbon monoxide (CO) | All UK | 10 mg/m$^3$ | maximum daily running 8 hour mean | | 31.12.2003 | As standard. target: 01.01.2005 |
| Nitrogen dioxide ($NO_2$)[1] | All UK | 200 µg/m$^3$ | 1 hour mean | 18 | 31.12.2005 | As objective. target: 01.01.2010 |
| Nitrogen dioxide ($NO_2$) | All UK | 40 µg/m$^3$ | annual mean | | 31.12.2005 | As standard. target: 01.01.2010 |
| Particulate Matter ($PM_{10}$) (gravimetric) | All UK | 40 µg/m$^3$ | annual mean | | 31.12.2004 | As standard. target: 01.01.2005 |
| | All UK | 50 µg/m$^3$ | 24 hour mean | 35 | 31.12.2004 | As objective. target: 01.01.2005 |
| | Scotland | 50 µg/m$^3$ | 24 hour mean | 7 | 31.12.2010 | As objective. target: 01.01.2010 |
| | Scotland | 18 µg/m$^3$ | annual mean | | 31.12.2010 | |
| Particulate Matter ($PM_{2.5}$) | UK (Except Scotland) | 25 µg/m$^3$ | annual mean | | 2020 | |
| | Scotland | 12 µg/m$^3$ | annual mean | | 2020 | |
| | UK urban areas | Target of 15% reduction in concentrations at urban background | annual mean | | Between 2010 and 2020 | |

## APPENDIX C - SUMMARY OF TRAFFIC DATA

### Traffic data utilised for the air quality assessment

| Link Ref | 2011 Base AADT | 2011 Base + Dev AADT | HGV (%) | Speed (km/h) |
|---|---|---|---|---|
| Maygrove Road | 3,015 | 3,084 | 4 | 10-20 |
| Iverson Road | 3,621 | 3,690 | 4 | 10-20 |
| A5 – Shoot-Up Hill | 13,707 | 13,776 | 15 | 15 |