Air Quality Assessment: Cheshunt Sports Village

LW Developments

2nd September 2016

Report Details:

Report Title	Air Quality Assessment: Cheshunt Sports Village
Client	LW Developments
Client Address	Regency House White Stubbs Farm White Stubbs Lane Broxbourne Hertfordshire EN10 7QA
Project Number	H2242

Version History:

Version No.	Date Issued	Comments	Author	Checked
V01	15th August 2016	Original Issue	Nick Hawkins MIOA MIAQM	Nick Hawkins MIOA MIAQM
V02	2nd September 2016	Minor textural amendments	Nick Hawkins MIOA MIAQM	Nick Hawkins MIOA MIAQM

This report has been prepared by Hawkins Environmental Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use by the client named on the report; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Hawkins Environmental Limited. Any such party relies upon the report at their own risk.

Hawkins Environmental Limited does not accept any liability in negligence for any matters arising outside of the agreed scope of works.

Table of Contents

List of Appendices

List of Tables

List of Figures

1. INTRODUCTION

1.1. Overview

Hawkins Environmental Limited has been instructed by LW Developments to undertake an air quality assessment for the proposed redevelopment of Cheshunt Football Club, situated in the Cheshunt Area of the Borough of Broxbourne.

During the planning process, it has been identified that the site may require an air quality assessment to determine whether the site is suitable for residential use and to determine whether the proposed development would have any adverse impact on the surrounding environment. Consequently, this assessment has been completed in order to determine whether the proposed development achieves compliance with the National Air Quality Objectives, as well as national, regional and local planning policy. This assessment has been undertaken in accordance with the Department of Environment, Food and Rural Affairs' (Defra) current *Technical Guidance on Local Air Quality Management (LAQM) (TG09)* and the Institute for Air Quality Management and Environmental Protection UK's *Land-use Planning & Development Control: Planning for Air Quality* (May 2015). The assessment addresses the effects of air pollutant emissions from traffic using the adjacent roads, and emissions associated with the development of the site. In addition, a risk based assessment of the likely impact of construction on the air quality of the local environment has been conducted in accordance with the Institute of Air Quality Management's 2014 edition of the *Guidance on the assessment of dust from demolition and construction.*

This report assesses the overall levels of hydrocarbons, nitrogen dioxide (NO_2) and particulates (PM_{10} and $PM_{2.5}$) in the vicinity of the site. A glossary of terms is detailed in **Appendix 1.** The constraints which existing air quality may have on the proposed development have been considered and forms part of this assessment. However, the impacts of the development on the air quality of surrounding properties have also been considered.

1.2. Site Description

The proposed development site is situated on the northern side of Theobolds Lane, approximately 150m east of the A10 and 1.2km north of the M25. The site currently comprises Cheshunt Football Club, and houses the current football stadium, practice pitches and associated buildings.

The proposed development will see the redevelopment of the site to form at circa 5000 seat football stadium, with 136 flats incorporated into the east and south stands and blocks situated at all four corners. An additional 50 dwellings will be situated to the east of the football stadium, to the west of Montayne Road. Commercial premises will also be situated within the west stand of the football stadium. A location plan of the proposed site can be seen in **Appendix 2**.

2. PLANNING POLICY

2.1. The National Planning Policy Framework

The NPPF includes 12 core planning principles which include:

- *"Always seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings;*
- *Take account of the different roles and character of different areas, promoting the vitality of our main urban areas, protecting the Green Belts around them, recognising the intrinsic character and beauty of the countryside; and*
- *Contribute to conserving and enhancing the natural environmental and reducing pollution"*

It also states that the planning system *"should contribute to and enhance the natural and local environment, by... 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…"* and "*To prevent unacceptable risks from pollution…, planning policies and decisions should ensure that new development is appropriate for its location".*

The NPPF briefly talks specifically about air quality stating that *"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 the local air quality action plan."*

2.2. National Planning Practice Guidance on Air Quality

The NPPG *"Provides guiding principles on how planning can take account of the impact of new development on air quality"*. The Guidance provides signposts as to how to address air quality in planning application and highlights the importance of local plans.

The Guidance states that *"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values"* and *"It is important that the potential impact of new development on air quality is taken into account … where the national assessment indicates that relevant limits have been exceeded or are near the limit"*. The Guidance goes on to say that *"Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality 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 Guidance identifies the content of an air quality assessment, stating clearly that *"Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality"* and that *"Mitigation options where necessary, will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact".*

2.3. Local Policy

The Borough of Broxbourne's Local Plan Second Review 2001-2011 states in Policy SUS6 Air Quality: *"In considering proposals for development, the Borough Council will have regard to its impact on air quality, including both the operational characteristics of the development and the traffic and other activities generation by it. Development that would lead to National Air Quantity Guidelines being exceeded would not be permitted".* In Policy SUS7: Air Quality Management Areas, the Local Plan states: *"The Council, in determining planning applications within air quality management areas, will have regard to the local Air Quality Action Plan".*

3. ASSESSMENT CRITERIA

3.1. Impacts of the Local Area on the Development

The Limit Values and National Air Quality Objectives[1] (NAQO's) are derived from air quality standards set to protect health and are set out at Schedule 2 of the Air Quality Standards Regulations 2010. The Limit Values address social and economic factors as well as the health standards.

For the purposes of this development proposal, the National Air Quality Objectives and their Limit Values will form the basis of the air quality assessment. The NAQO's are based on an assessment of the effects of each pollutant on public health. Therefore, they are a good indicator in assessing whether, under normal circumstances, the air quality in the vicinity of a development is likely to be detrimental to human health. In determining whether air pollutant levels may constrain development, the results of the study have been compared against the acceptability criteria. The Air Quality Standards are displayed in **Table 3.1** below.

Table 3.1: Air Quality Standards

Pollutant	Averaging Period	NAQO Limit Value
Sulphur Dioxide	One Hour	350 µg/m³ Not to be exceeded more than 24 times per calendar year
	One Day	150 µg/m³ Not to be exceeded more than 3 times per calendar year
Nitrogen Dioxide	One Hour	200 µg/m³ Not to be exceeded more than 18 times per calendar year
	Calendar Year	40 µg/m³
Benzene	Calendar Year	5 µg/m³
Lead	Calendar Year	0.5 µg/m³
PM_{10}	One Day	50 µg/m³ Not to be exceeded more than 35 times per calendar year
	Calendar Year	40 µg/m³
$PM_{2.5}$	Calendar Year	25 µg/m³
Carbon Monoxide	Maximum daily running 8 hour mean	10 mg/m³

[1] http://www.legislation.gov.uk/uksi/2010/1001/contents/made

3.2. Impacts of the Development on the Local Area

To determine the impact of the proposed development on surrounding local sensitive receptors, the impact magnitude has been derived from *Land-Use Planning & Development Control: Planning for Air Quality,* jointly published by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) in May 2015. **Table 3.2** identifies the Advice given in the IAQM/EPUK Guidance regarding describing the impacts.

Table 3.2: Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentrations 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

The guidance goes on to offer the following explanation:

1. *"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)'.*
2. *The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. .less than 0.5% will be described as Negligible.*
3. *The Table is only designed to be used with annual mean concentrations.*
4. *Descriptors for individual receptors only; the overall significance is determined using professional judgement (see Chapter 7). For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.*
5. *When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.*
6. *The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.*

7. *It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it."*

3.3. Construction Dust Impact Assessment

The Institute of Air Quality Management published in 2014[2] a complex risk based assessment methodology to determine the significance of an air quality impact arising from the construction of a new development, based on the magnitude of change. The methodology provides a five Step approach to determining the significance:

- ***"STEP 1** is to screen the requirement for a more detailed assessment. No further assessment is required if there are no receptors within a certain distance of the works.*
- ***STEP 2** is to assess the risk of dust impacts. This is done separately for each of the four activities (demolition; earthworks; construction; and trackout) and takes account of:*
    - *the scale and nature of the works, which determines the potential dust emission magnitude (STEP 2A); and*
    - *the sensitivity of the area (STEP 2B).*

  These factors are combined in STEP 2C to give the risk of dust impacts.

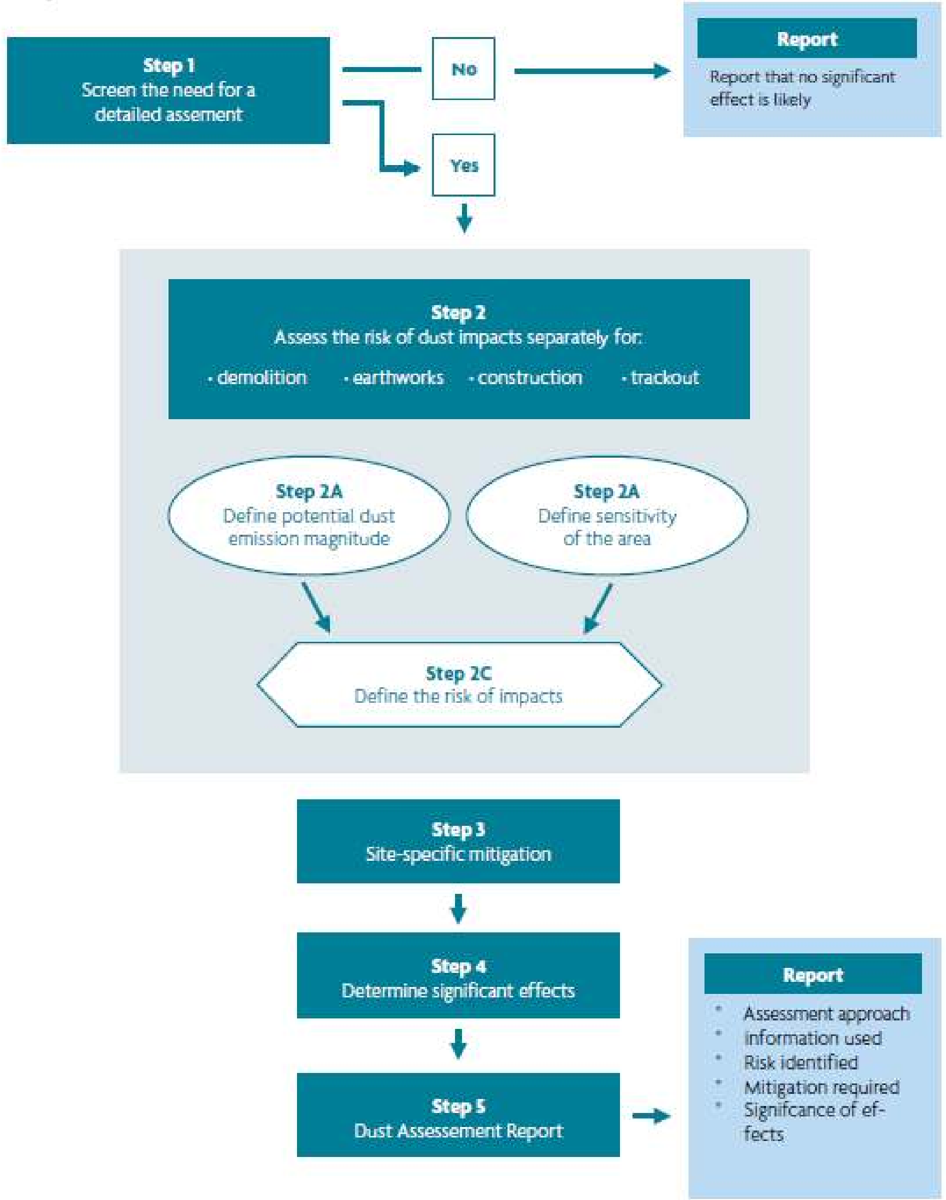
  Risks are described in terms of there being a low, medium or high risk of dust impacts for each of the four separate potential activities. Where there are low, medium or high risks of an impact, then site-specific mitigation will be required, proportionate to the level of risk.

  Based on the threshold criteria and professional judgement one or more of the groups of activities may be assigned a 'negligible' risk. Such cases could arise, for example, because the scale is very small and there are no receptors near to the activity.
- ***STEP 3** is to determine the site-specific mitigation for each of the four potential activities in STEP 2. This will be based on the risk of dust impacts identified in STEP 2. Where a local authority has issued guidance on measures to be adopted at demolition / construction sites, these should also be taken into account.*
- ***STEP 4** is to examine the residual effects and to determine whether or not these are significant.*
- ***STEP 5** is to prepare the dust assessment report."*

Figure 3.1 shows a schematic diagram of the assessment process, reproduced from the IAQM guidance.

[2] Holman *et al* (2014). *IAQM Guidance on the assessment of dust from demolition and construction,* Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.

Figure 3.1: Schematic Diagram of the Construction Dust Assessment Process



4. SCOPING

4.1. Overview

The National Planning Practice Guidance on Air Quality is explicit in stating that *"Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality".* This is reiterated in *Land-Use Planning & Development Control: Planning for Air Quality*, jointly published by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) in May 2015, which provided guidance on screening as to whether an air quality assessment is required and what needs to assessed.

4.2. Impacts of the Local Area on the Development

The IAQM/EPUK Guidance suggests that whether an assessment of the impacts of the local area on the proposed development is required is a matter of judgement, but should take into account:

- *"the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular NO2), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development."*

4.3. Impacts of the Development on the Local Area

To determine whether an assessment of the impacts of the development on the local environment is required, the IAQM/EPUK Guidance suggests a two stage approach. The guidance states that *"The **first stage** is intended to screen out smaller development and/or developments where impacts can be considered to have insignificant effects. The **second stage** relates to specific details regarding the proposed development and the likelihood of air quality impacts."*

Figure 4.1 reproduces Stage 1 of the IAQM/EPUK Guidance' two stage approach. In order to proceed to Stage 2, development needs to meet both one of the criteria in "A", and one of the criteria in "B". If the development fails to meet these criteria, then an air quality assessment looking at the impacts of the development on the local area will not be required.

Figure 4.2 reproduces Stage 2 of the IAQM/EPUK Guidance' two stage approach. If the development meets the criteria contained within Stage 1, *"more specific guidance as to when an air quality assessment is likely to be required to assess the impacts of the proposed development on the local area."* If the development then meets any of the eight criteria in Stage 2, an assessment of the impacts of the proposed development on the surrounding environment will be required.

Figure 4.1: IAQM/EPUK Guidance – Stage 1 Criteria

Criteria to Proceed to Stage 2

A. If any of the following apply:

- 10 or more residential units or a site area of more than 0.5ha
- more than 1,000 m² of floor space for all other uses or a site area greater than 1ha

B. Coupled with any of the following:

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

Note: Consideration should still be given to the potential impacts of neighbouring sources on the site, even if an assessment of impacts of the development on the surrounding area is screened out.

Figure 4.2: IAQM/EPUK Guidance – Stage 2 Criteria

The development will:	Indicative Criteria to Proceed to an Air Quality Assessment [a]
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight)	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight)	A change of HDV flows of - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor Coupled with the car park having more than 100 movements per day (total in and out)
7. Have one or more substantial combustion processes	Where the combustion unit is: - any centralised plant using bio fuel - any combustion plant with single or combined thermal input >300kW - a standby emergency generator associated with a centralised energy centre (if likely to be tested/used >18 hours a year)
8. Have a combustion process of any size	Where the pollutants are exhausted from a vent or stack in a location and at a height that may give rise to impacts at receptors through insufficient dispersion. This criterion is intended to address those situations where a new development may be close to other buildings that could be residential and/or which could adversely affect the plume's dispersion by way of their size and/or height.

4.4. Site Specific Scoping Assessment

The proposed development is located adjacent to the A10 which is known to be a highly trafficked road, therefore **an assessment of the impacts of the local area on the development is required**. However, it should be noted that the proposed development is not situated within an Air Quality Management Area (AQMA).

The proposed development consists of 186 new dwellings and number of car parking spaces; therefore Stage 1 "A" and "B" criteria are both met. Generated traffic would consist of more than 100 vehicle movements per day and therefore, **an assessment of the impacts of the development on the local area is required**.

5. METHODLOGY

In order to determine the extent to which air quality issues will affect the development of the site and its environs, the study has considered the following:

Baseline Conditions

- Conduct a review of the most recent progress reports on air quality carried out by the Local Authority for the area, as submitted to the Department for the Environment, Food and Rural Affairs (Defra);
- Determine whether the site is situated within a designated Air Quality Management Area;
- Review the any local air quality monitoring within the area of the development site;
- Review the Environment Agency's register of industrial sites under the EC Integrated Pollution Prevention and Control Directive (IPPC) to determine whether industrial sources of air pollution could be affecting the site;
- Review the Local Authority's list of registered Part A2 and Part B permitted premises under the PPC Regulations determine whether any other sources of air pollution could be affecting the site;
- Using the methodology described in the Breeze Roads Detailed Dispersion Model (details of which can be seen **in Appendix 3**, utilising data described in **Appendix 4**), predict concentrations of air pollutants onsite within the baseline year.

Impacts of the Local Area on the Development

- Using the methodology described in the Breeze Roads Detailed Dispersion Model (details of which can be seen in **Appendix 3**, utilising data described in **Appendix 4**), predict concentrations of air pollutants onsite within proposed opening year;
- Determine whether future residents within the proposed development are likely to be expose to levels of air pollution in excess of the National Air Quality Objectives;

Impacts of the Development on the Local Area

- Predict of changes in air pollutant concentrations in the vicinity of the site as a consequence of changes in traffic;
- Comment upon the likelihood on impacts arising from combustion emissions from onsite plant; and
- An assessment of the likelihood of issues relating to dust emissions during the construction phase of the project.

6. BASELINE CONDITIONS

6.1. Air Quality Review and Assessment

Local Authorities have been required to carry out a review of local air quality within their boundaries to assess areas that may fail to achieve the NAQO's. Where these objectives are unlikely to be achieved, local authorities must designate these areas as Air Quality Management Areas (AQMA's) and prepare a written action plan to achieve the NAQO's.

The review of air quality takes on several prescribed stages, of which each stage is reported. Following the Borough of Broxbourne's review of air quality within the Borough, it showed that the National Air Quality Objectives for nitrogen dioxide (NO_2) would be exceeded at several locations and as a consequence, three AQMAs were declared in 2003. Following on from a detailed review in 2011, one AQMA was extended in 2015 and two further AQMAs declared.

Local Air Quality Monitoring

The Borough of Broxbourne has conducted air quality monitoring, including at sites in the vicinity of the proposed development site. **Table 6.1** summarises the air quality monitoring data.

Table 6.1: Air Quality Monitoring

Location	Annual Mean concentrations (µg/m^3)				
	2010	2011	2012	2013	2014
Turners Hill, Cheshunt	51.8	43.8	46.5	52.2	44.3
Great Cambridge Road, Cheshunt	81.2	63.2	59.5	69.7	75.1

6.2. Industrial Emissions

Both the Environment Agency's register of industrial sites under the EC Integrated Pollution Prevention and Control Directive (IPPC) and the Local Authority's list of registered Part A2 and Part B permitted premises under the Pollution, Prevention and Control Act 1999 and the Environmental Permitting (England and Wales) Regulations 2010 have shown that there are no sites within close proximity of the development site that could be affecting air pollutant levels.

6.3. Baseline Onsite Pollution Concentrations

To characterise the air quality at development site at present, predictions of air pollutant concentrations at the development site have been made using the air quality model for the baseline year (2014). **Appendix 3** provides a description of the methodology used within the assessment, including the method to calculate NO_2 from NO_x. **Appendix 4** outlines the input data, including traffic data, background concentrations and receptor locations. In addition, details of the verification factor applied to the predicted concentrations of NO_x can also be found in **Appendix 4**.

Concentrations have been calculated for five representative points across the development site. The locations of these receptor locations can be seen on the site plan in **Appendix 4**. For each location, concentrations have been calculated for different floor levels. The results of these predictions can be seen in **Table 6.2**.

Table 6.2: Baseline Air Quality Concentrations 2014 – Development Site

Receptor	NO_2 (µg/m³)	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)
	Annual mean	Annual mean	Days >50 µg/m³	Annual mean
Site A – Ground Floor	29.87	18.70	2.00	14.11
Site A – First Floor	29.79	18.69	1.99	14.10
Site A – Second Floor	29.6	18.67	1.97	14.07
Site B – Ground Floor	27.16	18.44	1.76	13.66
Site B – First Floor	27.13	18.43	1.76	13.65
Site B – Second Floor	27.06	18.43	1.75	13.64
Site C – Ground Floor	30.36	18.85	2.14	14.16
Site C – First Floor	30.22	18.83	2.12	14.14
Site C – Second Floor	30.02	18.80	2.09	14.11
Site D – Ground Floor	27.66	18.58	1.89	13.71
Site D – First Floor	27.55	18.57	1.88	13.69
Site D – Second Floor	27.43	18.55	1.86	13.68
Site E – Ground Floor	26.11	18.37	1.70	13.47
Site E – First Floor	26.06	18.37	1.70	13.47
NAQO	**40**	**40**	**35**	**25**

If pollutant concentrations in **Table 6.2** are compared to the National Air Quality Objectives, it can be seen that on the development site at present, concentrations of all pollutants are below the National Air Quality Objectives.

7. IMPACTS OF THE LOCAL AREA ON THE DEVELOPMENT

7.1. Annual Mean Concentrations

To characterise the air quality at development site when constructed, predictions of air pollutant concentrations at the development site have been made using the air quality model for proposed year of occupation (2018). **Appendix 3** provides a description of the methodology used within the assessment, including the method to calculate NO_2 from NO_x. **Appendix 4** outlines the input data, including traffic data, background concentrations and receptor locations. In addition, details of the verification factor applied to the predicted concentrations of NO_x can also be found in **Appendix 4**.

Concentrations have been calculated for five representative points across the development site. The locations of these receptor locations can be seen on the site plan in **Appendix 4**. For each location, concentrations have been calculated for different floor levels. The results of these predictions can be seen in **Table 7.1**.

Table 7.1: Predicted Future Air Quality Concentrations 2018 – Development Site

Receptor	NO_2 (µg/m^3)	PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)
	Annual mean	Annual mean	Days >50 µg/m^3	Annual mean
Site A – Ground Floor	24.72	18.59	1.90	12.81
Site A – First Floor	24.66	18.58	1.88	12.81
Site A – Second Floor	24.50	18.54	1.85	12.79
Site B – Ground Floor	22.42	18.15	1.52	12.56
Site B – First Floor	22.40	18.14	1.51	12.56
Site B – Second Floor	22.34	18.13	1.50	12.55
Site C – Ground Floor	25.32	18.77	2.06	12.92
Site C – First Floor	25.19	18.74	2.03	12.90
Site C – Second Floor	24.99	18.69	1.99	12.87
Site D – Ground Floor	23.01	18.32	1.66	12.66
Site D – First Floor	22.91	18.30	1.64	12.65
Site D – Second Floor	22.79	18.27	1.62	12.63
Site E – Ground Floor	21.57	18.01	1.41	12.48
Site E – First Floor	21.53	18.00	1.40	12.47
NAQO	**40**	**40**	**35**	**25**

If pollutant concentrations in **Table 7.1** are compared to the National Air Quality Objectives, it can be seen that on the development site during the opening year, concentrations of all pollutants are below the National Air Quality Objectives.

7.2. NO_2 1-hour Exposure

According to research conducted in 2003[3], there is only a risk that the NO_2 1-hour objective (200 µg/m^3) could be exceeded if the annual mean nitrogen dioxide concentration is greater than 60 µg/m^3. At the development site, the worst case annual mean is 25.32 µg/m^3, therefore hourly exceedances are not expected to occur.

[3] Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marner, 2003.

8. IMPACTS OF THE DEVELOPMENT ON THE LOCAL AREA

8.1. Traffic Related Emissions

To assess the impact of a proposed development on local air quality, the methodology from Land-Use Planning & Development Control: Planning for Air Quality, jointly published by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) in May 2015 has been implemented.

A transport assessment was prepared for the planning application by WSP which indicates the number of vehicle movements generated by the proposed development. To characterise the change in air quality as a consequence of the proposed development, predictions of air pollutant concentrations at sensitive receptors have been carried out for the proposed opening year of the development (2018) both with and without the proposed development traffic. **Appendix 3** provides a description of the methodology used within the assessment, including the method to calculate NO_2 from NO_x. **Appendix 4** outlines the input data, including traffic data, background concentrations. In addition, details of the verification factor applied to the predicted concentrations of NO_x can also be found in **Appendix 4**.

Concentrations have been calculated for four sensitive receptors at locations likely to be most affected by changes in both relative and absolute traffic flows. The results of these predictions can be seen in **Table 8.1** and **Table 8.2**, for without with development related traffic flows respectively.

The results of these predictions can be used to identify the increase in pollutant concentrations as a consequence of the proposed traffic generation. These calculations can be seen in **Table 8.3**. The results show that the impact of the increase in traffic flow is very small at the worst affected sensitive receptors, such that the percentage change in concentrations relative to AQAL is very small. Consequently, the proposed development will not have an impact on the air quality of the local area and the impact is considered to be *"negligible"*.

Table 8.1: Air Quality Concentrations 2018 – Without Development Related Traffic

Receptor	**NO_2 (µg/m^3)**	**PM_{10} (µg/m^3)**		**$PM_{2.5}$ (µg/m^3)**
	Annual mean	Annual mean	Days >50 µg/m^3	Annual mean
Hennons, Theobolds Lane	25.59	18.75	2.04	12.90
Rush Lodge, Theobolds Lane	44.16	22.87	7.85	15.27
70 Theobolds Lane	23.7	18.63	1.93	12.84
70 Cranbourne Road	22.94	18.48	1.80	12.75
NAQO	**40**	**40**	**35**	**25**

Table 8.2: Air Quality Concentrations 2018 – With Development Related Traffic

Receptor	NO_2 (µg/m³)	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)
	Annual mean	Annual mean	Days >50 µg/m³	Annual mean
Hennons, Theobolds Lane	25.7	18.77	2.06	12.92
Rush Lodge, Theobolds Lane	44.45	22.94	7.99	15.32
70 Theobolds Lane	24.36	18.80	2.09	12.93
70 Cranbourne Road	23.54	18.64	1.94	12.84
NAQO	**40**	**40**	**35**	**25**

Table 8.3: Assessment of the Impacts of the Increases in Traffic Flow

Receptor	NO2 (µg/m3) Annual mean		% Change in Conc. Relative to Air Quality Assessment Level (AQAL)	Long Term Average Concentration at Receptor in Assessment Year	*Impact Descriptor*
	Without Development	With Development			
Hennons, Theobolds Ln	25.59	25.70	0.275	64% of AQAL	*Negligible*
Rush Lodge, Theobolds Ln	44.16	44.45	0.725	111% of AQAL	*Negligible*
70 Theobolds Lane	23.7	24.36	1.65	61% of AQAL	*Negligible*
1 Cranbourne Road	22.94	23.54	1.5	59% of AQAL	*Negligible*
NAQO	**40**	**40**	**-**	**-**	**-**

8.2. Combustion Emissions from Onsite Plant

At the proposed development, neither CHP plants nor biomass boilers are proposed and therefore plant emissions are unlikely to be a significant factor. The dwellings within the proposed development will each have heating and hot water, which are likely to be provided by high efficiency condensing combination boilers. A typical boiler will emit less than 75 mg/kWh of NO_x and conform to BS EN 483:1999 *Gas-fired central heating boilers. Type C boilers of nominal heat input not exceeding 70 kW.* Therefore, assuming the boilers specified for the final design of these dwellings adhere to BS EN 483:1999, since emissions from individual condensing boilers are not normally a cause for concern in terms of air quality due to the very low emissions, their sporadic and staggered use over the day and their typically wide geographical spacing, a detailed assessment of the impacts of these boilers have not been undertaken.

9. CONSTRUCTION DUST IMPACT ASSESSMENT

9.1. Overview

The main air quality impacts that may arise during construction activities are:

- Dust deposition, resulting in the soling of surfaces;
- Visible dust plumes; and
- An increase in concentrations of airborne particles (e.g. PM_{10}, $PM_{2.5}$) and nitrogen dioxide due to exhaust emissions from site plant and traffic that can impact adversely on human health.

The most common impacts are dust soiling and increased ambient PM_{10} concentrations due to dust arising from the site. Most of this PM_{10} is likely to be in the $PM_{2.5-10}$ fraction, known as coarse particles.

It is very difficult to quantify emissions of dust from construction activities. It is therefore common practise to provide a qualitative assessment of potential impacts. The Institute of Air Quality Management's *Guidance on the assessment of dust from demolition and construction (February 2014)* contains a complex methodology for determining the significance of construction impacts on air quality. The following sections outline the steps outlined in the IAQM methodology.

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

The IAQM guidance states that:

"An assessment will normally be required where there is:

- *a 'human receptor' within:*
  - *350 m of the boundary of the site; or*
  - *50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).*
- *an 'ecological receptor' within:*
  - *50 m of the boundary of the site; or*
  - *50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s)."*

There are existing receptors within 350m of the boundary of the development site and within 50m of the route used by construction vehicles on the public highway. Therefore, a detailed assessment is required to determine potential dust impacts.

<u>Step 1 Summary:</u>
A detailed assessment is required to determine potential dust impacts.

9.3. Step 2 – Assess the Risks of Dust Impacts

The IAQM guidance states that:

"The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk.

A site is allocated to a risk category based on two factors:

- *the scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large (STEP 2A); and*
- *the sensitivity of the area to dust impacts (STEP 2B), which is defined as low, medium or high sensitivity .*

These two factors are combined in STEP 2C to determine the risk of dust impacts with no mitigation applied. The risk category assigned to the site can be different for each of the four potential activities (demolition, earthworks, construction and trackout). More than one of these activities may occur on a site at any one time."

9.3.1. Step 2a – Dust Emission Magnitude

The first step (Step 2a) is therefore to assess the magnitude of the anticipated works. **Table 9.1** summarises the dust emission magnitude for each activity. Given the size of the building to be demolished, the dust emission magnitude is considered to be *"medium"*. Earthworks are expected to be required given the size of the site and the nature of the development; therefore, the dust emission magnitude is considered to be *"medium"*. The buildings to be constructed is reasonable large considering the size of the site, so the dust emission magnitude is considered to be *"medium"*. Regarding trackout, there could be at times up to 15 lorry movements per hour; however, the sections of unpaved roads will be short; therefore the dust emission magnitude is expected to be *"medium"*

Table 9.1: Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	**Medium**
Earthworks	**Medium**
Construction	**Medium**
Trackout	**Medium**

9.3.2. Step 2b – Sensitivity of the Area

The next step (Step 2b) is therefore to assess the sensitivity of the area that could be affected by the anticipated works. **Table 9.2** summarises the sensitivity of the area for each activity.

There are a number of existing dwellings in the area that are considered to be high sensitivity receptors. There are between 10 and 100 high sensitivity receptors within 20m of the site boundary; therefore the sensitivity to dust soiling effects on people and property is *"high"* for all activities.

The annual mean concentration of PM_{10} is less than 24 µg/m^3; given the number of high sensitivity receptors outlined above, this results in a *"low"* sensitivity of the area to human health impacts for all activities.

There are no ecological receptors that are considered to be anything greater than low sensitivity receptors within 50m of the site; this results in a *"low"* sensitivity of the area to ecological impacts for all activities.

Table 9.2: Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Low
Ecological	Low	Low	Low	Low

9.3.3. Step 2c – Define the Risks

The next step (Step 2c) is to assign the level of risk for each activity, based on the receptor sensitivity and the dust emission magnitude. **Table 9.3** summarises the dust risk for each activity.

Table 9.3: Summary Dust Risk Table to Define Site-Specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	Medium
Human Health	Low	Low	Low	Low
Ecological	Low	Low	Low	Low

Step 2 Summary:

- *Dust Emission Magnitude is "Medium" for demolition, trackout, earthworks and construction.*
- *The Sensitivity of the area of "High" for dust soiling and Low for ecological impacts and human health.*
- *The site is considered a "Medium Risk Site" is respect of demolition, trackout, earthworks and construction.*

9.4. Step 3 – Site Specific Mitigation

Stage 2 determines that the site is a *"Medium Risk Site"* in respect of construction, trackout earthworks and demolition.

The IAQM guidance provides a 51 point list of potential mitigation measures and suggests where these measures are highly recommended, desirable or not required based upon the risk of the site. All 51 points are shown in detail in **Appendix 5**. For all sites that are a *"Medium Risk Site"* or higher, a Dust Management Plan is highly recommended and should incorporate the mitigation measures recommended based on the site risk. **Table 9.4** below summarises which mitigation measures are highly recommended based on the site risk.

Table 9.4: Summary Mitigation Measures that are Highly Recommended

Category of Mitigation	Sub- Category of Mitigation	Designated Site Risk	Mitigation Measures that are Highly Recommended (See Appendix 3 for details)
All Sites – Communication		**Medium Risk**	Points 1-3
All Sites – Dust Management	Dust Management Plan	**Medium Risk**	Point 4
	Site Management	**Medium Risk**	Points 5-7
	Monitoring	**Medium Risk**	Points 10-12
	Prep/Maintaining the Site	**Medium Risk**	Points 13-19
	Operating Vehicle/ Machinery	**Medium Risk**	Points 20-22 & Point 24
	Operations	**Medium Risk**	Points 26-30
	Waste Management	**Medium Risk**	Point 31
Measures Specific to Demolition		**Medium Risk**	Points 33-35
Measures Specific to Earthworks		**Medium Risk**	None (but some are desirable)
Measures Specific to Construction		**Medium Risk**	None (but some are desirable)
Measures Specific to Trackout		**Medium Risk**	None (but some are desirable)

Step 3 Summary:

The site is considered a "Medium Risk Site" overall and a Dust Management Plan is recommended incorporating a number of specific mitigation measures based on the site specific risks.

9.5. Step 4 – Determining Significant Effects

The site is considered a *"Medium Risk Site"* overall and if appropriate mitigation measures are put in place, as identified in Step 3, significant effects on receptors are unlikely to occur. Considering both the construction details and the specific characteristics of the site, it is anticipated that effective mitigation will be possible and residual effects will not be considered significant.

Step 4 Summary:
With risk appropriate mitigation, residual effects will not be considered significant.

9.6. Step 5 – Dust Assessment Report

Step 5 Summary:
Dust and other pollutant emissions from the construction, demolition, earthworks and trackout phases of the construction of the proposed development will see the site designated a "Medium Risk Site". However, with risk appropriate mitigation, residual effects will not be considered significant.

10. MITIGATION

As a consequence of the proposed development, there will not be a significant increase in pollutant concentrations and therefore mitigation is not seen to be necessary, other than those routinely used to control construction dust, as detailed in the previous section. Similarly, concentrations of all pollutants are below the National Air Quality Objectives at the development site and therefore it is not necessary to implement mitigation to reduce the exposure from NO_2 or any other pollutant to future occupiers of the proposed development.

11. CONCLUSIONS & SUMMARY

An air quality assessment has been undertaken in accordance with the Department of Environment, Food and Rural Affairs' (Defra) current *Technical Guidance on Local Air Quality Management (LAQM) (TG09)* and addresses the effects of air pollutant emissions from traffic using the adjacent roads, and emissions associated with the development of the site. In addition, a risk based assessment of the likely impact of construction on the air quality of the local environment has been conducted in accordance with the Institute of Air Quality Management's 2014 edition of the *Guidance on the assessment of dust from demolition and construction.*

Baseline pollutant concentrations on site have been investigated using both existing monitoring data and through predictions using the Breeze Roads Detailed Dispersion Model methodology. At present, and in the opening year of the proposed development (2018), concentrations of all pollutants are below the Air Quality Objectives; therefore the site is suitable for housing from an air quality perspective and no further mitigation is seen as necessary.

In order to assess the impact of the proposed development on local air quality, the IAQM/EPUK Guidance *Land-Use Planning & Development Control: Planning for Air Quality* has been utilised. The assessment has shown that due to limited traffic generation onto already highly trafficked roads, the impact of new vehicle emissions from the proposed development is consider to be *"negligible*".

With regards to the impacts of construction on air quality, dust and other pollutant emissions from the construction and demolition phases of the construction of the proposed development will see the site designated a "*Medium Risk Site"*. However, with risk appropriate mitigation, residual effects will not be considered significant.

Since it has been shown that the proposed development meets the guidance contained within *Technical Guidance on Local Air Quality Management (LAQM) (TG09),* IAQM/EPUK's *Land-Use Planning & Development Control: Planning for Air Quality* and IAQM's *Guidance on the assessment of dust from demolition and construction*, it is considered that the proposed development adheres to the principles of the National Planning Policy Framework since the new development will not be *"put at risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution"*. Since it has been shown that in terms of air quality, the proposals adhere to local and national planning policy, it is considered that the air pollution should not be a constraint on the proposed residential development.

Appendix 1
Glossary of Terms

Appendix 1: Glossary of Terms

1,3-butadiene: Is a Volatile Organic Compound (VOC) emitted into the atmosphere principally from fuel combustion of petrol and diesel vehicles. Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.

Air Quality Standard/Air Quality Objective: 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 assessment of the effects of each pollutant on human health including the effects on sensitive sub groups.

Annual mean: The average of the concentrations measured for each pollutant for one year. In the case of the Air Quality Objectives this is for a calendar year.

Air Quality Management Area (AQMA): An area that a local authority has designated for action, based upon predicted exceedences of Air Quality Objectives.

Benzene: A VOC which is a minor constituent of petrol. The main sources of benzene in the atmosphere in Europe are the distribution and combustion of petrol. Of these, combustion by petrol vehicles is the single biggest source (70% of total emissions).

Concentration: The amount of a (polluting) substance in a volume (of air), typically expressed as a mass of pollutant per unit volume of air (for example, microgrammes per cubic metre, $\mu g/m^3$) or a volume of gaseous pollutant per unit volume of air (parts per million, ppm).

Exceedance: A period of time where the concentration of a pollutant is greater than the appropriate Air Quality Objective.

Nitrogen Oxides: Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO_2), which is harmful to health. NO_2 and NO are both oxides of nitrogen and together are referred to as nitrogen oxides (NO_x).

Particulate Matter: Fine Particles are composed of a wide range of materials arising from a variety of sources including combustion sources (mainly road traffic), and coarse particles, suspended soils and dust from construction work. Particles are measured in a number of different size fractions according to their mean aerodynamic diameter. Most monitoring is currently focused on PM_{10} (less than 10 microns in diameter), but the finer fractions such as $PM_{2.5}$ (less than 2.5 microns in diameter) is becoming of increasing interest in terms of health effects.

$\mu g/m^3$ microgrammes per cubic metre of air: A measure of concentration in terms of mass per unit volume. A concentration of 1 $\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

Appendix 2
Site Location Plan

Appendix 2: Site Location Plan

Map Information

Scale	1:10000
Date:	15/08/16
Reference	H2242
Order No:	1720973

F!ND
PROFESSIONAL MAPPING INTELLIGENCE
Created at findmaps.co.uk

Appendix 3
Air Quality Model

Appendix 3: Air Quality Model

Breeze Roads & CAL3QHCR

In the UK, the Department for Environment, Food & Rural Affairs (Defra) provides guidance on the most appropriate methods to estimate pollutant concentrations for use in Local Air Quality Management (LAQM). Defra regularly updates its Technical Guidance, with the latest LAQM Technical Guidance TG(09) published in February 2009[4].

The methodology in TG(09) directs air quality professionals to a number of tools published by Defra to predict and manage air quality. One of the main tools for modelling air pollutants is Breeze Roads, which is a refined air dispersion model produced by Trinity Consultants in the USA.

Breeze Roads is an air dispersion modelling suite that predicts the air quality impacts of nitrogen dioxide, particulate matter and other inert pollutant concentrations from moving and idling motor vehicles at or alongside roads and junctions.

The model includes the CALINE4, CAL3QHC and CAL3QHCR line source dispersion models and a traffic algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC and CAL3QHCR are enhanced versions of the CALINE3 model that incorporates methods for estimating queue lengths and the contribution of emissions from idling vehicles.

Breeze Roads incorporates three modules; two for modeling a single hour of user-defined meteorological data (CAL3QHC and CALINE4) and a third for modeling historic, hourly meteorological data (CAL3QHCR). The latter module has the capability of processing a year of hourly meteorological data, carbon monoxide (CO), particulate matter (PM), or nitrogen dioxide (NO_2) emissions, traffic, and signalization data. In addition, the CAL3QHCR module incorporates the Industrial Source Complex (ISC) mixing height algorithm. These enhancements are based on the algorithms in the CALINE4 model.

For the purposes of this assessment, as the assessment requires the determination of the annual concentrations of pollutants, the CAL3QHCR module is used, as this can use a year of hourly meteorological data to determine the annual concentration of the pollutants of concern.

Unlike the commonly used 'DMRB Screening Method', Breeze Roads can take into account annualised meteorological data; it can take into account source, receiver and terrain heights; canyon effects can be modelled; and the model can calculate hourly concentrations.

Annex 3 of TG(09) provides detailed guidance on the modelling of air pollutants and in particular highlights a procedure to validate models. The procedure discusses the comparison of modelled results against measured levels, either from diffusion tubes (for NO_2) or continuous monitors (for NO_2 or PM_{10}).

Model verification and subsequent adjustment for oxides of nitrogen is undertaken based upon NO_X as most models (including Breeze Roads) predict NO_2 based upon its relationship to NO_x. Consequently, the verification process requires conversion to NO_x of any measurements of NO_2 in order to compare against modelled levels of NO_x.

[4] Part IV of the Environment Act 1995, Local Air Quality Management Technical Guidance (TG09), Defra, February 2009.

Defra has published in 2009 a methodology to calculate NO_x from NO_2 and as part of its LAQM toolkit[5]. The calculation method allows local authorities and air quality consultants to derive NO_2 and NO_x wherever NO_x is predicted by modelling emissions from roads. The calculation method incorporates the impact of expected changes in the fraction of NO_x emitted as NO_2 (f – NO_2) and changes in regional concentrations of NO_x, NO_2 and O_3.

Background concentrations for various pollutants are published and updated regularly by Defra, so it is possible to calculate the contribution of NO_x from road traffic at a particular location. If the ratio of the monitored road traffic contribution to the modelled road traffic contribution of NO_x is calculated, this factor can be applied to the component derived from road traffic emissions for any predictions of NO_x in the area. Therefore, it is possible to validate the model such that predictions should be within 10% of air quality measurements.

[5] http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html

Appendix 4
Modelling Procedure and Input Data

Appendix 4: Modelling Procedure and Input Data

The following Appendix summarises the input data and assumptions used in the modelling of air pollutants.

Model Input Data

Traffic flows in the vicinity of the site have been provided by WSP, the transport consultants for the scheme. Data was provided for 2016 and 2029 (the proposed future baseline year). For the purposes of the assessment, the baseline year was 2014 and the opening year of the development was considered to be 2018. For the purposes of the assessment, the 2016 traffic data is considered to be representative of 2014 flows and the 2029 traffic flow data is considered to be an overestimation of the likely 2018 traffic flow data and therefore is likely to represent a worst-case scenario.

Using the traffic flow data, it has been possible to calculate the emission factors using Defra's Emission Factor Toolkit Version 7.0, published in 2016 in accordance with the latest guidance. NO_x Emission Factors are taken from the European Environment Agency (EEA) COPERT 4 (v11) emission calculation tool, with emission factors for other pollutants are those published by the Department for Transport combined with information on fleet composition on different road types collected as part of the National Atmospheric Emissions Inventory. The traffic information and emission factors are detailed in the tables below for 2014 (baseline year) and 2018 (opening year).

Model Input Data 2014

Road	AADT	% HGV	Speed km/h	Emission Factor g /veh km		
				NO_x	PM_{10}	$PM_{2.5}$
A1	43584	6.3	118	0.612371	0.030441	0.047468
Theobolds Lane	3570	0.5	48	0.358899	0.036205	0.021947
B176	22200	2	48	0.406477	0.038143	0.023217
A121	17250	3.9	64	0.418281	0.040013	0.024271

Model Input Data 2018 – Without Development

Road	AADT	% HGV	Speed km/h	Emission Factor g /veh km		
				NO_x	PM_{10}	$PM_{2.5}$
A1	52032	6.3	118	0.408734	0.03998	0.023295
Theobolds Lane	5130	0.5	48	0.2561466	0.033078	0.01894
B176	24936	2	48	0.2773943	0.034624	0.019839
A121	19992	3.9	64	0.2733918	0.03623	0.020644

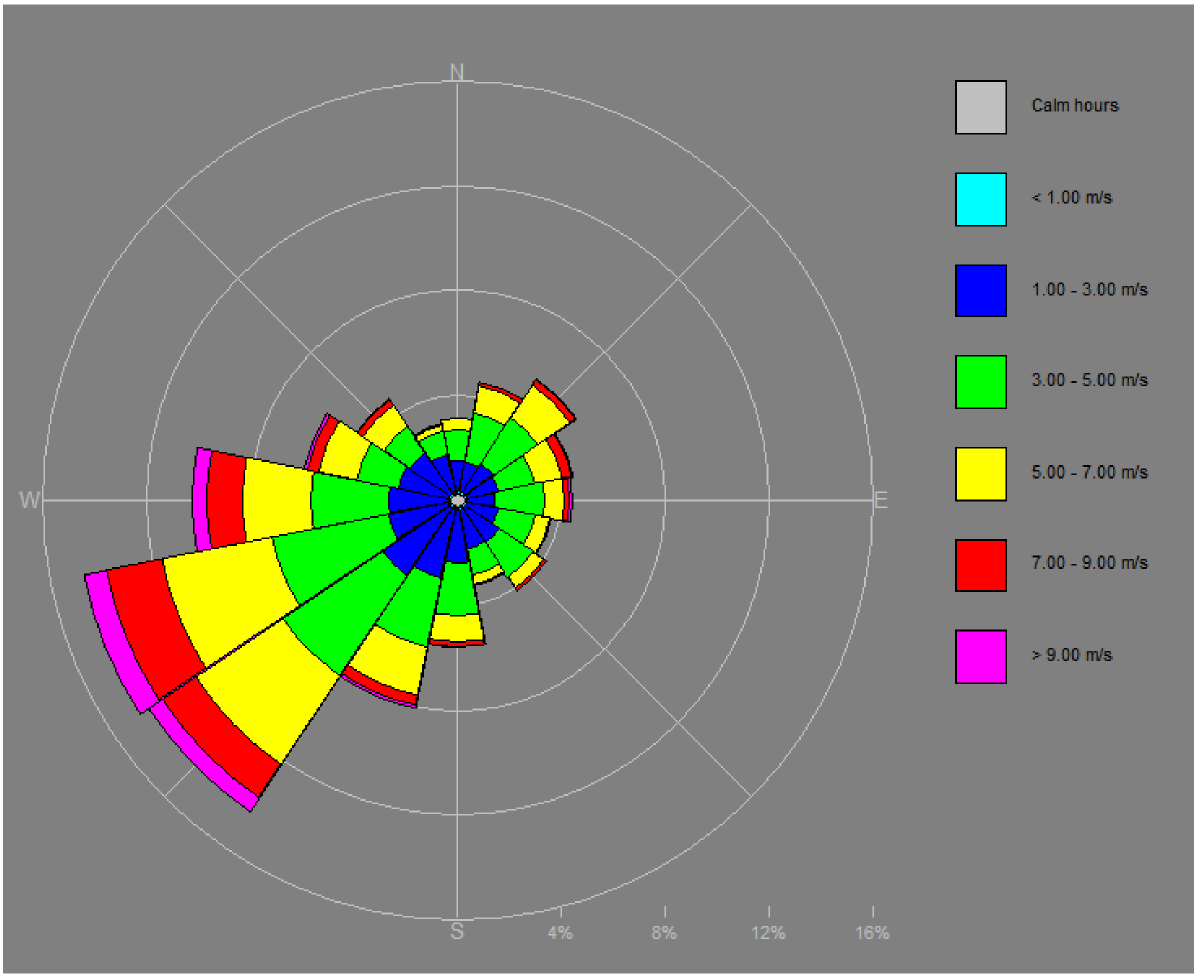
Model Input Data 2018 – With Development

Road	AADT	% HGV	Speed km/h	Emission Factor g /veh km		
				NO_x	PM_{10}	$PM_{2.5}$
A1	52470	6.3	118	0.408734	0.039979951	0.023295
Theobolds Lane	6036	0.5	48	0.256147	0.033077869	0.01894
B176	25272	2	48	0.277394	0.034624074	0.019839
A121	20568	3.9	64	0.273392	0.03623041	0.020644

Meteorological Data

TG(09) suggests that a single year's meteorological data will be sufficient to predict air pollution concentrations. Meteorological data was obtained for the nearest meteorological station to the proposed development site, which is situated at RAF Northolt in Hillingdon (Surface Station Number 3672). The meteorological data consists of hourly sequential data of wind speed, wind direction, surface temperature, precipitation rate and cloud cover data. This data was used for both model verification and future year scenarios. The figure below shows the wind rose data used in the modelling.

Wind Rose - RAF Northolt



Background Concentration of Air Pollutants

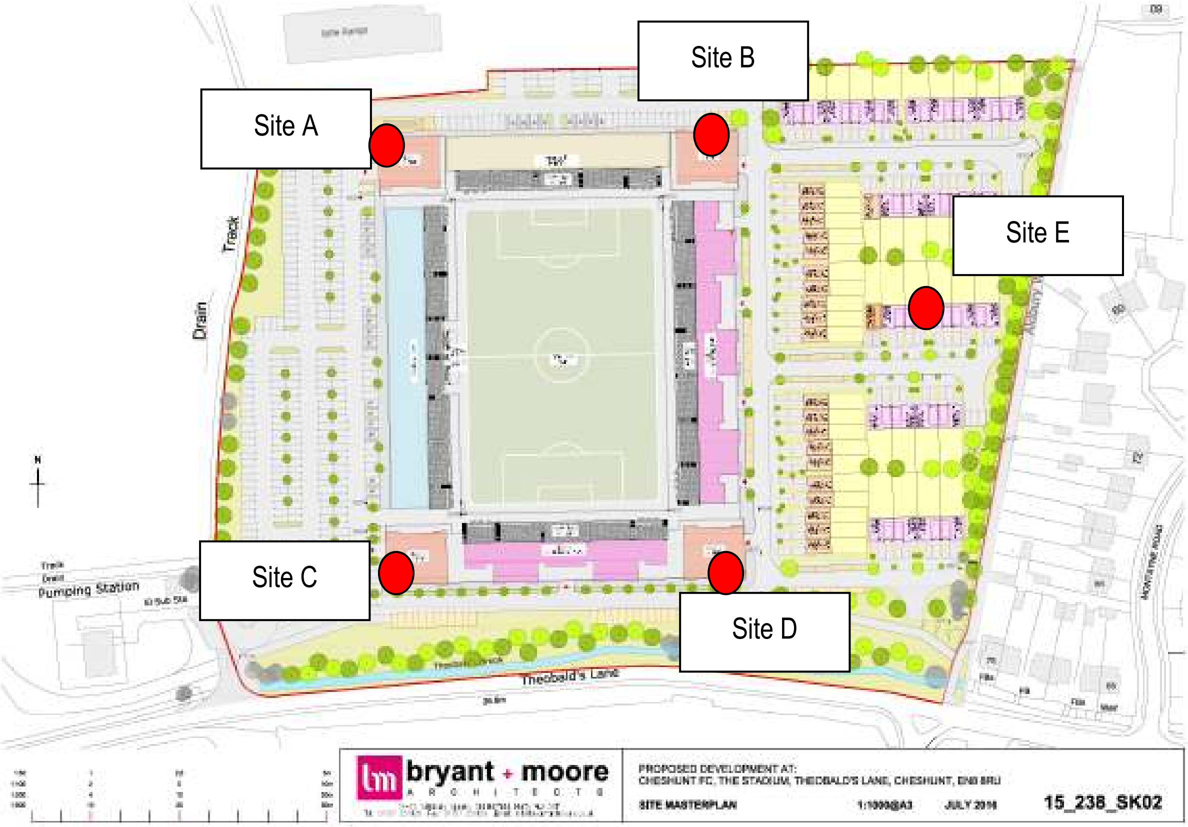
Background concentrations of air pollutants for the modelling were obtained from the UK National Air Quality Information Archive, in accordance with Local Air Quality Management Technical Guidance TG(09). The Table below identifies the background concentrations used in the model for the baseline year (2014) and the proposed year of occupation (2018). In order to avoid 'double counting', major road sources within the grid square identified were removed from the total background as they have been explicitly modelled as part of the assessment.

Background Concentrations of Pollutants

Year	Grid Reference	NO_x µg/m³	NO_2 µg/m³	PM_{10} µg/m³	$PM_{2.5}$ µg/m³
2014	535500,201500	26.73	18.59	17.53	12.45
2018	535500,201500	21.51	15.26	16.81	11.79

Receptor Locations

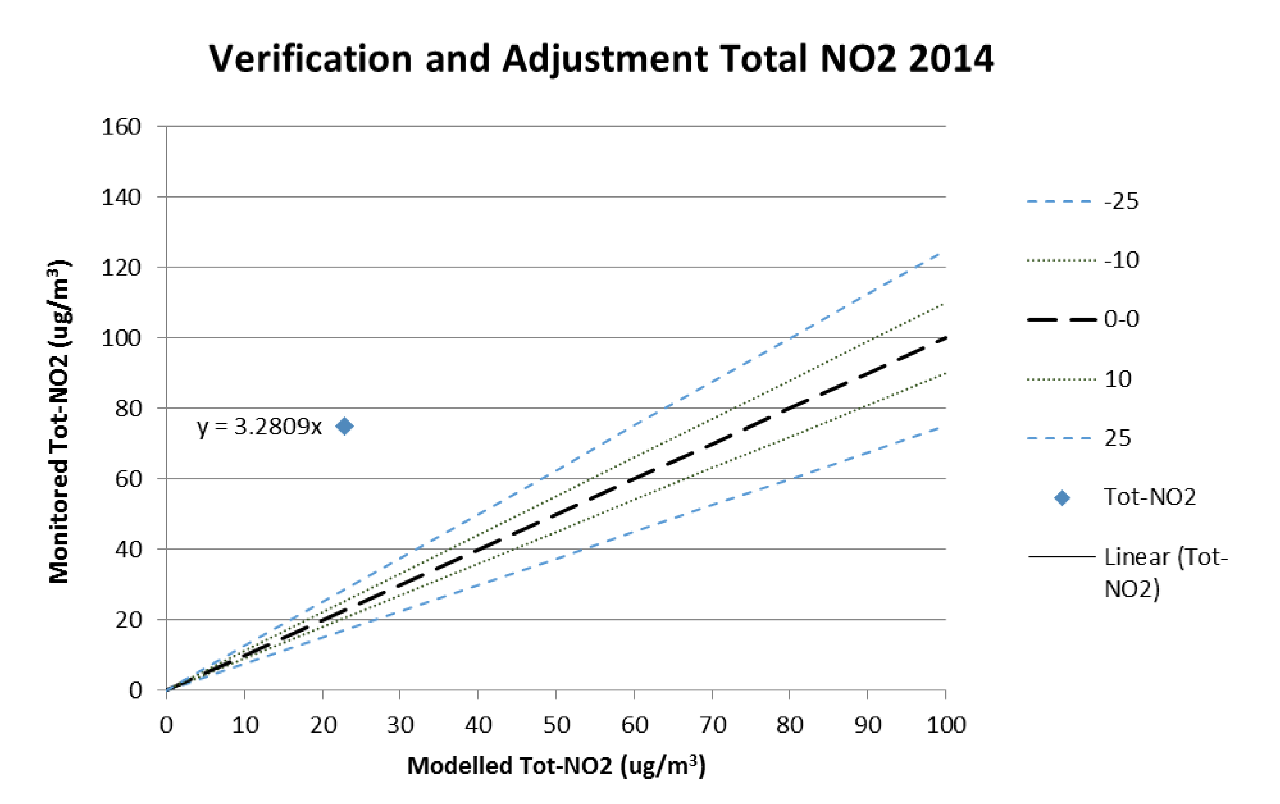
The site plan below shows the locations of the sample sensitive receptor locations used within the modelling:

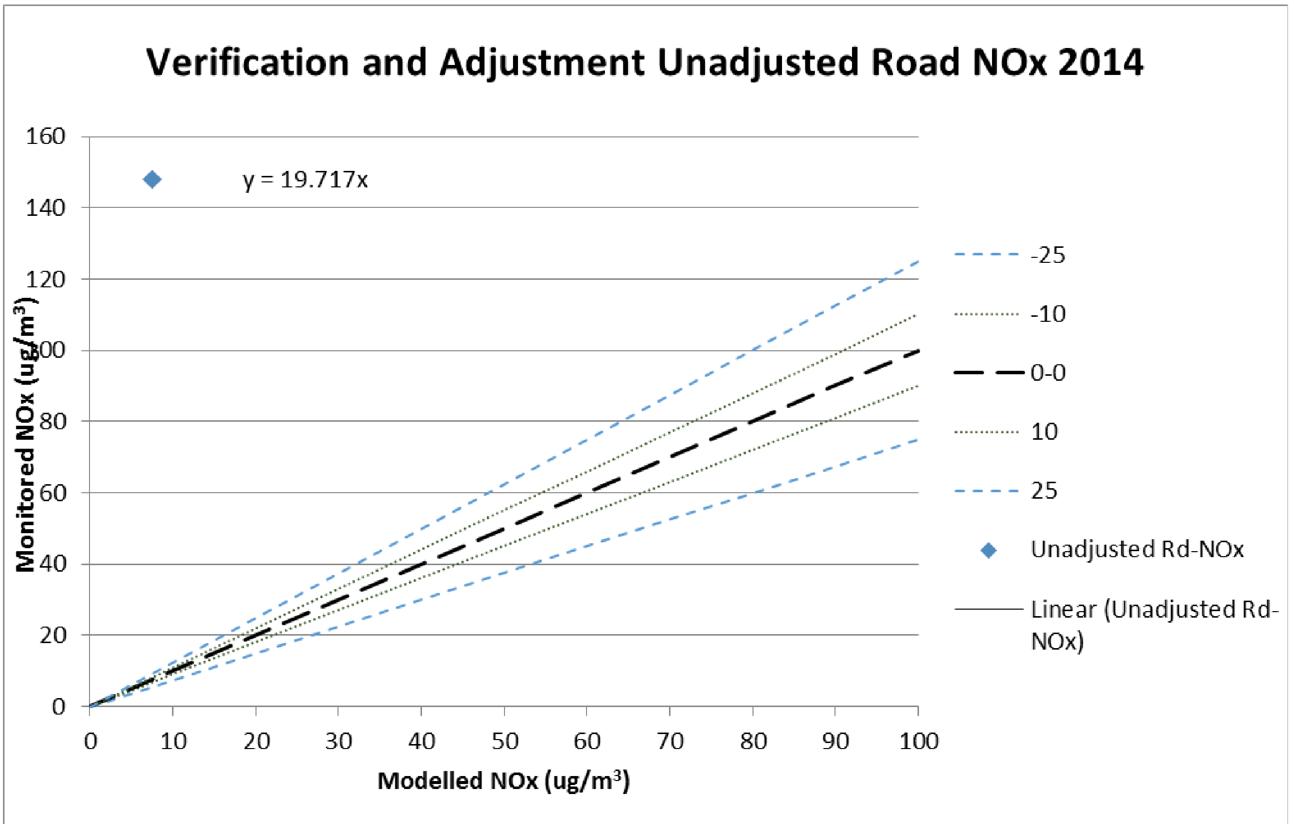


Verification and Adjustment

Verification of the air pollutant model was carried out in accordance with LAQM Technical Guidance TG(09) using the data from the diffusion tube located in the vicinity of the site for 2014. The exercise required the modelling of the diffusion tube location for 2014 and comparing the modelled results with the monitoring results. The verification data is summarised below and shows that pollutant concentrations where under predicted using the model; therefore an adjustment factor was applied to the model contribution of NO_x.

	Modelled Rds NOx	Modelled Tot-NO2	Monitored Tot-NO2	%Diff Mod/Mon Tot-NO2	Modelled Rd-NOx	Monitored Rd-Nox	NOx ADJ Corr1	Adj Mod Rd-NOx	Adj Mod Tot-NO2	Monitored Tot-NO2	%Diff Mod/Mon Adj Tot-NO2
Great Cambridge Road, Cheshunt	7.50	22.89	75.1	-70	7.50	147.88	19.72	147.90	75.11	75.1	0
						Regression	**19.72**				


Verification and Adjustment Total NO2 2014
Monitored Tot-NO2 (ug/m³)
Modelled Tot-NO2 (ug/m³)
y = 3.2809x
-25
-10
0-0
10
25
Tot-NO2
Linear (Tot-NO2)
0
20
40
60
80
100
120
140
160
0
10
20
30
40
50
60
70
80
90
100


Verification and Adjustment Unadjusted Road NOx 2014
Monitored NOx (ug/m³)
Modelled NOx (ug/m³)
y = 19.717x
-25
-10
0-0
10
25
Unadjusted Rd-NOx
Linear (Unadjusted Rd-NOx)
0
20
40
60
80
100
120
140
160
0
10
20
30
40
50
60
70
80
90
100

PM_{10} Exceedences

The number of exceedences of 50 µg/m^3 as a 24-hour mean PM_{10} concentration has been calculated from the modelled total annual mean concentration following the relationship advised by Defra:

$A = -18.5 + 0.00145\ B^3 + 206/B$

where A is the number of exceedences of 50 µg/m^3 as a 24-hour mean PM_{10} concentration and B is the annual mean PM_{10} concentration.

Appendix 5
IAQM Construction Dust Guidance

Appendix 5: IAQM Construction Dust Guidance

The Institute of Air Quality Management's *Guidance on the assessment of dust from demolition and construction (February 2014)* contains a complex methodology for determining the significance of construction impacts on air quality. The assessment is summarised in Section 8 of this report. However, depending on the outcome of the Risk Assessment, mitigation is recommended. The following summarises the various mitigating measures that may be required:

Step 3 – Site Specific Mitigation

8.2 Dust and Air Emissions Mitigation Measures

The mitigation measures have been divided into general measures applicable to all site and measures applicable specifically to demolition, earthworks, construction and trackout, for consistency with the assessment methodology. The following tables detail the mitigation required for high, medium and low risk sites, as determined in **STEP 2C.**

For those mitigation measures that are general, the highest risk category should be applied. For example, if the site is medium risk for earthworks and construction, but a high risk for demolition and track-out, the general measures applicable to a high risk site should be applied.

It should be noted that it is difficult to provide generic guidance, as each site and its location will be different and professional judgement is required.

Key to tables:

H Highly recommended
D Desirable
N Not required

Mitigation for all sites: Communications

Mitigation measure	Low Risk	Medium Risk	High Risk
1. Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	N	H	H
2. 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.	H	H	H
3. Display the head or regional office contact information	H	H	H

Mitigation for all sites: Dust Management

Mitigation measure	Low Risk	Medium Risk	High Risk
4. Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM10 continuous monitoring and/or visual inspections.	D	H	H
Site Management			
5. 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.	H	H	H
6. Make the complaints log available to the local authority when asked.	H	H	H
7. Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	H	H	H
8. Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.	N	N	H
Monitoring			
9. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.	D	D	H
10. 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	H	H	H
11. 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.	H	H	H
12. Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	N	H	H
Preparing and maintaining the site			
13. Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H	H	H
14. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	H	H	H
15. Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period	D	H	H
16. Avoid site runoff of water or mud.	H	H	H
17. Keep site fencing, barriers and scaffolding clean using wet methods.	D	H	H

Mitigation measure	Low Risk	Medium Risk	High Risk
18. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	D	H	H
19. Cover, seed or fence stockpiles to prevent wind whipping.	D	H	H
Operating vehicle/machinery and sustainable travel			
20. Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable	H	H	H
21. Ensure all vehicles switch off engines when stationary - no idling vehicles.	H	H	H
22. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H	H	H
23. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)	D	D	H
24. Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	N	H	H
25. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)	N	D	H
Operations			
26. 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.	H	H	H
27. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H	H	H
28. Use enclosed chutes and conveyors and covered skips.	H	H	H
29. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H	H	H
30. 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.	D	H	H
Waste management			
31. Avoid bonfires and burning of waste materials.	H	H	H

Measures specific to demolition

Mitigation measure	Low Risk	Medium Risk	High Risk
32. Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	D	D	H
33. Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	H	H	H
34. Avoid explosive blasting, using appropriate manual or mechanical alternatives.	H	H	H
35. Bag and remove any biological debris or damp down such material before demolition.	H	H	H

Measures specific to earthworks

Mitigation measure	Low Risk	Medium Risk	High Risk
36. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable..	N	D	H
37. Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable	N	D	H
38. Only remove the cover in small areas during work and not all at once	N	D	H

Measures specific to construction

Mitigation measure	Low Risk	Medium Risk	High Risk
39. Avoid scabbling (roughening of concrete surfaces) if possible	D	D	H
40. 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 appropriate additional control measures are in place.	D	H	H
41. 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.	N	D	H
42. For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	N	D	D

Measures specific to trackout

Mitigation measure	Low Risk	Medium Risk	High Risk
43. 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.	D	H	H
44. Avoid dry sweeping of large areas.	D	H	H
45. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D	H	H
46. Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	N	H	H
47. Record all inspections of haul routes and any subsequent action in a site log book.	D	H	H
48. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	N	H	H
49. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D	H	H
50. Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	N	H	H
51. Access gates to be located at least 10m from receptors where possible.	N	H	H