

# **AIR QUALITY**

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## 1.0 INTRODUCTION

### Overview

- 1.1. Hawkins Environmental Limited has been instructed by Satnam Millennium Ltd to undertake an air quality assessment for the proposed redevelopment of Peel Hall, Warrington.
- 1.2. The Scoping Report of the Environmental Impact Assessment has 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*.
- 1.3. Discussions with Richard Moore within the Environmental Protection Team of Warrington Borough Council has confirmed the scope and methodology for the assessment.
- 1.4. This report assesses the overall levels of nitrogen dioxide (NO<sub>2</sub>) and particulates (PM<sub>10</sub> and PM<sub>2.5</sub>) 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.

### Site Description

- 1.5. The site is generally open grassland and scrub vegetation with mature hedges and trees along field boundary drains. There is a small woodland coppice with further mature vegetation surrounding sports pitches towards the eastern boundary. A detailed assessment of the habitats and vegetation within the site is set out in section 6 of the ES.
- 1.6. The highest point of the site is to the east of Peel Hall at 20.57 metres A.O.D. From that point the land falls to the North West boundary at 17.4 metres A.O.D and to approximately 10 metres A.O.D along the Southern boundary. The general visual impression gained on site is that it is predominantly flat without major undulations.
- 1.7. Peel Cottage and Peel Hall are both located on Peel Cottage Lane which is located to the north west of the site. Peel Cottage and Peel Hall are not included in this application.

### The Development Proposals

- 1.8. The proposals subject of this ES are for the construction of a new residential neighbourhood comprising up to 1200 houses, together with up to 2.3 hectares of employment uses (B1 uses) and a local centre including a food store (A1 and A5 uses), healthcare (D1) and a family pub (A4). The site will also contain a primary school site and open space provision including sports pitches with ancillary facilities, together with means of access and buffer planting zones. The total site area is circa 63 hectares (158 acres). The location of the site is shown on **Appendix 1**.

## 2.0 PLANNING POLICY

### The National Planning Policy Framework

- 2.1. In March 2012, the National Planning Policy Framework<sup>1</sup> (NPPF) was published to replace the thousands of pages of national planning policy guidance, including guidance on air quality. Amongst other documents, the NPPF replaces the 2004 document *Planning Policy Statement 23 (PPS 23) 'Planning and Pollution Control'*<sup>2</sup> published by the Office for the Deputy Prime Minister, which is now officially withdrawn as official government guidance. PPS 23 provided planning policy on all types of pollution control, including air quality.
- 2.2. 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 buildings;*
  - *Take account of the different roles and character of different areas, promoting the vitality of the main urban areas, protecting the Green Belts around them, recognising the intrinsic beauty of the countryside; and*
  - *Contribute to conserving and enhancing the natural environmental and reducing pollution”*
- 2.3. It also states that the planning system “should contribute to enhance the natural environment, by... preventing both new and existing development from contributing to or being put at risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution...To prevent unacceptable risks from pollution, planning policies and decisions should ensure that new development is appropriate for its location”.
- 2.4. 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.”

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<sup>1</sup> <http://www.communities.gov.uk/documents/planningandbuilding/pdf/2116950.pdf>

<sup>2</sup> Planning Policy Statement 23: Planning & Pollution Control (2004). Office for the Deputy Prime Minister .

### National Planning Practice Guidance on Air Quality

- 2.5. 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.
- 2.6. 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)”*.
- 2.7. The Guidance identifies the content of an air quality assessment, stating clearly that *“Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality”* and that *“Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact”*.

### Local Policy

- 2.8. Policy QE 6 of Warrington Borough Council's Local Plan Core Strategy (Adopted July 2014) states that *“The Council, in consultation with other Agencies, will only support development which would not lead to an adverse impact on the environment or amenity of future occupiers or those currently occupying adjoining or nearby properties, or does not have an unacceptable impact on the surrounding area. The Council will take into consideration the following: ... Air quality... the effect and timing of traffic movement to, from and within the site and car parking including impacts on highway safety.”*

### 3.0 ASSESSMENT CRITERIA

#### Impacts of the Local Area on the Development

- 3.1. The Limit Values and National Air Quality Objectives<sup>3</sup> (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.
- 3.2. 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 $\mu\text{g}/\text{m}^3$ Not to be exceeded more than 24 times per calendar year
	One Day	150 $\mu\text{g}/\text{m}^3$ Not to be exceeded more than 3 times per calendar year
Nitrogen Dioxide	One Hour	200 $\mu\text{g}/\text{m}^3$ Not to be exceeded more than 18 times per calendar year
	Calendar Year	40 $\mu\text{g}/\text{m}^3$

<sup>3</sup> <http://www.legislation.gov.uk/uksi/2010/1001/contents/made>

Pollutant	Averaging Period	NAQO Limit Value
Benzene	Calendar Year	5 µg/m <sup>3</sup>
Lead	Calendar Year	0.5 µg/m <sup>3</sup>
PM <sub>10</sub>	One Day	50 µg/m <sup>3</sup> Not to be exceeded more than 35 times per calendar year
	Calendar Year	40 µg/m <sup>3</sup>
PM <sub>2.5</sub>	Calendar Year	25 µg/m <sup>3</sup>
Carbon Monoxide	Maximum daily running 8 hour mean	10 mg/m <sup>3</sup>

#### Impacts of the Development on the Local Area

- 3.3. 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

- 3.4. 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.”*

3.5. It should be noted that to bring the noise chapter of the ES in line with the other ES chapters, the magnitude impacts will be described as Negligible, Minor, Moderate and Major. For the purposes of this report, these terms are seen as interchangeable to Negligible, Slight, Moderate and Substantial.



3.6. *Land-Use Planning & Development Control: Planning for Air Quality*, takes extensively about assessing significance in air quality assessments. As described in the guidance, the “assessment framework for describing impacts can be used as a starting point to make a judgement on significance of effect, but there will be other influences that might need to be accounted for. The impact descriptors set out in [Table 3.2 of this report] are not, of themselves, a clear and unambiguous guide to reaching a conclusion on significance. These impact descriptors are intended for application at a series of individual receptors. Whilst it may be that there are ‘slight’, ‘moderate’ or ‘substantial’ impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances.” The guidance goes on to say that any significance needs to be assessed using a certain amount of professional judgement and should take into account “the existing and future air quality in the absence of the development; the extent of current and future population exposure to the impacts; and the influence and validity of any assumptions adopted when undertaking the prediction of impacts”.

### Construction Dust Impact Assessment

3.7. The Institute of Air Quality Management published in 2014<sup>4</sup> 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.

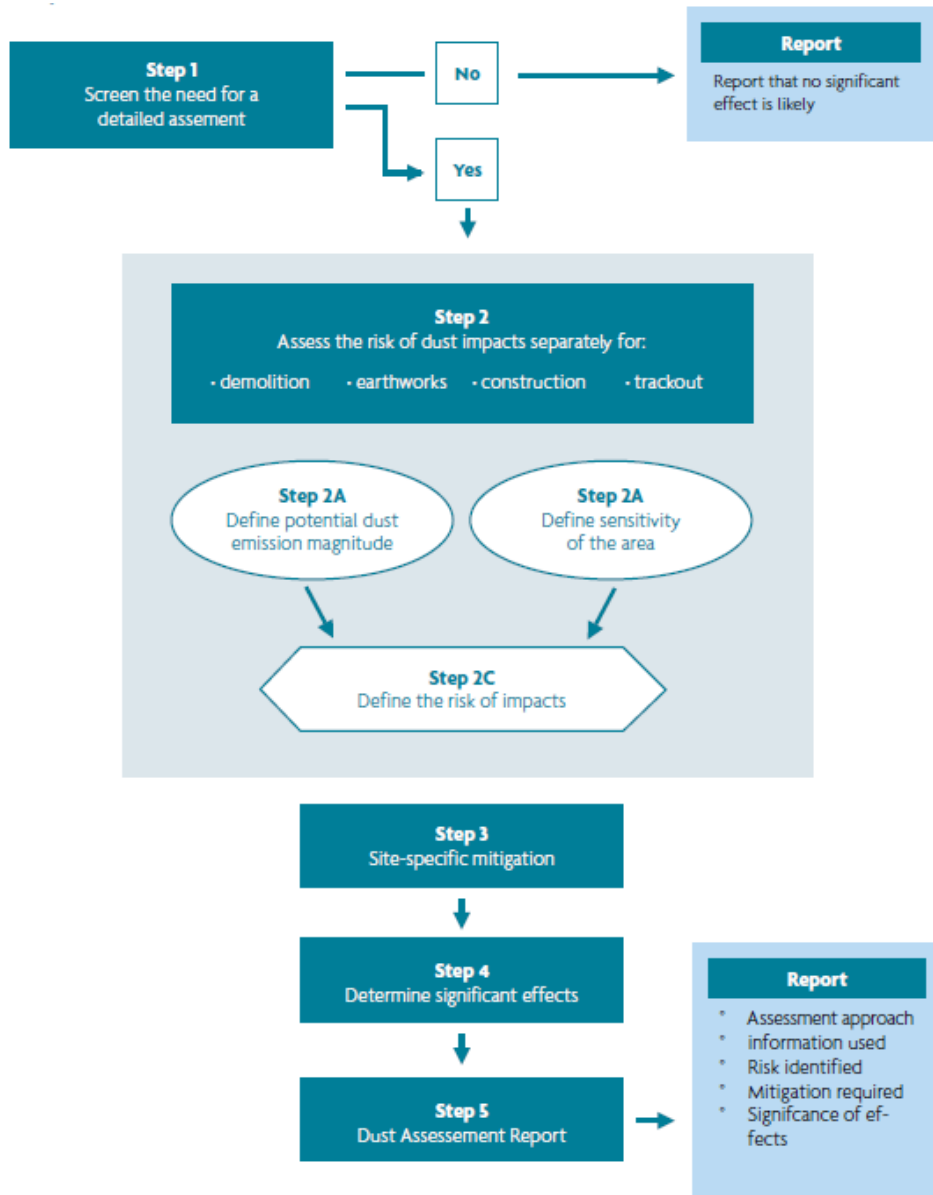
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<sup>4</sup> Holman et al (2014). *IAQM Guidance on the assessment of dust from demolition and construction*, Institute of Air Quality Management, London. [www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf](http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf).

- **STEP 5** is to prepare the dust assessment report.”

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

**Figure 3.1: Schematic Diagram of the Construction Dust Assessment Process**



## 4.0 SCOPING

### Overview

- 4.1. 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 be assessed.

### Impacts of the Local Area on the Development

- 4.2. 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 NO<sub>2</sub>), 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.”*

### Impacts of the Development on the Local Area

- 4.3. 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.”*

- 4.4. **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.
- 4.5. **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:
<ul style="list-style-type: none"><li>• 10 or more residential units or a site area of more than 0.5ha</li><li>• more than 1,000 m<sup>2</sup> of floor space for all other uses or a site area greater than 1ha</li></ul>
B. Coupled with any of the following:
<ul style="list-style-type: none"><li>• the development has more than 10 parking spaces</li><li>• the development will have a centralised energy facility or other centralised combustion process</li></ul>
<b>Note:</b> 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 <sup>a</sup>
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: <ul style="list-style-type: none"> <li>- more than 100 AADT within or adjacent to an AQMA</li> <li>- more than 500 AADT elsewhere</li> </ul>
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 <ul style="list-style-type: none"> <li>- more than 25 AADT within or adjacent to an AQMA</li> <li>- more than 100 AADT elsewhere</li> </ul>
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: <ul style="list-style-type: none"> <li>- more than 25 AADT within or adjacent to an AQMA</li> <li>- more than 100 AADT elsewhere</li> </ul>
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: <ul style="list-style-type: none"> <li>- any centralised plant using bio fuel</li> <li>- any combustion plant with single or combined thermal input &gt;300kW</li> <li>- a standby emergency generator associated with a centralised energy centre (if likely to be tested/used &gt;18 hours a year)</li> </ul>
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.

### Site Specific Scoping Assessment

- 4.6. The proposed development site is bounded to the north by a known Air Quality Management Area, which extends 50m from the kerb of the motorway into the development site and therefore, it is possible that exceedances of the National Air Quality Objective for NO<sub>2</sub> could occur within the development site; therefore **an assessment of the impacts of the local area on the development is required.**
- 4.7. The proposed development consists of up to 1200 new dwellings plus car parking; therefore Stage 1 “A” and “B” criteria are both met. Although no combustion processes are proposed, since there could be increasing in pollutant concentrations, **an assessment of the impacts of the development on the local area will be required.**

## 5.0 METHODOLOGY

5.1. 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;
- Conduct local air quality monitoring within the area of the development site (details of which can be seen in **Appendix 3**);
- 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 4**, utilising data described in **Appendix 5**), 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 4**, utilising data described in **Appendix 5**), 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, including the cumulative impacts of the proposed development;

- Comment upon the likelihood on impacts arising from combustion emissions from onsite plant;
- An assessment of the likelihood of issues relating to dust emissions during the construction phase of the project.



## 6.0 *BASELINE CONDITIONS*

### Air Quality Review and Assessment

- 6.1. 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.
- 6.2. The review of air quality takes on several prescribed stages, of which each stage is reported. Following Warrington Borough Council's initial review of air quality within the Borough in 2001, it showed that the National Air Quality Objectives for nitrogen dioxide (NO<sub>2</sub>) would be complied with in the vast majority of the Warrington, within the exception of the Motorway network; therefore a 50m strip either side of the carriageway was therefore formally designated as an AQMA in 2001. Subsequent assessments have identified additional alternative areas within the Borough experiencing marginal exceedances of the Objective levels.
- 6.3. It is understood through discussions with Warrington Borough Council that although the AQMA remains in place up to 50m from the carriageway, recent improvements in air quality results in exceedances up to distances significantly less than 50m from the carriageways and any exceedances are very marginal. Currently, there are around 40 properties around the motorway network within the AQMA where exceedances of the NAQO would be expected.
- 6.4. Recent air quality monitoring to the west of the proposed development site at the junction of Winwick Road and Long Lane indicate marginal exceedances of the NAQO due to the presence of queuing traffic. Although the area has not been declared an AQMA, Warrington Borough Council is continuing to assess the situation.

### Industrial Emissions

- 6.5. 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.

#### Baseline Onsite Pollution Concentrations

- 6.6. Since Warrington Borough Council did not have any air quality monitoring equipment on or in the vicinity of the proposed development site, it was considered that there was no suitable data that could be used for verification purposes, or that would be representative of the development site. As a consequence, this air quality assessment was accompanied by four months Nitrogen Dioxide monitoring. **Appendix 3** describes the air quality monitoring process, with **Appendix 2** showing the locations of the air quality monitoring.
- 6.7. **Table 6.1** shows the seasonally adjusted and bias corrected results of the diffusion tube survey for 2014 and shows that adjacent to the M62, concentrations of NO<sub>2</sub> are around the NAQO level, which concurs with the AQMA designation. However, the results show that there has been an improvement in air pollution, such that by 100m from the carriageway, concentrations of NO<sub>2</sub> are around background levels.

**Table 6.1: Bias Adjusted Results of the NO<sub>2</sub> Diffusion Tubes**

Location	NO <sub>2</sub> (µg/m <sup>3</sup> )
	Seasonally Adjusted Bias Corrected Annual mean
End of Mill Lane	25.70
Footpath Sigh, Radley Lane	28.09
Footbridge M62*	30.53
Transect - M62 boundary	39.34
Transect - 50m	24.73
Transect - 100m	22.99
Transect - 150m	24.96
1st/14th Warrington West Scout Hut	17.70

Location	NO <sub>2</sub> (µg/m <sup>3</sup> )
	Seasonally Adjusted Bias Corrected Annual mean
Adjacent to wood in middle of site	20.86
<b>NAQO</b>	<b>40</b>

\*= Based on only two months of data – use with caution

## 7.0 IMPACTS OF THE LOCAL AREA ON THE DEVELOPMENT

### Annual Mean Concentrations

- 7.1. 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 (2019). **Appendix 4** provides a description of the methodology used within the assessment, including the method to calculate NO<sub>2</sub> from NO<sub>x</sub>. **Appendix 5** outlines the input data, including traffic data, background concentrations and emission factors. In addition, details of the verification factor applied to the predicted concentrations of NO<sub>x</sub> can also be found in **Appendix 5**.
- 7.2. Concentrations have been calculated for nineteen representative points across the development site. The nine diffusion tube locations have been modelled, plus 10 additional locations through the centre of the site at 10m intervals from the M62 to more accurately predict the reduction in NO<sub>2</sub> due to distance from the M62. The traffic flows used for the predictions in **Table 7.1** include 2019 baseline flows, plus development related traffic and all committed development traffic flows.
- 7.3. The locations of these receptor locations can be seen on the site plan in **Appendix 2**. The results of these predictions can be seen in **Table 7.1**.

**Table 7.1: Predicted Future Air Quality Concentrations 2019 – Development Site**

Receptor	NO <sub>2</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )		PM <sub>2.5</sub> (µg/m <sup>3</sup> )
	Annual mean	Annual mean	Days >50 µg/m <sup>3</sup>	Annual mean
End of Mill Lane	27.91	18.31	1.65	14.20
Footpath Sigh, Radley Lane	27.12	18.20	1.56	14.13
Footbridge M62*	32.56	18.93	2.21	14.62
Transect - M62 boundary	33.69	19.08	2.37	14.72
Transect - 50m	28.32	18.36	1.69	14.24
Transect - 100m	27.41	18.24	1.59	14.16
Transect - 150m	26.90	18.18	1.54	14.12

Receptor	NO <sub>2</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )		PM <sub>2.5</sub> (µg/m <sup>3</sup> )
	Annual mean	Annual mean	Days >50 µg/m <sup>3</sup>	Annual mean
1st/14th Warrington West Scout Hut	25.92	18.05	1.44	14.03
Adjacent to wood in middle of site	26.45	18.11	1.49	14.07
Centre of Site – 10m from M62	31.75	18.81	2.11	14.54
Centre of Site – 20m from M62	30.36	18.63	1.93	14.42
Centre of Site – 30m from M62	29.44	18.50	1.82	14.33
Centre of Site – 40m from M62	28.91	18.43	1.76	14.29
Centre of Site – 50m from M62	28.50	18.38	1.71	14.25
Centre of Site – 60m from M62	28.18	18.34	1.68	14.22
Centre of Site – 70m from M62	27.94	18.31	1.65	14.20
Centre of Site – 80m from M62	27.74	18.28	1.63	14.19
Centre of Site – 90m from M62	27.57	18.26	1.61	14.17
Centre of Site – 100m from M62	27.43	18.24	1.60	14.16
<b>NAQO</b>	<b>40</b>	<b>40</b>	<b>35</b>	<b>25</b>

- 7.4. 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 NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> are all below the National Air Quality Objectives.
- 7.5. The results appear to show much lower pollutant concentrations than originally thought, considering an AQMA has been declared 50m either side of the M62. The most northern 30-40m of the proposed development site would be sited within an AQMA and therefore it should be expected that exceedances of the NAQO for NO<sub>2</sub> could occur in the area of the development site closest to the M62. It is understood that at the time of declaration in 2001, exceedances of the NO<sub>2</sub> Objective could occur up to around 50m from the Motorway, hence the designation up to 50m from the Motorway; however, it is also understood that pollutant concentrations in the area have decreased since 2001, and therefore the area experiencing exceedances of the Objective are now likely to be less than 50m from the carriageway. **Table 7.1** shows that this area will have decreased in size sufficiently by 2019

such that none of the development site would be situated in an area where exceedances could occur.

- 7.6. Although exceedance of the NAQOs are not expected on the proposed development, a precautionary approach has been adopted to safeguard the amenity of the future residents. Consequently, early in the design process it was decided that no development of sensitive land uses (e.g. dwellings, educational/healthcare uses) would be situated within the AQMA (i.e. all would be greater than 50m from the Motorway). The exception to this would be to allow apartment developments with mechanical ventilation to be positioned in the zone 40-50m from the Motorway, within the AQMA but within the zone where it is expected that exceedances of the NAQOs no longer occur. The positioning of barrier blocks of this kind will have potentially significant benefits in terms of noise levels across the development site.
- 7.7. Given that the closest dwellings are likely to be greater than 40m from the M62 and the closest naturally ventilated dwellings will be greater than 50m from the M62, even assuming a degree of error in the measurements and calculations, it is not expected that any new dwellings will be situated in an area where exceedances of the NAQOs are likely to occur.

#### NO<sub>2</sub> 1-hour Exposure

- 7.8. According to research conducted in 2003<sup>5</sup>, there is only a risk that the NO<sub>2</sub> 1-hour objective (200 µg/m<sup>3</sup>) could be exceeded if the annual mean nitrogen dioxide concentration is greater than 60 µg/m<sup>3</sup>. At the development site, the worst case annual mean is 33.69 µg/m<sup>3</sup>, therefore hourly exceedances are not expected to occur.

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<sup>5</sup> Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marnier, 2003.

## 8.0 IMPACTS OF THE DEVELOPMENT ON THE LOCAL AREA

### Traffic Related Emissions

- 8.1. 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.
- 8.2. A transport assessment was prepared for the planning application by Highgate Transportation which indicates the number of vehicle movements generated by the proposed development. It should be noted that the traffic data used in these assessments does include all committed development.
- 8.3. 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 (2019) both with and without the proposed development traffic. **Appendix 4** provides a description of the methodology used within the assessment, including the method to calculate NO<sub>2</sub> from NO<sub>x</sub>. **Appendix 5** outlines the input data, including traffic data, background concentrations. In addition, details of the verification factor applied to the predicted concentrations of NO<sub>x</sub> can also be found in **Appendix 5**.
- 8.4. Concentrations have been calculated for thirteen sensitive receptors at locations likely to be most affected by changes in both relative and absolute traffic flows. The locations of these receptor locations can be seen on the plan in **Appendix 5**. The results of these predictions can be seen in **Table 8.1** and **Table 8.2**, for without with development related traffic flows respectively.

**Table 8.1: Air Quality Concentrations 2019 – Without Development Related Traffic**

Receptor	NO <sub>2</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )		PM <sub>2.5</sub> (µg/m <sup>3</sup> )
	Annual mean	Annual mean	Days >50 µg/m <sup>3</sup>	Annual mean
61 Mill Lane	26.29	18.10	1.48	14.07
2 Mill Lane	27.19	18.21	1.57	14.14
15 Colstream Close	26.13	18.09	1.47	14.06
112 St Bridgets Close	26.04	18.09	1.47	14.05
132 Capesthorne Road	26.14	18.12	1.50	14.07
2 Birch Avenue	26.49	18.15	1.52	14.09
36 Cotswold Road	26.08	18.09	1.47	14.06
21 Sandy Lane West	26.02	18.09	1.47	14.05
83 Myddleton Lane	26.16	18.08	1.47	14.05
71 Statham Ave	25.82	18.05	1.44	14.03
150 Poplars Ave	25.96	18.08	1.46	14.04
312 Poplars Ave	26.16	18.11	1.49	14.07
358 Poplars Avenue	26.19	18.11	1.49	14.07
<b>NAQO</b>	<b>40</b>	<b>40</b>	<b>35</b>	<b>25</b>

**Table 8.2: Air Quality Concentrations 2019 – With Development Related Traffic**

Receptor	NO <sub>2</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )		PM <sub>2.5</sub> (µg/m <sup>3</sup> )
	Annual mean	Annual mean	Days >50 µg/m <sup>3</sup>	Annual mean
61 Mill Lane	26.46	18.15	1.52	14.09
2 Mill Lane	27.26	18.23	1.58	14.15
15 Colstream Close	26.23	18.12	1.49	14.07
112 St Bridgets Close	26.12	18.11	1.49	14.07
132 Capesthorne Road	26.20	18.14	1.51	14.08
2 Birch Avenue	26.51	18.16	1.53	14.10



Receptor	NO <sub>2</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )		PM <sub>2.5</sub> (µg/m <sup>3</sup> )
	Annual mean	Annual mean	Days >50 µg/m <sup>3</sup>	Annual mean
36 Cotswold Road	26.13	18.11	1.48	14.06
21 Sandy Lane West	26.06	18.10	1.48	14.06
83 Myddleton Lane	26.22	18.09	1.48	14.06
71 Statham Ave	25.86	18.06	1.44	14.03
150 Poplars Ave	26.10	18.11	1.49	14.06
312 Poplars Ave	26.35	18.16	1.53	14.09
358 Poplars Avenue	26.39	18.16	1.53	14.09
<b>NAQO</b>	<b>40</b>	<b>40</b>	<b>35</b>	<b>25</b>

8.5. 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 just under 0.5%, which is imperceptible at all receptor locations. 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: Assessment of the Impacts of the Increases in Traffic Flow**

Receptor	NO <sub>2</sub> (µg/m <sup>3</sup> ) Annual mean		% Change in Concentrations Relative to Air Quality Assessment Level (AQAL)	Long Term Average Concentration at Receptor in Assessment Year	Impact Descriptor
	Without Development	With Development			
61 Mill Lane	26.29	26.46	0.425	66% of AQAL	<i>Negligible</i>
2 Mill Lane	27.19	27.26	0.175	68% of AQAL	<i>Negligible</i>
15 Colstream Close	26.13	26.23	0.25	66% of AQAL	<i>Negligible</i>
112 St Bridgets Close	26.04	26.12	0.2	65% of AQAL	<i>Negligible</i>
132 Capesthorpe Road	26.14	26.2	0.15	66% of AQAL	<i>Negligible</i>
2 Birch Avenue	26.49	26.51	0.05	66% of AQAL	<i>Negligible</i>
36 Cotswold Road	26.08	26.13	0.125	65% of AQAL	<i>Negligible</i>
21 Sandy Lane West	26.02	26.06	0.1	65% of AQAL	<i>Negligible</i>
83 Myddleton Lane	26.16	26.22	0.15	66% of AQAL	<i>Negligible</i>
71 Statham Ave	25.82	25.86	0.1	65% of AQAL	<i>Negligible</i>
150 Poplars Ave	25.96	26.10	0.35	65% of AQAL	<i>Negligible</i>
312 Poplars Ave	26.16	26.35	0.475	66% of AQAL	<i>Negligible</i>
358 Poplars Avenue	26.19	26.39	0.5	66% of AQAL	<i>Negligible</i>
<b>NAQO</b>	<b>40</b>	<b>40</b>	<b>-</b>	<b>-</b>	<b>-</b>

### Cumulative Impacts

- 8.6. It is understood that there are a number of other committed developments in the area that have been consented that will contribute to increased traffic flow in the area. Whilst the increase in traffic flow direct attributed to the proposed development is unlikely to have a significant impact, the cumulative impact of the other proposed developments combined with the proposed traffic generation from the Peel Hall development has been assessed to determine the cumulative impact from all development.
- 8.7. The committed developments under consideration are as follows:
- Land at Benson Road, Birchwood (ref: 2015/26220).
  - Birchwood Shopping Centre (ref: 2015/25880).
  - Birchwood Park (ref: 2015/26044, 2014/23358 and 2008/12744).
  - Calver Park (ref: 2015/26685 and 2013/22533).
- 8.8. In order to assess the impact of the proposed development, previously the air pollutant concentrations as described in **Table 8.1**, **Table 8.2** and **Table 8.3** have been modelled both with and without the proposed development, including all committed development traffic. However, in **Table 8.4**, the air pollutant concentrations with the proposed development and all other committed development is compared to air pollutant concentrations without either the proposed development or other committed development, to determine the cumulative impact of all development in the area.
- 8.9. The results in **Table 8.4** show that the impact of the increase in traffic flow is still very small at the worst affected sensitive receptors and although the impact is greater when considering all development together, the cumulative impact change in concentrations relative to AQAL is still under 0.5%, which is imperceptible at all receptor locations. Consequently, the cumulative impact of the proposed development and all committed development will not have an impact on the air quality of the local area and the impact is considered to be “negligible”.

**Table 8.4: Assessment of the Cumulative Impacts of the Increases in Traffic Flow**

Receptor	NO <sub>2</sub> (µg/m <sup>3</sup> ) Annual mean		% Change in Concentrations Relative to Air Quality Assessment Level (AQAL)	Long Term Average Concentration at Receptor in Assessment Year	Impact Descriptor
	Without Development	With Development			
61 Mill Lane	26.27	26.46	0.475	66% of AQAL	<i>Negligible</i>
2 Mill Lane	27.18	27.26	0.2	68% of AQAL	<i>Negligible</i>
15 Colstream Close	26.11	26.23	0.3	66% of AQAL	<i>Negligible</i>
112 St Bridgets Close	26.02	26.12	0.25	65% of AQAL	<i>Negligible</i>
132 Capesthorpe Road	26.12	26.2	0.2	66% of AQAL	<i>Negligible</i>
2 Birch Avenue	26.48	26.51	0.075	66% of AQAL	<i>Negligible</i>
36 Cotswold Road	26.08	26.13	0.125	65% of AQAL	<i>Negligible</i>
21 Sandy Lane West	26.02	26.06	0.1	65% of AQAL	<i>Negligible</i>
83 Myddleton Lane	26.14	26.22	0.2	66% of AQAL	<i>Negligible</i>
71 Statham Ave	25.82	25.86	0.1	65% of AQAL	<i>Negligible</i>
150 Poplars Ave	25.96	26.1	0.35	65% of AQAL	<i>Negligible</i>
312 Poplars Ave	26.16	26.35	0.475	66% of AQAL	<i>Negligible</i>
358 Poplars Avenue	26.19	26.39	0.5	66% of AQAL	<i>Negligible</i>
<b>NAQO</b>	<b>40</b>	<b>40</b>	-	-	-

#### Combustion Emissions from Onsite Plant

- 8.10. 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<sub>x</sub> and conform to BS EN 483:1999 *Gas-fired central heating boilers. Type C boilers of nominal heat input not exceeding 70 kW*, although many now emit less than 40 mg/kWh of NO<sub>x</sub>. 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.

## 9.0 CONSTRUCTION DUST IMPACT ASSESSMENT

### Overview

- 9.1. The main air quality impacts that may arise during construction activities are:
- Dust deposition, resulting in the soiling of surfaces;
  - Visible dust plumes; and
  - An increase in concentrations of airborne particles (e.g. PM<sub>10</sub>, PM<sub>2.5</sub>) and nitrogen dioxide due to exhaust emissions from site plant and traffic that can impact adversely on human health.
- 9.2. The most common impacts are dust soiling and increased ambient PM<sub>10</sub> concentrations due to dust arising from the site. Most of this PM<sub>10</sub> is likely to be in the PM<sub>2.5-10</sub> fraction, known as coarse particles.
- 9.3. 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.

### Step 1 – Screening the Need for a Detailed Assessment

- 9.4. 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)."*

9.5. 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.

**Step 1 Summary:**

*A detailed assessment is required to determine potential dust impacts.*

Step 2 – Assess the Risks of Dust Impacts

9.6. 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."*

Step 2a – Dust Emission Magnitude

9.7. 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 that the structures on site to be demolished are every small, the dust emission magnitude is considered to be "small". Significant earthworks are expected to be required given the site of the site and the

dust emission magnitude is therefore considered to be “*large*”. The combined size of all buildings to be constructed on site will be large and therefore the dust emission magnitude is considered to be “*large*”. Regarding trackout, there could be at times up to 15 lorry movements per hour; and sections of unpaved roads could be long considered the size of the site; therefore the dust emission magnitude is expected to be “*large*”

**Table 9.1: Dust Emission Magnitude**

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Large
Construction	Large
Trackout	Large

Step 2b – Sensitivity of the Area

- 9.8. 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.
- 9.9. There are a number of existing dwellings in the area that are considered to be high sensitivity receptors. There are greater than 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.
- 9.10. The annual mean concentration of PM<sub>10</sub> is less than 24 µg/m<sup>3</sup>; given the number of high sensitivity receptors outlined above, this results in a “*medium*” sensitivity of the area to human health impacts for all activities.
- 9.11. 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	Medium	Medium	Medium	Medium
Ecological	Low	Low	Low	Low

Step 2c – Define the Risks

9.12. 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	High	High	High
Human Health	Low	Medium	Medium	Medium
Ecological	Negligible	Low	Low	Low

**Step 2 Summary:**

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

Step 3 – Site Specific Mitigation

9.13. Stage 2 determines that the site is a “*High Risk Site*” in respect of construction, trackout and earthworks.

- 9.14. 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. Since this site has been designated a “High Risk Site”, a Dust Management Plan would be essential and it would be recommended that all 51 points shown in detail in **Appendix 5** should be incorporated into the Plan.

**Step 3 Summary:**

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

Step 4 – Determining Significant Effects

- 9.15. The site is considered a “*High 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.*

Step 5 – Dust Assessment Report

- 9.16. The final step of the guidance is to produce a dust assessment report, which Section 8 of this report summarises.

**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 "High Risk Site". However, with risk appropriate mitigation, residual effects will not be considered significant.*

## 10.0 EVALUATION OF SIGNIFICANCE

### Impacts of the Local Area on the Development

- 10.1. Predictions of pollutant concentrations show that in 2019, the opening year of the development, the whole development site will experience concentrations of all pollutants below the National Air Quality Objective levels; therefore, onsite pollutant concentrations are not considered to be a significant constraint upon the development of the site for residential purposes.

### Impacts of the Development on the Local Area

- 10.2. The evaluation of key impacts has shown that providing suitable precautions are made in the planning and execution of the construction phase of the development, significant impacts can be avoided. The assessment has shown that any increases in pollutant concentrations as a consequence of the proposed development will be considered to be “negligible” and therefore would not be considered to be significant.

## **11.0 MITIGATION**

- 11.1. 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<sub>2</sub> or any other pollutant to future occupiers of the proposed development.

## 12.0 CONCLUSIONS

- 12.1. 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*.
- 12.2. 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 (2019), concentrations of all pollutants are below the National Air Quality Objectives, although marginal exceedances of the National Air Quality Objectives were expected in the baseline year closest to the M62. However, given that the closest dwellings are likely to be greater than 40m from the M62 and the closest naturally ventilated dwellings will be greater than 50m from the M62, even assuming a degree of error in the measurements and calculations, it is not expected that any new dwellings will be situated in an area where exceedances of the NAQOs are likely to occur and therefore no new residents would be exposed to levels of air pollution prejudicial to health or amenity.
- 12.3. 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 considered to be "*negligible*".
- 12.4. 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 "*High Risk Site*". However, with risk appropriate mitigation, residual effects will not be considered significant.

12.5. 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

**National 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.

**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,  $\mu\text{g}/\text{m}^3$ ) 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.

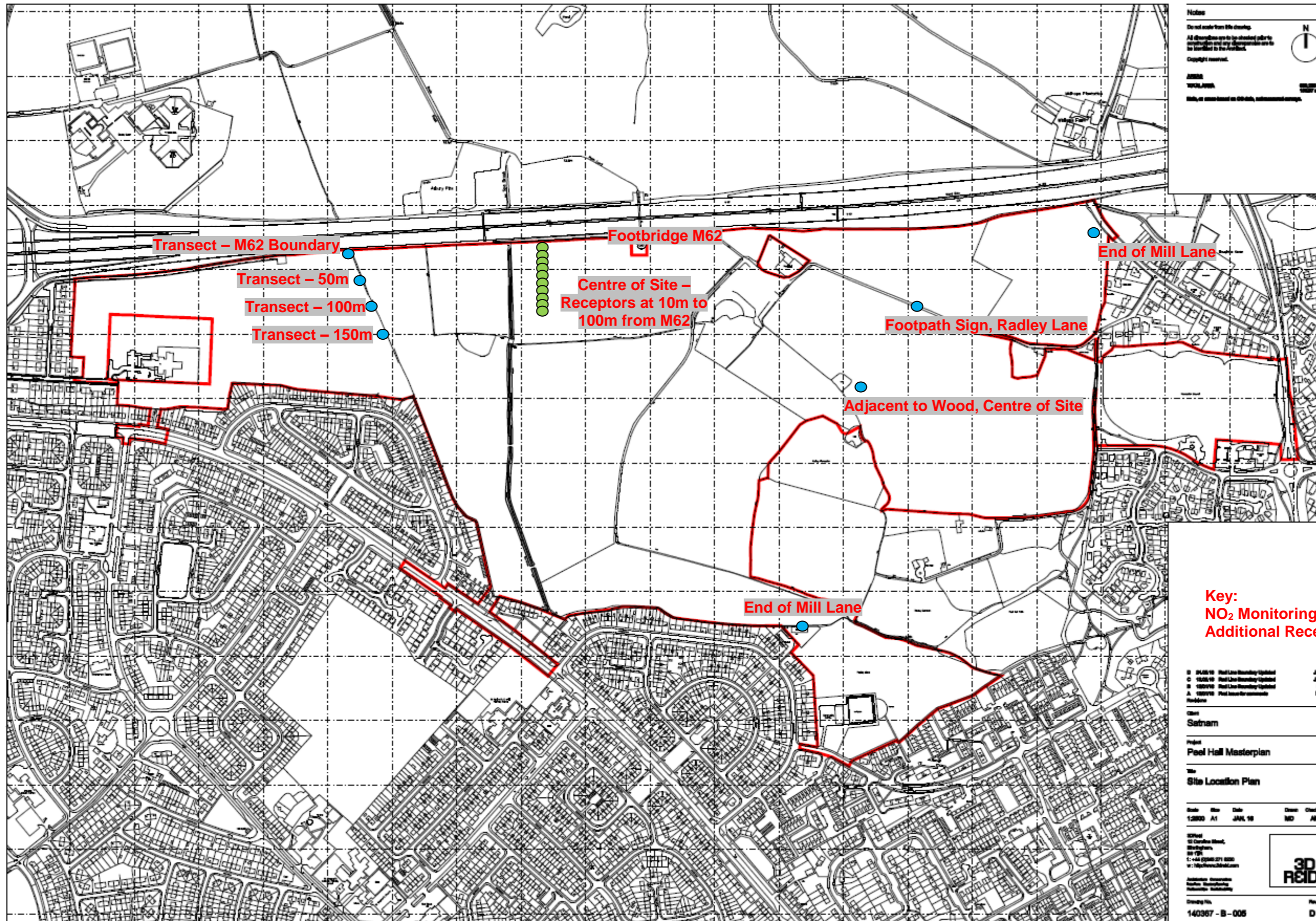
**Nitrogen Oxides:** Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO<sub>2</sub>), which is harmful to health. NO<sub>2</sub> and NO are both oxides of nitrogen and together are referred to as nitrogen oxides (NO<sub>x</sub>).

**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<sub>10</sub> (less than 10 microns in diameter), but the finer fractions such as PM<sub>2.5</sub> (less than 2.5 microns in diameter) is becoming of increasing interest in terms of health effects.

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



# Appendix 2: Site Location Plan





## **Appendix 3: Air Quality Monitoring**

### Overview

Since Warrington Borough Council did not have any air quality monitoring equipment on or in the vicinity of the proposed development site, it was considered that there was no suitable data that could be used for verification purposes, or that would be representative of the development site. As a consequence, this air quality assessment was accompanied by four months Nitrogen Dioxide monitoring.

Nitrogen Dioxide (NO<sub>2</sub>) is commonly the most prevalent pollutant emanating from road traffic; therefore to determine whether air pollution is a problem in a particular area, it is common to measure NO<sub>2</sub>. Palmes-type diffusion tubes are widely used in the UK for indicative measurement of ambient concentrations of NO<sub>2</sub>, as they are relatively inexpensive. Diffusion tubes are passive samplers: they consist of small plastic tubes containing a chemical reagent to absorb the pollutant to be measured directly from the air. In the case of Palmes-type nitrogen dioxide diffusion tubes, the absorbent used is triethanolamine (TEA). Stainless-steel mesh grids at the closed end of the tube are coated with a water-based or acetone-based solution of this absorbent.

### Diffusion Tube Placement

Nine diffusion tubes were utilised for four months from the beginning of September 2014 to the beginning of January 2015. The nine tubes were located around the development site to characterise pollutant concentrations on the development site at present. The locations of the tubes can be seen in Appendix [22](#).

### Raw Data

The diffusion tubes were processed in the laboratories of Gradko, one of the main manufacturers of diffusions tubes in the UK. Gradko provided the raw results for the tubes which are displayed in the Table below.

**Unbias Corrected Results of the NO<sub>2</sub> Diffusion Tubes – September 2014 to January 2015**

Site No.	Location	NO <sub>2</sub> (µg/m <sup>3</sup> ) Annual mean					
		Month 1	Month 2	Month 3	Month 4	4 Month Ave	NAQO
1	End of Mill Lane	37.10	25.11	38.77	35.28	34.06	40
2	Footpath Sigh, Radley Lane	Missing	25.59	48.29	37.84	37.24	40
3	Footbridge M62	Missing	31.50	Missing	49.43	40.47	40
4	Transect - M62 boundary	60.24	35.86	59.48	52.98	52.14	40
5	Transect - 50m	36.19	25.71	34.19	35.03	32.78	40
6	Transect - 100m	31.94	23.04	32.46	34.48	30.48	40
7	Transect - 150m	34.55	23.52	36.02	38.25	33.08	40
8	1st/14th Warrington West Scout Hut	25.19	18.83	Missing	26.37	23.46	40
9	Adjacent to wood in middle of site	29.60	19.78	34.42	26.83	27.66	40

### Bias Adjustment

Diffusion tubes are useful low-cost method for indicative monitoring of ambient nitrogen dioxide (NO<sub>2</sub>) concentrations. However, diffusion tubes are affected by several sources of interference which can cause substantial under or overestimation (often referred to as "bias") compared to the more accurate and much more expensive chemiluminescent analysers. Clearly, any such "bias" is a problem in any situation where diffusion tube results are to be compared with air quality objectives. As a result, local authorities using NO<sub>2</sub> diffusion tubes in their Review and Assessment are required to quantify the "bias" of their diffusion tube measurements and apply an appropriate bias adjustment factor to the annual mean if required.

Bias adjustment factors are normally either locally-derived (in which the accuracy of the diffusion tubes is quantified by exposure alongside an automatic chemiluminescence analyser), or nationally-derived based on the result of many co-location studies (using the same laboratory and tube preparation method).

In the case of this diffusion tube survey, a nationally derived bias adjustment factor of 0.92 has been applied to the results. The adjustment factor was taken from the National Diffusion Tube Bias Adjustment Factor Spreadsheet (March 2016) published by Defra for Gradko 20% TEA diffusion tubes. The adjustment factor was based on 22 studies.

### Seasonal Adjustment Factor

Since the air quality measurements were only conducted over four months, but the National Air Quality Objective is an annual mean, the four month mean must be converted to an annual mean. Since pollutant concentrations vary according to season, a seasonal adjustment factor has been applied to the air pollution measurements based on the seasonal relationship at the closest air quality monitoring station. Warrington Borough Council's Updating and Screening Assessment (2015) provides short term adjustment ratios to convert September to December means to annual means. A ratio of 0.82 has been applied to determine an annual mean.

## **Appendix 4: 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<sup>6</sup>.

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<sub>2</sub>) 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.

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<sup>6</sup> Part IV of the Environment Act 1995, Local Air Quality Management Technical Guidance (TG09), Defra, February 2009.

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<sub>2</sub>) or continuous monitors (for NO<sub>2</sub> or PM<sub>10</sub>).

Model verification and subsequent adjustment for oxides of nitrogen is undertaken based upon NO<sub>x</sub> as most models (including Breeze Roads) predict NO<sub>2</sub> based upon its relationship to NO<sub>x</sub>. Consequently, the verification process requires conversion to NO<sub>x</sub> of any measurements of NO<sub>2</sub> in order to compare against modelled levels of NO<sub>x</sub>.

Defra has published in 2009 a methodology to calculate NO<sub>x</sub> from NO<sub>2</sub> and as part of its LAQM toolkit<sup>7</sup>. The calculation method allows local authorities and air quality consultants to derive NO<sub>2</sub> and NO<sub>x</sub> wherever NO<sub>x</sub> is predicted by modelling emissions from roads. The calculation method incorporates the impact of expected changes in the fraction of NO<sub>x</sub> emitted as NO<sub>2</sub> (f – NO<sub>2</sub>) and changes in regional concentrations of NO<sub>x</sub>, NO<sub>2</sub> and O<sub>3</sub>.

Background concentrations for various pollutants are published and updated regularly by Defra, so it is possible to calculate the contribution of NO<sub>x</sub> from road traffic at a particular location. If the ratio of the monitored road traffic contribution to the modelled road traffic contribution of NO<sub>x</sub> is calculated, this factor can be applied to the component derived from road traffic emissions for any predictions of NO<sub>x</sub> in the area. Therefore, it is possible to validate the model such that predictions should be within 10% of air quality measurements.

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<sup>7</sup> <http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>

## Appendix 5: Modelling Procedure and Input Data

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

### Model Input Data

Highgate Transportation, who are the Transport Consultants on the scheme, have provided traffic data for four separate scenarios for the air quality modelling: the baseline 2014; baseline 2019; baseline 2019 + committed development; and baseline 2019 + committed development + development flows.

Using the traffic flow data, it has been possible to calculate the emission factors using Defra's Emission Factor Toolkit Version 6.0.2, published in 2014 in accordance with the latest guidance. NO<sub>x</sub> Emission Factors are taken from the European Environment Agency (EEA) COPERT 4 (v10) 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 the four scenarios.

### **Model Input Data – Baseline 2014**

Road	AADT	Emission Factor g /veh km		
		NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Poplars Avenue	6528	0.547348	0.042598	0.026036
Mill Lane (Blackbrook Av - site access)	9762	0.376587	0.035648	0.021529
Mill Lane (Radley Lane - Delph Lane)	840	0.370877	0.035416	0.021379
Mill Lane (site access - Delph Lane)	9762	0.376587	0.035648	0.021529
Delph Lane	9246	0.438687	0.02991	0.02016
Blackbrook Av (Mill Ln - Capesthorpe Rd)	8244	0.681907	0.048075	0.029588
Blackbrook Av (Capesthorpe Rd - Insall Rd)	9804	0.406886	0.036881	0.022329
Blackbrook A (Insall Rd - Birchwood Way)	10626	0.419838	0.037408	0.022671
Birch Avenue	570	0.450222	0.036506	0.022415
Cotswold Road	2256	0.560308	0.043126	0.026378
Cleveland Road	4944	0.434767	0.038016	0.023065
Sandy Lane West	12810	0.417292	0.037305	0.022604

Road	AADT	Emission Factor		
		g /veh km		
		NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Sandy Lane	4854	0.481886	0.039934	0.024308
Winwick Road (M62 - Sandy Ln West)	37362	0.501416	0.043018	0.026086
Winwick Rd (Sandy Ln W - Hawleys Ln)	38046	0.479837	0.041966	0.025419
Winwick Road (south of Hawleys Lane)	34392	0.473803	0.041672	0.025233
Capesthorne Road	11082	0.4195	0.037395	0.022662
Enfield Park Road	6906	0.38433	0.035963	0.021734
Crab Lane	10266	0.488522	0.040204	0.024484
Birchwood Way (A50 - Blackbrook Av)	16026	0.419572	0.037398	0.022664
Birchwood Way (Blackbrook Av - Crab Ln)	16524	0.428225	0.03775	0.022892
Birchwood Way (Crab Ln - Birchwood)	17592	0.380383	0.035803	0.02163
Howson Road	3648	0.605173	0.044952	0.027562
A50 Long Lane	14682	0.463262	0.039176	0.023817
Statham Avenue	2094	0.388624	0.036138	0.021847
Northway	3438	0.511394	0.041135	0.025087
Hilden Road	6882	0.438374	0.038163	0.02316
Insall Road/Fernhead Lane	7692	0.453007	0.038758	0.023546
Cromwell Avenue	4944	1.10749	0.065397	0.04082
Myddleton Lane	2448	0.400783	0.027547	0.017901
Winwick Link Road	18078	0.561021	0.043155	0.026397
Winwick Road (north of M62)	33474	0.45323	0.040669	0.024598
M62 west	113484	0.766743	0.036986	0.026995
M62 west off slip	11262	0.814729	0.039691	0.028789
M62 west on slip	10854	0.814313	0.039667	0.028773
M62 east	110028	0.77254	0.037313	0.027212
M62 east off slip	8952	0.837556	0.040977	0.029642
M62 east on slip	9696	0.876345	0.043163	0.031092



**Model Input Data – Baseline 2019**

Road	AADT	Emission Factor		
		g /veh km		
		NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Poplars Avenue	6966	0.322232	0.037497	0.021069
Mill Lane (Blackbrook Av - site access)	10056	0.261903	0.032128	0.018057
Mill Lane (Radley Lane - Delph Lane)	900	0.259885	0.031949	0.017956
Mill Lane (site access - Delph Lane)	10056	0.261903	0.032128	0.018057
Delph Lane	9870	0.307023	0.024245	0.01469
Blackbrook Av (Mill Ln - Capesthorne Rd)	8802	0.369771	0.041728	0.023442
Blackbrook Av (Capesthorne Rd - Insall Rd)	10518	0.272607	0.033081	0.018591
Blackbrook A (Insall Rd - Birchwood Way)	11400	0.277183	0.033488	0.01882
Birch Avenue	612	0.321398	0.032364	0.01835
Cotswold Road	2418	0.326811	0.037905	0.021297
Cleveland Road	5304	0.282457	0.033957	0.019083
Sandy Lane West	13740	0.276284	0.033408	0.018775
Sandy Lane	5208	0.299105	0.035439	0.019914
Winwick Road (M62 - Sandy Ln West)	40074	0.286334	0.038062	0.021258
Winwick Rd (Sandy Ln W - Hawleys Ln)	40806	0.279372	0.037224	0.020794
Winwick Road (south of Hawleys Lane)	36888	0.277425	0.03699	0.020664
Capesthorne Road	11886	0.277064	0.033477	0.018814
Enfield Park Road	7242	0.264638	0.032372	0.018193
Crab Lane	10764	0.301449	0.035648	0.020031
Birchwood Way (A50 - Blackbrook Av)	17106	0.277089	0.03348	0.018815
Birchwood Way (Blackbrook Av - Crab Ln)	17724	0.280146	0.033752	0.018968
Birchwood Way (Crab Ln - Birchwood)	18450	0.263244	0.032247	0.018124
Howson Road	3912	0.342661	0.039315	0.022089
A50 Long Lane	15744	0.292524	0.034853	0.019586
Statham Avenue	2232	0.266155	0.032507	0.018269
Northway	3690	0.30953	0.036367	0.020435
Hilden Road	7386	0.283732	0.034071	0.019147
Insall Road/Fernhead Lane	8250	0.288902	0.034531	0.019405
Cromwell Avenue	11070	0.520128	0.055109	0.030949

Road	AADT	Emission Factor		
		g /veh km		
		NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Myddleton Lane	2508	0.279508	0.02375	0.014205
Winwick Link Road	16992	0.327063	0.037927	0.02131
Winwick Road (north of M62)	35904	0.270788	0.036191	0.020222
M62 west	121716	0.436851	0.027067	0.017516
M62 west off slip	12079	0.43764	0.029221	0.018792
M62 west on slip	11641	0.437618	0.029202	0.018781
M62 east	118008	0.436946	0.027327	0.01767
M62 east off slip	9601	0.437994	0.030245	0.019398
M62 east on slip	10399	0.438633	0.031986	0.02043

#### Model Input Data – Baseline 2019 + Committed Development

Road	AADT	Emission Factor		
		g /veh km		
		NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Poplars Avenue	7326	0.322232	0.037497	0.021069
Mill Lane (Blackbrook Av - site access)	10932	0.261903	0.032128	0.018057
Mill Lane (Radley Lane - Delph Lane)	912	0.259885	0.031949	0.017956
Mill Lane (site access - Delph Lane)	10896	0.261903	0.032128	0.018057
Delph Lane	10680	0.307023	0.024245	0.01469
Blackbrook Av (Mill Ln - Capesthorne Rd)	9870	0.369771	0.041728	0.023442
Blackbrook Av (Capesthorne Rd - Insall Rd)	10728	0.272607	0.033081	0.018591
Blackbrook A (Insall Rd - Birchwood Way)	11412	0.277183	0.033488	0.01882
Birch Avenue	612	0.321398	0.032364	0.01835
Cotswold Road	2418	0.326811	0.037905	0.021297
Cleveland Road	5328	0.282457	0.033957	0.019083
Sandy Lane West	13806	0.276284	0.033408	0.018775
Sandy Lane	5232	0.299105	0.035439	0.019914
Winwick Road (M62 - Sandy Ln West)	40260	0.286334	0.038062	0.021258
Winwick Rd (Sandy Ln W - Hawleys Ln)	41016	0.279372	0.037224	0.020794
Winwick Road (south of Hawleys Lane)	36984	0.277425	0.03699	0.020664

Road	AADT	Emission Factor		
		g /veh km		
		NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Capesthorne Road	12606	0.277064	0.033477	0.018814
Enfield Park Road	8988	0.264638	0.032372	0.018193
Crab Lane	12828	0.301449	0.035648	0.020031
Birchwood Way (A50 - Blackbrook Av)	17850	0.277089	0.03348	0.018815
Birchwood Way (Blackbrook Av - Crab Ln)	19062	0.280146	0.033752	0.018968
Birchwood Way (Crab Ln - Birchwood)	21942	0.263244	0.032247	0.018124
Howson Road	3942	0.342661	0.039315	0.022089
A50 Long Lane	15942	0.292524	0.034853	0.019586
Statham Avenue	2334	0.266155	0.032507	0.018269
Northway	3714	0.30953	0.036367	0.020435
Hilden Road	7542	0.283732	0.034071	0.019147
Insall Road/Fernhead Lane	8646	0.288902	0.034531	0.019405
Cromwell Avenue	11814	0.520128	0.055109	0.030949
Myddleton Lane	3114	0.279508	0.02375	0.014205
Winwick Link Road	17166	0.327063	0.037927	0.02131
Winwick Road (north of M62)	36186	0.270788	0.036191	0.020222
M62 west	121908	0.436851	0.027067	0.017516
M62 west off slip	12098	0.437638	0.029221	0.018792
M62 west on slip	11660	0.437642	0.029203	0.018782
M62 east	118236	0.436946	0.027327	0.01767
M62 east off slip	9617	0.438033	0.030247	0.0194
M62 east on slip	10416	0.438658	0.031988	0.020431

**Model Input Data – Baseline 2019 + Committed Development + Development Traffic**

Road	AADT	Emission Factor		
		g /veh km		
		NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Poplars Avenue	11706	0.322232	0.037497	0.021069
Mill Lane (Blackbrook Av - site access)	16380	0.261903	0.032128	0.018057
Mill Lane (Radley Lane - Delph Lane)	2310	0.259885	0.031949	0.017956

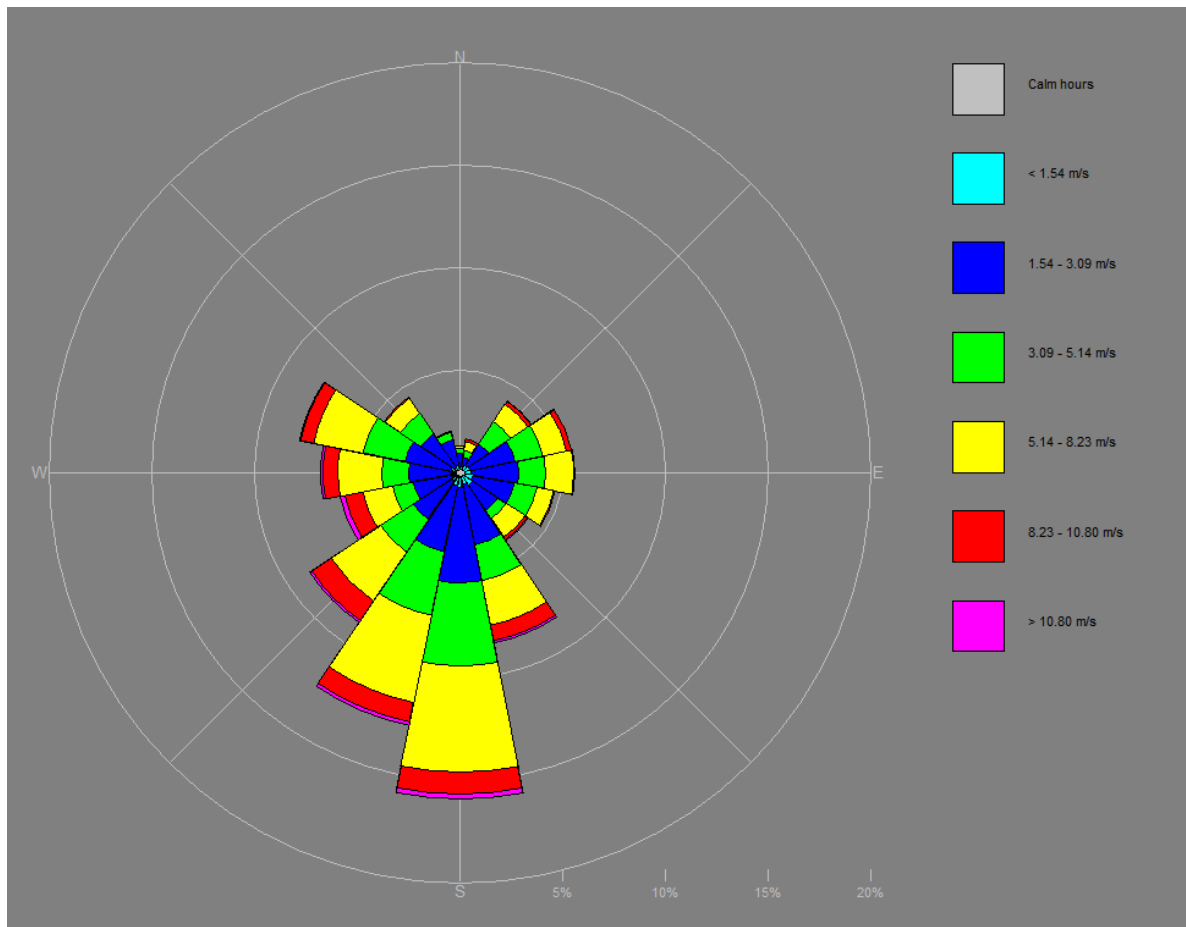
Road	AADT	Emission Factor		
		g /veh km		
		NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Mill Lane (site access - Delph Lane)	12684	0.261903	0.032128	0.018057
Delph Lane	12336	0.307023	0.024245	0.01469
Blackbrook Av (Mill Ln - Capesthorne Rd)	15150	0.369771	0.041728	0.023442
Blackbrook Av (Capesthorne Rd - Insall Rd)	13632	0.272607	0.033081	0.018591
Blackbrook A (Insall Rd - Birchwood Way)	14478	0.277183	0.033488	0.01882
Birch Avenue	804	0.321398	0.032364	0.01835
Cotswold Road	3390	0.326811	0.037905	0.021297
Cleveland Road	6354	0.282457	0.033957	0.019083
Sandy Lane West	15810	0.276284	0.033408	0.018775
Sandy Lane	5508	0.299105	0.035439	0.019914
Winwick Road (M62 - Sandy Ln West)	41646	0.286334	0.038062	0.021258
Winwick Rd (Sandy Ln W - Hawleys Ln)	41544	0.279372	0.037224	0.020794
Winwick Road (south of Hawleys Lane)	37590	0.277425	0.03699	0.020664
Capesthorne Road	13938	0.277064	0.033477	0.018814
Enfield Park Road	10632	0.264638	0.032372	0.018193
Crab Lane	14346	0.301449	0.035648	0.020031
Birchwood Way (A50 - Blackbrook Av)	18696	0.277089	0.03348	0.018815
Birchwood Way (Blackbrook Av - Crab Ln)	19566	0.280146	0.033752	0.018968
Birchwood Way (Crab Ln - Birchwood)	22746	0.263244	0.032247	0.018124
Howson Road	4608	0.342661	0.039315	0.022089
A50 Long Lane	17238	0.292524	0.034853	0.019586
Statham Avenue	2910	0.266155	0.032507	0.018269
Northway	4086	0.30953	0.036367	0.020435
Hilden Road	9408	0.283732	0.034071	0.019147
Insall Road/Fernhead Lane	8796	0.288902	0.034531	0.019405
Cromwell Avenue	13218	0.520128	0.055109	0.030949
Myddleton Lane	4482	0.279508	0.02375	0.014205
Winwick Link Road	17844	0.327063	0.037927	0.02131
Winwick Road (north of M62)	37086	0.270788	0.036191	0.020222
M62 west	122460	0.436851	0.027067	0.017516

Road	AADT	Emission Factor g /veh km		
		NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
M62 west off slip	12153	0.437646	0.029222	0.018793
M62 west on slip	11712	0.437612	0.029201	0.01878
M62 east	118878	0.436946	0.027327	0.01767
M62 east off slip	9660	0.438009	0.030246	0.019399
M62 east on slip	10463	0.438651	0.031988	0.020431
New Mill Lane Access	1278	0.265356	0.032435	0.018229
New Mill Lane/Blackbrook Avenue Access	5646	0.265356	0.032435	0.018229
New Poplars Ave Access (Central)	4494	0.265356	0.032435	0.018229
New Poplars Ave Access (West)	1050	0.265356	0.032435	0.018229

#### 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 Manchester Airport. 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 – Manchester Airport



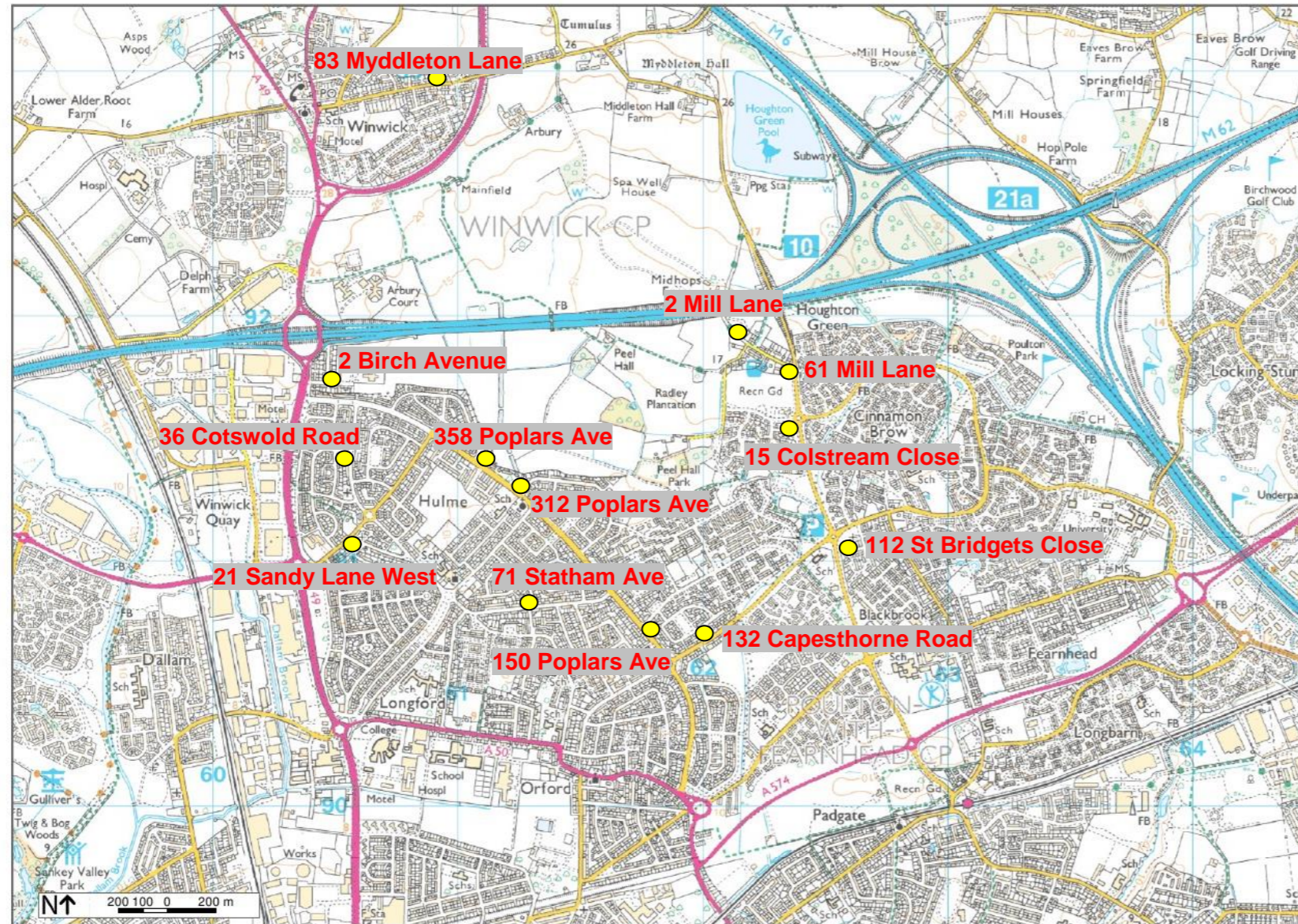
### Background Concentration of Air Pollutants

Discussions with Richard Moore in the Environmental Protection Team at Warrington Borough Council have indicated that there is a preference for any modelling to utilise monitored background concentrations from the Selby Street Urban Background Monitoring Station for 2013 and use these data for all baseline and future predictions. Warrington Borough Council's 2015 Updating and Screening Assessment indicates that the annual mean background concentration of  $\text{NO}_2$  was  $25.6 \mu\text{g}/\text{m}^3$ ,  $18 \mu\text{g}/\text{m}^3$  for  $\text{PM}_{10}$  and  $14 \mu\text{g}/\text{m}^3$  for  $\text{PM}_{2.5}$ .



## Receptor Locations

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



### Map Information

Scale 1:25000  
Date: 23/05/16  
Reference H1960  
Order No: 1681731



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### Verification and Adjustment

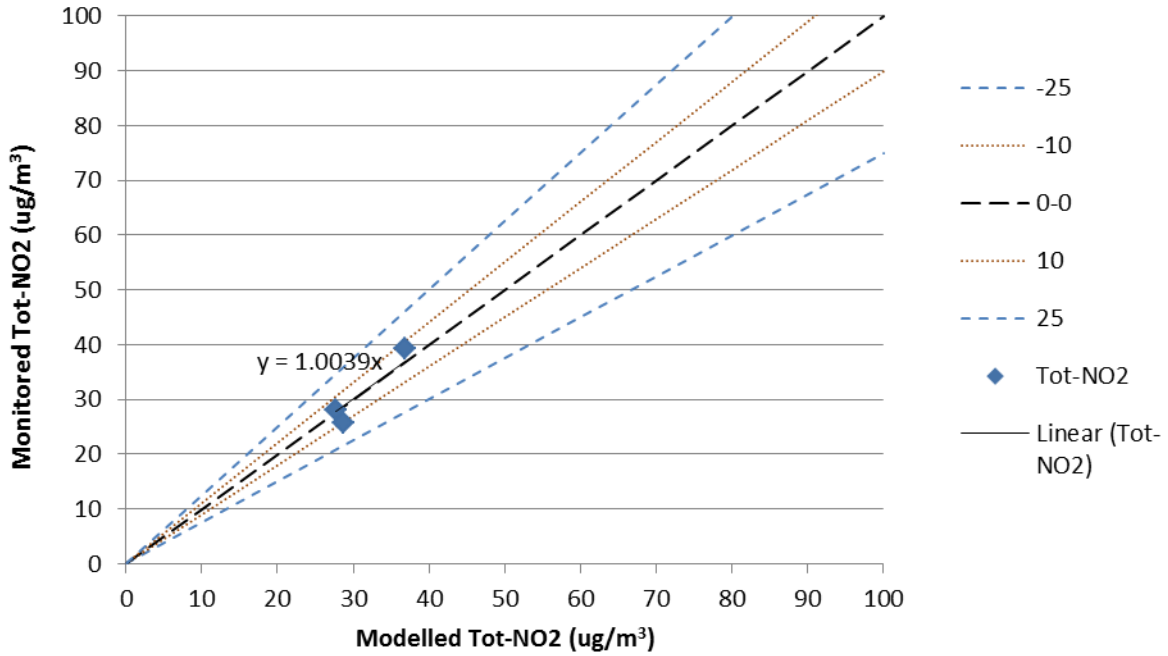
Verification of the air pollutant model was carried out in accordance with LAQM Technical Guidance TG(09) using the data from the diffusion tubes located on the development site during 2014. Of the nine tubes on the site, only three were deemed suitable for verification. Of the others, the tube adjacent to the footbridge was seen as unreliable as it only contained two months of data, with the remaining five locations recorded annual means below the measured background levels for the area. 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 were under predicted using the model; therefore an adjustment factor of 1.1541 was applied to the model contribution of NO<sub>x</sub>.

	<b>Model led Rds NOx</b>	<b>Model led Tot- NO2</b>	<b>Monit ored Tot- NO2</b>	<b>%Diff Mod/ Mon Tot- NO2</b>	<b>Model led Rd- NOx</b>	<b>Monit ored Rd- Nox</b>	<b>NOx ADJ Corr1</b>	<b>Adj Mod Rd- NOx</b>	<b>Adj Mod Tot- NO2</b>	<b>Monit ored Tot- NO2</b>	<b>%Diff Mod/ Mon Adj Tot- NO2</b>
End of Mill Lane	6.52	28.76	25.7	12	6.52	0.2	0.03	7.52	29.24	25.7	14
Footpath Sigh, Radley Lane	4.37	27.73	28.1	-1	4.37	5.12	1.17	5.04	28.06	28.1	0
Transect - M62 boundary	24.51	36.91	39.3	-6	24.51	30.22	1.23	28.29	38.52	39.3	-2

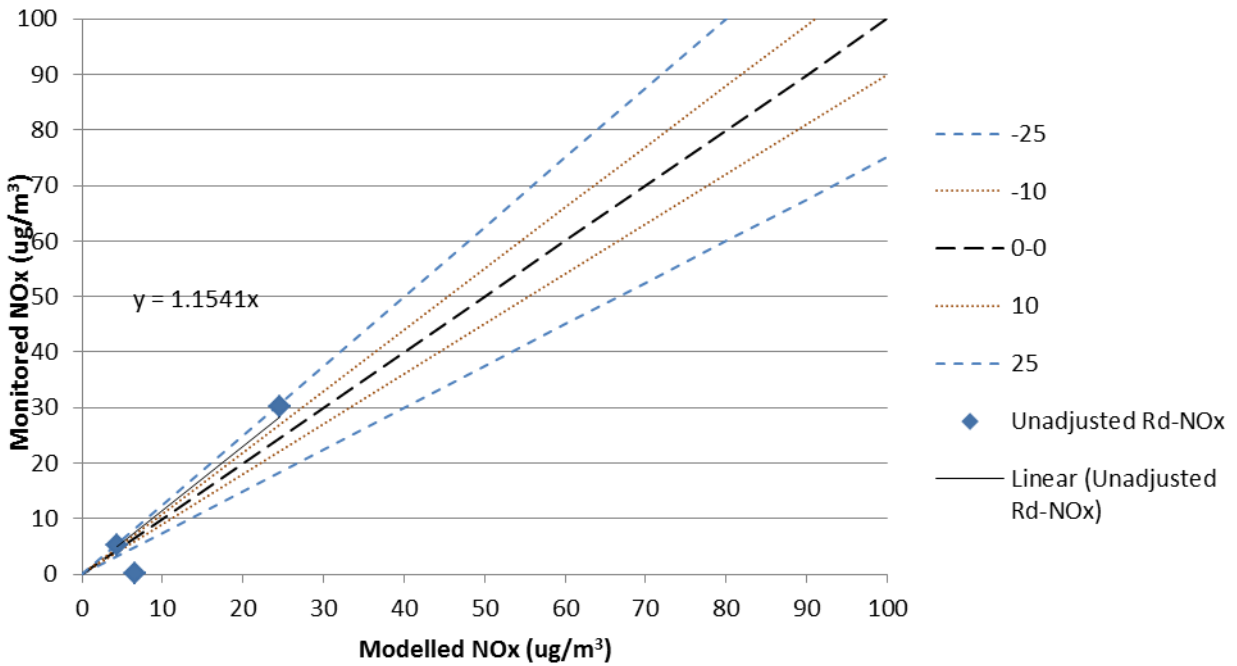
Regression **1.1541**



### Verification and Adjustment Total NO2 2014



### Verification and Adjustment Unadjusted Road NOx 2014



### PM<sub>10</sub> Exceedences

The number of exceedences of 50 µg/m<sup>3</sup> as a 24-hour mean PM<sub>10</sub> 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<sup>3</sup> as a 24-hour mean PM<sub>10</sub> concentration and B is the annual mean PM<sub>10</sub> concentration.

## Appendix 6: 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:

<b>H</b>	Highly recommended
<b>D</b>	Desirable
<b>N</b>	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
<b>Site Management</b>			
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
<b>Monitoring</b>			
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 <sub>10</sub> 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
<b>Preparing and maintaining the site</b>			
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 active 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
<b>Operating vehicle/machinery and sustainable travel</b>			
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
<b>Operations</b>			
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
<b>Waste management</b>			
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