



Air Quality Assessment:

59 London Street, Reading

Heathlands Riding Establishment

12th June 2025



Report Details:

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This report has been prepared by Hawkins Environmental Limited for the sole purpose of assisting in gaining planning consent for the proposed development described in the introduction of this report.

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

This assessment takes into account the prevailing conditions at the time of the report and assesses the impact of the development (if applicable) using data provided to Hawkins Environmental Limited by third parties. The report is designed to assist the developer in refining the designs for the proposed development and to demonstrate to agents of the Local Planning Authority that the proposed development is suited to its location. This should be viewed as a risk assessment and does not infer any guarantee that the site will remain suitable in future, nor that there will not be any complaints either from users of the development or from impacts emanating from the development site itself.

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Table of Contents

1.	INTRODUCTION	5
1.1.	Overview	5
1.2.	Site Description	5
2.	LEGISLATION, PLANNING POLICY & GUIDANCE.....	7
2.1.	Legislation	7
2.2.	Planning Policy	10
2.3.	Best Practice Guidance	13
3.	ASSESSMENT METHODOLOGY	15
3.1.	Methodology Overview	15
3.2.	Identification of Receptors	15
3.3.	Baseline and Site Suitability Methodology.....	15
3.4.	Significance Criteria.....	16
4.	BASELINE CONDITIONS.....	17
4.1.	Air Quality Review and Assessment.....	17
4.2.	Local Air Quality Monitoring.....	17
4.3.	Industrial Emissions.....	18
4.4.	Baseline Onsite Pollution Concentrations	18
5.	SITE SUITABILITY	20
5.1.	Annual Mean Concentrations	20
5.2.	NO ₂ 1-hour Exposure.....	20
6.	MITIGATION.....	22
6.1.	Site Suitability	22
7.	CONCLUSIONS & SUMMARY	23

List of Appendices

Appendix 1 Glossary of Terms.....	24
Appendix 2 Air Quality Model.....	26
Appendix 3 Modelling Procedure and Input Data.....	28

List of Tables

Table 2.1: Air Quality Standards Regulations 2010 – Limit Values	8
Table 2.2: WHO Air Quality Guideline Levels	14
Table 4.1: Air Quality Monitoring	17
Table 4.2: Baseline Air Quality Concentrations 2023 – Development Site.....	19
Table 5.1: Predicted Future Air Quality Concentrations 2026 – Development Site.....	20

List of Figures

Figure 1.1: Site Location Plan	6
Figure 4.1: Monitoring Locations	18

1. INTRODUCTION

1.1. Overview

Hawkins Environmental Limited has been instructed by Heathlands Riding Establishment to undertake an Air Quality Assessment for the proposed redevelopment of 59 London Street, situated in the town centre of Reading in the eponymous Unitary Authority Area of Reading.

The proposed development has been granted planning permission by Reading Borough Council under Application No. PL/22/1623, subject to a number of planning conditions, of which Condition 5 refers specifically to air quality:

“Condition 5: No development shall commence on site until a detailed Air Quality Assessment to determine whether mitigation is required to protect the residents from the effects of poor air quality is submitted to and approved in writing by Local Planning Authority. Where this Air Quality Assessment identifies that future residents will be exposed to poor air quality, an air quality mitigation scheme shall accompany this assessment demonstrating sufficient mitigation to protect the occupants. The scheme shall be implemented as approved prior to occupation of any part of the development and retained as approved at all times thereafter.”.

Consequently, this Air Quality Assessment has been completed in order to assist with the discharge of Condition 5 by demonstrating compliance with the condition as well as national, regional and local planning policy.

This report primarily assesses concentrations of nitrogen dioxide (NO₂), particulate matter of <10 µm diameter (PM₁₀), and particulate matter of <2.5 µm diameter (PM_{2.5}). The assessment considers both the constraints that existing air quality may have on the development of the site (site suitability) as well as the impacts of development on local air quality (impact assessment).

This assessment has been undertaken in accordance with the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) guidance *Land-Use Planning & Development Control: Planning for Air Quality* (January 2017) and the Department for Environment, Food and Rural Affairs' (Defra) *Local Air Quality Management Technical Guidance (TG22)* (August 2022).

In addition to considering the operational phase of the development, a risk-based assessment of the impact of the demolition and construction phases on local air quality has been conducted in accordance with the IAQM *Guidance on the Assessment of Dust from Demolition and Construction* (January 2024).

A glossary of terms is detailed in **Appendix 1**.

1.2. Site Description

The proposed development site is situated in the town centre of Reading on the A327 London Road approximately 100 m south of the junction with Queens Road.

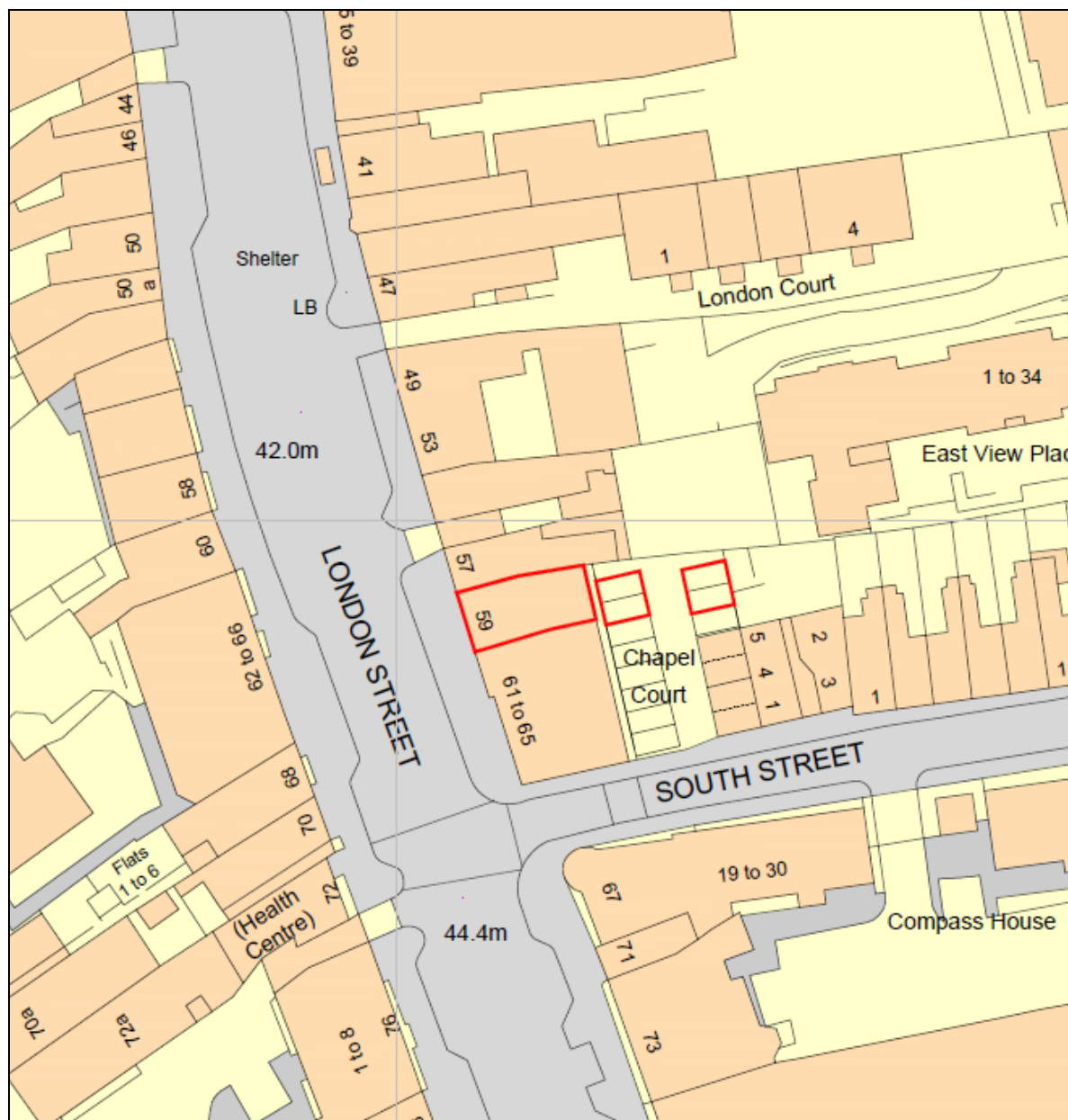
The site is currently a commercial premises over ground, first and second floors.

The proposed development will see the conversion of the first and second floors to provide two one-bedroom flats and erection of a roof terrace.

The local planning authority is Reading Borough Council.

A location plan of the proposed development site is provided in **Figure 1.1** below.

Figure 1.1: Site Location Plan



2. LEGISLATION, PLANNING POLICY & GUIDANCE

Air quality considerations within the planning system are governed by:

- National Legislation – Acts of Law passed by Parliament, and Regulations created by the Government under powers granted by those Acts, see **Section 2.1**;
- Planning Policy – Documents and guidelines issued by Government bodies that provide a framework for how planning decisions should be made, see **Section 2.2**;
- Best Practice Guidance – Direction on specific air quality issues and methods of assessment published by professional bodies and institutions such as the Institute of Air Quality Management (IAQM) or World Health Organization (WHO), see **Section 2.3**.

2.1. Legislation

Early pieces of air quality legislation in the UK included the *Clean Air Act 1956* and 1968, which aimed to address the air quality issues associated with rapid industrialisation; and the *Environmental Protection Act 1990*, which further strengthened pollution regulation from industry and gave local councils new enforcement powers.

Today, the legislative framework governing air quality in England is based on the primary legislation of the *Environment Act 1995* and the *Environment Act 2021*; as well as secondary legislation resulting from each act respectively, *The Air Quality Standards Regulations 2010* and *The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023*.

The planning system more broadly is governed by the primary legislation of the *Town and Country Planning Act 1990*. Each of these is discussed in **Sections 2.1.1** to **2.1.5**, below.

2.1.1. Environment Act 1995

The *Environment Act 1995* is a major piece of primary legislation addressing environmental issues in the UK, including air quality.

The Act established the Environment Agency to regulate pollution, enforce environmental laws, and protect natural resources.

Part IV of the Act focuses on air quality, providing a legal framework for its management and improvement.

Part IV requires the UK government to develop and maintain a *National Air Quality Strategy* (see **Section 2.2.1**) with standards, objectives and measures for improving air quality, and introduced the *Local Air Quality Management (LAQM)* regime (see **Section 2.3.2**), mandating local authorities to monitor and assess air quality in their areas.



2.1.2. Air Quality Standards Regulations 2010

The *Air Quality Standards Regulations 2010* are a piece of secondary legislation under the *Environment Act 1995*, which set pollutant concentration limits to protect human health and the environment.

The Regulations contain legally binding *Limit Values* that must not be exceeded. These are set for individual pollutants (sulphur dioxide, nitrogen dioxide, benzene, lead, PM₁₀, PM_{2.5} and carbon monoxide), specifying a concentration, an averaging time over which it is measured, the number of exceedances allowed per year (if any) and a date by which it must be achieved. Some pollutants have more than one limit value covering different averaging times.

The Regulations also contain *Target Values* for other pollutants (ozone, arsenic, cadmium, nickel, mercury, polycyclic aromatic hydrocarbons), structured similarly, which while not legally binding, must be met where possible without disproportionate costs.

Derived from *Directive 2008/50/EC* (the *Ambient Air Quality and Cleaner Air for Europe Directive*) of the European Parliament, these limits remain in force post-Brexit as retained EU law, ensuring continued protection of air quality.

The UK is bound to these limit values to mitigate harmful effects on health and the environment. The *National Air Quality Objectives* (NAQOs), as presented in the *National Air Quality Strategy* (see **Section 2.2.1**), are largely based on these limit values.

Limit Values

The limit values contained in the *Air Quality Standards Regulations 2010* (and associated NAQOs in the *National Air Quality Strategy*) form the basis of this air quality assessment. The limit values are based on an assessment of the health effects of each pollutant and are therefore a good indicator as to whether air quality in the vicinity of a development may be detrimental to human health. The limit values are shown in **Table 2.1**.

Table 2.1: Air Quality Standards Regulations 2010 – Limit Values

Pollutant	Averaging Period	Limit Value
Sulphur Dioxide (SO ₂)	One Hour	350 µg/m ³ not to be exceeded more than 24 times per calendar year
	One Day	125 µg/m ³ not to be exceeded more than three times per calendar year
Nitrogen Dioxide (NO ₂)	One Hour	200 µg/m ³ not to be exceeded more than 18 times per calendar year
	Calendar Year	40 µg/m ³
Benzene	Calendar Year	5 µg/m ³
Lead	Calendar Year	0.5 µg/m ³
PM ₁₀	One Day	50 µg/m ³ not to be exceeded more than 35 times per calendar year



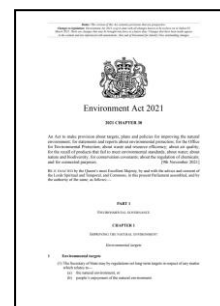
Pollutant	Averaging Period	Limit Value
	Calendar Year	40 $\mu\text{g}/\text{m}^3$
PM _{2.5}	Calendar Year	20 $\mu\text{g}/\text{m}^3$
Carbon Monoxide	Maximum daily running 8-hour mean	10 mg/m^3

2.1.3. Environment Act 2021

The *Environment Act 2021* is a further significant piece of primary legislation in the UK that formed part of a new legal framework for environmental protection post-Brexit.

The Act made further provisions for air quality, primarily addressing the issue of fine particulate matter by mandating the setting of new targets for PM_{2.5} concentrations.

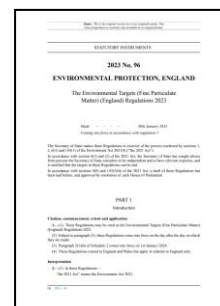
It also refined and strengthened the LAQM regime introduced under the *Environment Act 1995*, provided a legal basis for the introduction of Clean Air Zones, and established the Office for Environmental Protection to protect and improve the environment by holding government and public authorities to account for their environmental policies.



2.1.4. Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

The *Environmental Targets (Fine Particulate Matter) (England) Regulations 2023* are a piece of secondary legislation to protect human health and the environment by setting new legally binding targets on concentrations of PM_{2.5} under the framework set out in the *Environment Act 2021*, in much the same way that the *Environment Act 1995* provided the framework for the *Air Quality Standards Regulations 2010*. The two Targets are:

- Annual mean concentrations of PM_{2.5} to be 10 $\mu\text{g}/\text{m}^3$ or lower by 2040.
- Population exposure to PM_{2.5} to be reduced by 35% compared to 2018 levels by 2040.



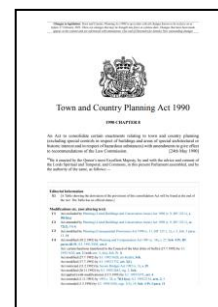
The two targets are designed to work together to drive actions that both reduce concentrations where it is highest and reduce the pollution that everyone in the country experiences.

It should be noted that the meaning of “Targets” here is different to that in the *Air Quality Standards Regulations 2010*, wherein “target values” have specific meaning. Both PM_{2.5} targets described in the *Environmental Targets (Fine Particulate Matter) (England) Regulations 2023* as set out above are legally binding in the way that “limit values” are in the 2010 Regulations.

2.1.5. Town and Country Planning Act 1990

The *Town and Country Planning Act 1990* is a piece of primary legislation governing land use and development control in England and Wales. It provides the legal framework for planning permissions, enforcement and permitted development rights. Whilst it does not directly set air quality limits, it allows councils to enforce pollution controls through planning conditions, environmental impact assessments (EIA), and enforcement actions.

The Act sets out permitted development rights which allow certain types of development without planning permission, including small home extensions and conversions of offices to residential properties.



The Act states that the vast majority of development (including building new structures, major extensions or alterations, and change of use class) requires planning permission from the relevant local planning authority (LPA). The LPA must then assess the development proposals against local and national planning policies (see **Section 2.2**), including those which make provisions for air quality, in order to approve or reject the proposals. If a proposal is rejected by the LPA, the applicant can appeal to the national Planning Inspectorate.

Whilst the Act does not focus solely on air quality, it provides legal mechanisms to ensure new developments do not harm the environment and protect air quality. This includes the requirement for large developments to conduct an EIA (under Section 71A), the ability to grant approval subject to planning conditions, such as air quality damage cost calculations (under Section 70), green belt protection (under Section 336), and the ability to issue enforcement notices if a development is causing harm to public health, the environment or local amenity (under Section 172).

2.2. Planning Policy

National Policies

2.2.1. National Air Quality Strategy (2023)

As per the legislation of Part IV of the *Environment Act 1995*, successive governments have produced, maintained and updated air quality policy in the form of various Air Quality Strategy policy papers.

The original *National Air Quality Strategy 1997* was the first UK-wide strategy to set standards and objectives for major air pollutants. It was replaced by the *Air Quality Strategy for England, Scotland, Wales and Northern Ireland* in 2000 with an addendum in 2003, which tightened several of the objectives and introduced a new one for polycyclic aromatic hydrocarbons. A further update came in 2007 with subsequent revisions in 2011, with new objectives for PM_{2.5}.



In April 2023 the UK Government published a document, *Air Quality Strategy: Framework For Local Authority Delivery*, which supersedes the 2007 Strategy in respect of England only.

Like its predecessors, *Air Quality Strategy: Framework For Local Authority Delivery* sets out the *National Air Quality Objectives* (NAQOs). The NAQOs currently mirror the legally binding limit values as set out in the *Air*

Quality Standards Regulations 2010, as shown in **Table 2.1**. The NAQOs also currently incorporate the new legally binding PM_{2.5} targets as set out in the *Environmental Targets (Fine Particulate Matter) (England) Regulations 2023*, as discussed in **Section 2.1.4**.

2.2.2. National Planning Policy Framework (2024)

The *National Planning Policy Framework* (NPPF) was first published in March 2012 and has undergone regular revision, with the latest version published in December 2024 in response to the proposed reforms to the planning system under the Starmer ministry.

The NPPF sets out England's planning policies and guidance on their application. It guides LPAs in creating Local Plans, which, along with the NPPF itself, inform planning decisions. These local and neighbourhood plans should address community needs and priorities.

The NPPF notes *"The purpose of the planning system is to contribute to the achievement of sustainable development, including the provision of homes, commercial development, and supporting infrastructure in a sustainable manner"* (para. 7) and that sustainable development should be delivered with three main objectives: economic; social and environmental (para. 8).

The NPPF supports a presumption in favour of development, unless the adverse impacts of that development outweigh the benefits (para. 10).

Specifically referencing air quality, the NPPF states that *"Planning policies and decisions should contribute to and enhance the natural and local environment by... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality"* (para. 187).

The NPPF also states that *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan"* (para. 199).



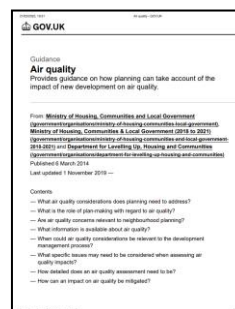
2.2.3. Planning Practice Guidance (2019)

Planning Practice Guidance (PPG) was launched as a series of online guidance documents to support the NPPF, with first Air Quality guidance published on 6th March 2014. It has since undergone regular revision, with the most recent changes in November 2019. It provides guidance on how planning can take account of the impact of new development on air quality.

The air quality PPG notes *"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with relevant 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 PPG goes on to say that *"Whether 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 have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species)"*.

With regards to the content of an air quality assessment, the PPG states *"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific"*.



Local Policies

2.2.4. Reading Borough Local Plan (2019)

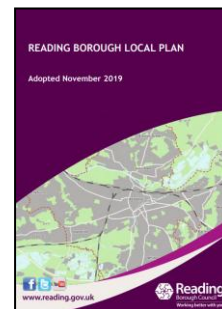
The Reading Borough Local Plan Policy EN15 of the Reading Borough Local Plan relates specifically to air quality:

"EN15: AIR QUALITY"

Development should have regard to the need to improve air quality and reduce the effects of poor air quality.

i. Development that would detrimentally affect air quality will not be permitted unless the effect is to be mitigated. The following criteria should be taken into account:

- *Whether the proposal, including when combined with the cumulative effect of other developments already permitted, would worsen air quality;*
- *Whether the development is within, or accessed via, an Air Quality Management Area; and*
- *Whether it can be demonstrated that a local worsening in air quality that would not detrimentally affect human health or the environment would be offset by an overall improvement in air quality, for instance through reduction in the need to travel.*



ii. Where a development would introduce sensitive uses (such as residential, schools and nurseries, hospitals, care facilities) into, or intensify such uses within, an Air Quality Management Area, detrimental effects on that use will be mitigated. Mitigation measures should be detailed in any planning application. If there are significant detrimental effects that cannot be mitigated, the application should be refused.

iii. Where required, planning obligations will be used to secure contributions to measures to tackle poor air quality or for air quality monitoring.”.

2.3. Best Practice Guidance

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

Land-Use Planning & Development Control: Planning for Air Quality, jointly published by the IAQM and Environmental Protection UK (EPUK) in May 2015 and updated in January 2017, serves as a comprehensive guide for integrating air quality considerations into the planning system and development control processes

Specific guidance is given on undertaking an air quality assessment for planning, including how to assess both the impacts of existing air quality on a new development, or the impacts of new developments on air quality in their area. It also discusses how to determine the significance of the effects arising from such air quality impacts.

Guidance is also given on screening criteria for different types of assessment, the verification of air quality models, identification of appropriate receptors, and appropriate mitigation measures.



2.3.2. Local Air Quality Management Technical Guidance TG22 (2022)

The LAQM process is a framework under which local authorities are required to review and manage air quality in their areas. It is governed by Part IV of the *Environment Act 1995* (see **Section 2.1.1**) and aims to ensure compliance with the NAQOs.

Local authorities are required to regularly review and assess air quality in their areas. If the review indicates that the NAQOs are being exceeded or are likely to be exceeded, local authorities must designate an AQMA. Once an AQMA has been designated, the local authority is required to develop and implement Action Plans that outline measures to improve air quality, with continuing monitoring, evaluation and reporting required.

Although produced for local authorities tasked with managing air quality in their areas, TG22 provides detailed instructions on how to assess air quality using both monitoring data and modelling techniques, and evaluate whether air quality objectives are being met, and is therefore essential guidance for anyone considering air quality impacts within the planning system.



2.3.3. World Health Organization Air Quality Guidelines (2021)

The *World Health Organisation Air Quality Guidelines* proposes air quality guideline levels for key air pollutants that pose health risks. The guidelines cover a range of pollutants and suggest threshold levels at which health effects are unlikely to occur, based on the latest scientific evidence.

Due to a substantial increase in scientific evidence since 2005 (the publication of the previous guidelines), the World Health Organisation (WHO) significantly lowered its guideline levels for most air pollutants in its 2021 update, such that they are now more stringent than the legally binding limit values as described in the *Air Quality Standards Regulations 2010* (see **Section 2.1.2**).



Table 2.2 summarises the WHO Guideline levels.

Table 2.2: WHO Air Quality Guideline Levels

Pollutant	Average Period	WHO Guideline Value
Nitrogen Dioxide	One Hour	200 µg/m ³
	One Day	25 µg/m ³
	Calendar Year	10 µg/m ³
PM ₁₀	One Day	45 µg/m ³ (99 th Percentile)
	Calendar Year	15 µg/m ³
PM _{2.5}	One Day	15 µg/m ³ (99 th Percentile)
	Calendar Year	5 µg/m ³

3. ASSESSMENT METHODOLOGY

3.1. Methodology Overview

This assessment of air quality has been prepared specifically to assist with the discharge of Planning Condition 5 of the Decision Notice for Application No. PL/22/1623, and considers several different areas, specifically:

1. Establishing the baseline conditions at the proposed development site. This entails an evaluation of historic air quality data, the most recent published years' worth of which is used to verify an air quality model for predicting onsite pollutant concentrations at present. See **Section 3.3**.
2. Constraints of existing air quality on the proposed development. This determines the site's suitability for use. The verified baseline model is updated to model the year of first use, incorporating projected traffic growth, changes in emissions factors, and background concentrations as appropriate. Opening year pollutant concentrations are then compared to the relevant air quality objectives.

3.2. Identification of Receptors

Land-Use Planning & Development Control: Planning for Air Quality (see **Section 2.3.1**) states that receptor locations should be chosen both within a proposed development (site suitability), as well as on roads significantly affected by it (impact assessment), even if distant to it, and particularly if within AQMAs.

The guidance notes "*These receptors will represent locations where people are likely to be exposed for the appropriate averaging time (dependent on the air quality objective being assessed against)*". This is critical as it identifies that sensitivity to air quality is related to the time spent in a location. For example, annual mean objectives should be used to assess anywhere a person may be present for sustained periods over a year, for example dwellings. Although users wouldn't be present for the appropriate averaging time, hospitals and schools would also be assessed against annual mean objectives, owing to the higher sensitivity of their users.

Offices and commercial uses would not usually be assessed against annual objectives, given that most users would be healthy adults who would spend less than 25% of the hours in a year there, however assessment against daily or hourly mean objectives would be necessary. Similarly, hotels may not be assessed against annual mean objectives, however hostels, sheltered accommodation and student accommodation would be considered the same as dwellings, as residents could be expected to stay for several months.

3.3. Baseline and Site Suitability Methodology

To determine the baseline conditions, the following is undertaken:

- A review of the most recent Air Quality Annual Status Reports published by the local planning authority (as required under Local Air Quality Management Regime (see **Section 2.3.2**), as submitted to the Department for the Environment, Food and Rural Affairs (Defra);
- Determination of whether the site is situated within a designated Air Quality Management Area (AQMA).

- A review of local air quality monitoring data in the area around the proposed development site;
- A review of 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 of the list of registered Part A2 and Part B permitted premises under the PPC Regulations to determine whether any other sources of air pollution could be affecting the site;
- If required, predict concentrations of air pollutants at the proposed development site in the baseline year and the future baseline year using the ADMS-Roads Dispersion Model (details of which can be seen in **Appendix 2**, utilising data described in **Appendix 3**).

The assessment of site suitability is based on the 'future baseline' scenario, which is the year of first occupation or operation of the proposed development. It updates the 'baseline' scenario, i.e. that which is based on the most recent full year of published air quality monitoring data that can be used to create a validated model.

The 'future baseline' updates to the dispersion model include predicted changes in traffic flow between the two years, changes in emissions factors (the amount of pollutant emitted per vehicle-km, which improves in future years as older, more polluting vehicles are removed from the fleet and cleaner engine technologies and alternative fuel vehicles are adopted), and changes in regional background concentrations if appropriate.

3.4. Significance Criteria

Land-Use Planning & Development Control: Planning for Air Quality provides a framework to assess 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 6.3 [Replicated in Table 3.1 of this chapter] 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 (Paragraph 7.4)".*

The Land-Use Planning & Development Control guidance goes on to state 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"* (Paragraph 7.7). For example, for a large development, a major adverse impact on a single dwelling might be considered insignificant; however, a minor impact to 100,000 dwellings might be considered to be highly significant. Furthermore, the absolute level of pollutant concentrations are also important in determining significance; for example, a moderate impact to a small group of dwellings might be considered highly significant if the concentrations of NO₂ were well in excess of the NAQO level, however, that same moderate impact might be considered insignificant if concentrations were well below the NAQO.

4. BASELINE CONDITIONS

4.1. Air Quality Review and Assessment

Local Authorities are required to carry out a review of air quality within their boundaries to identify areas that fail to achieve compliance with the NAQOs. Where the objectives are not being met, local authorities must designate these areas as Air Quality Management Areas (AQMAs) and prepare an Air Quality Action Plan (AQAP) identifying measures to achieve compliance with the NAQOs.

The review of air quality takes on several prescribed stages, each of which is reported in a yearly Air Quality Annual Status Report. The most recent publicly available Annual Status Report published by Reading Borough Council (published in 2024 based on data collected in 2023) indicates that there is currently a single AQMA declared within the Borough. The AQMA was declared in 2009 for exceedances of the annual mean objective for NO₂; primarily driven by road traffic pollution. The AQMA encompasses the town centre and all of the main arterial routes in and out of it.

It is understood that exceedances of the NAQOs for both PM₁₀ and PM_{2.5} are not expected within the Borough in future years.

Concentrations of SO₂, Benzene, Lead and CO are not considered to be an issue within the Borough. Consequently, no further consideration is given to these pollutants as it is highly unlikely that they would be of concern on the proposed development site.

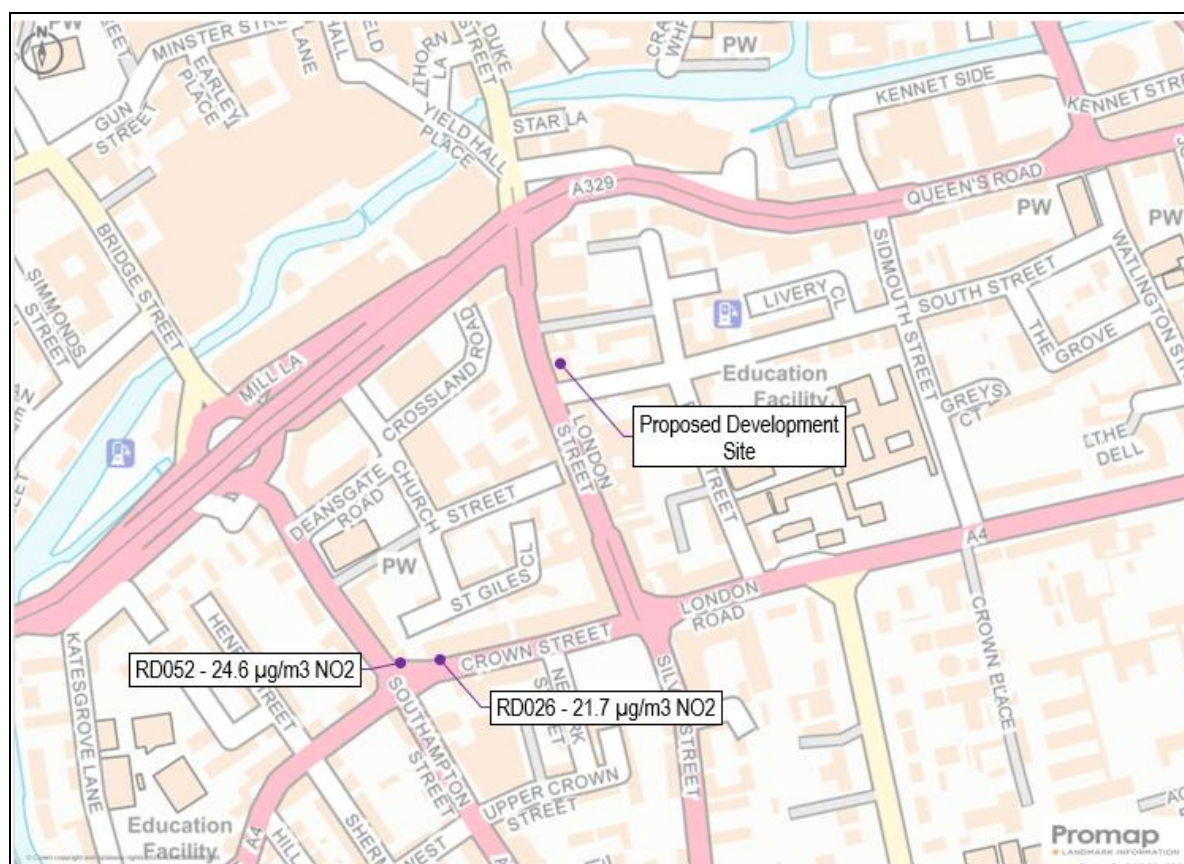
4.2. Local Air Quality Monitoring

Reading Borough Council conducts air quality monitoring, including at two sites in the vicinity of the proposed development site. Both sites are considered to be roadside monitoring locations and therefore are suitable for verification of the air quality model. **Table 4.1** summarises the air quality monitoring data which is displayed graphically in **Figure 4.1**.

Table 4.1: Air Quality Monitoring

Location	Site Type	Annual Mean Concentration of NO ₂ (µg/m ³)				
		2019	2020	2021	2022	2023
RD026 – 44 Crown Street	Roadside	29.4	22.3	26.8	24.2	<u>21.7</u>
RD052 – Red Cow	Roadside	31.4	24.5	28.7	26.9	<u>24.6</u>

Figure 4.1: Monitoring Locations



4.3. Industrial Emissions

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

4.4. Baseline Onsite Pollution Concentrations

To characterise the air quality at the development site at present, predictions of air pollutant concentrations at the development site have been made using the air quality model for the baseline year (2023). **Appendix 2** provides a description of the methodology used in the assessment, including the method to calculate NO₂ from NO_x. **Appendix 3** outlines the input data, including traffic data, background concentrations and receptor locations. In addition, details of the verification factor applied to the predicted concentrations of NO_x can also be found in **Appendix 3**.

Concentrations have been calculated at the building facade facing London Street. A receptor location plan can be seen on the site plan in **Appendix 3**. Pollutant concentrations have been calculated for each floor level at which residential receptors are proposed. The results of these predictions can be seen in **Table 5.2**.

Table 4.2: Baseline Air Quality Concentrations 2023 – Development Site

Receptor		NO ₂ (µg/m ³)	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)
		Annual Mean	Annual Mean	Days >50 µg/m ³	Annual Mean
London Street Facade	Ground Floor	17.98	14.30	0.15	8.64
	1 st Floor	16.07	13.75	0.25	8.34
National Air Quality Objective		40	40	35	20

If pollutant concentrations in **Table 4.2** are compared to the National Air Quality Objectives, it can be seen that on the development site at present, concentrations of all pollutants are below the National Air Quality Objectives.

5. SITE SUITABILITY

5.1. Annual Mean Concentrations

To characterise the air quality at the development site when constructed, predictions of air pollutant concentrations at the development site have been made using the air quality model for the proposed year of occupation (2026). **Appendix 2** provides a description of the methodology used in the assessment, including the method to calculate NO₂ from NO_x. **Appendix 3** outlines the input data, including traffic data, background concentrations and receptor locations. In addition, details of the verification factor applied to the predicted concentrations of NO_x can also be found in **Appendix 3**.

Concentrations have been calculated at the building facade facing London Street. A receptor location plan can be seen on the site plan in **Appendix 3**. Pollutant concentrations have been calculated for each floor level at which residential receptors are proposed. The results of these predictions can be seen in **Table 5.1**.

Table 5.1: Predicted Future Air Quality Concentrations 2026 – Development Site

Receptor		NO ₂ (µg/m ³)	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)
		Annual Mean	Annual Mean	Days >50 µg/m ³	Annual Mean
London Street Facade	Ground Floor	16.66	14.31	0.14	8.63
	1 st Floor	15.31	13.75	0.25	8.34
National Air Quality Objective		40	40	35	20

If pollutant concentrations in **Table 5.1** are compared to the National Air Quality Objectives, it can be seen that on the development site during the opening year, concentrations of pollutants are below the National Air Quality Objectives.

5.2. NO₂ 1-hour Exposure

In order to meet the hourly Air Quality Standard on NO₂, the average hourly concentration of NO₂ must not exceed the hourly objective level of 200 µg/m³ more than 18 times in one calendar year. If this standard is not met, there would be concern that even short duration exposure to pollutant concentrations could be prejudicial to health, which could be a concern for gardens, balconies and other outdoor amenity spaces associated with the development.

According to research conducted in 2003¹, there is only a risk that the NO₂ 1-hour objective (200 µg/m³) could be exceeded if the annual mean nitrogen dioxide concentration is greater than 60 µg/m³. At the development site, the worst-case annual mean is 16.66 µg/m³, therefore hourly exceedances are not expected to occur. Consequently, local short duration pollutant concentrations would not be considered a cause for concern in gardens, balconies and other outdoor amenity spaces associated with the development.

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

6. MITIGATION

6.1. Site Suitability

Air pollutant concentrations at the proposed development site have been modelled to be compliant with the National Air Quality Objectives in the opening year of the proposed development.

Mitigation measures to reduce the exposure of future occupiers of the proposed development are therefore not required.

7. CONCLUSIONS & SUMMARY

An Air Quality Assessment has been undertaken in accordance with Defra's *Local Air Quality Management Technical Guidance (TG22)* and the IAQM/EPUK guidance *Land-Use Planning & Development Control: Planning for Air Quality* (2017), addressing the effects of air pollutant concentrations at the proposed development site to assist with the discharge of Planning Condition 5 of the Decision Notice for Application No. PL/22/1623.

Baseline pollutant concentrations at the proposed development site have been assessed using existing pollutant monitoring data, which has been used to make predictions of pollutant concentrations in future years using dispersion modelling in ADMS-Roads. These predictions have been used to determine the suitability of the site for its proposed use, as well as to assess the impact of the site on local air quality.

Regarding site suitability, modelling shows that at present, and in the opening year of the proposed development (2027), concentrations of all pollutants are below the National Air Quality Objectives.

Based on the results of the assessments discussed above, which have all been carried out in accordance with the latest guidance, it is considered that the proposed development adheres to national, regional and local planning policy, and therefore that air quality concerns should not be a constraint on the proposed development.

Appendix 1

Glossary of Terms

Appendix 1: Glossary of Terms

National Air Quality Standard/National Air Quality Objective (NAQO): 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 an assessment of the effects of each pollutant on human health including the effects on sensitive subgroups.

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 exceedances 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 into the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO₂), which is harmful to health. NO₂ and NO are both oxides of nitrogen and together are referred to as nitrogen oxides (NO_x).

Particulate Matter: Fine Particles are composed of a wide range of materials arising from a variety of sources including combustion sources (mainly road traffic), and coarse particles, suspended soils and dust from construction work. Particles are measured in a number of different size fractions according to their mean aerodynamic diameter. Most monitoring is currently focused on PM₁₀ (less than 10 microns in diameter), but the finer fractions such as PM_{2.5} (less than 2.5 microns in diameter) is becoming of increasing interest in terms of health effects.

$\mu\text{g}/\text{m}^3$ 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

Air Quality Model

Appendix 2: Air Quality Model

ADMS-Roads

In the UK, the Department for Environment, Food & Rural Affairs (Defra) provides guidance on the most appropriate methods to estimate pollutant concentrations as part of Local Air Quality Management (LAQM). The most recent guidance, LAQM Technical Guidance TG22, was published in 2022 and outlines recommended tools and methodologies for air quality modelling.

One of the principal modelling tools endorsed by Defra is ADMS-Roads, a detailed atmospheric dispersion model developed by Cambridge Environmental Research Consultants that simulates how pollutant emissions disperse in the atmosphere. Specifically designed for UK road networks, ADMS-Roads is widely considered one of the most suitable models for predicting the impact of traffic-related air pollution, particularly nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}).

ADMS-Roads offers a more advanced approach than many other models such as CALINE (used in Breeze Roads), by incorporating state-of-the-art representations of atmospheric processes. Rather than relying on the simplified Pasquill-Gifford stability classes, ADMS-Roads uses the Monin-Obukhov length to more accurately model boundary layer stability. It also includes sophisticated algorithms to account for height-dependent variations in wind speed, turbulence, and atmospheric stability—factors critical to accurate dispersion predictions.

Unlike basic screening models such as the DMRB Method, ADMS-Roads supports the use of hourly, annualised meteorological data, and allows for the modelling of complex features such as terrain, building canyon effects, and varying source and receptor heights.

TG22 also outlines procedures for model verification and adjustment, which involve comparing modelled results with monitored data. Since models like ADMS-Roads predict total oxides of nitrogen (NO_x) rather than NO₂ directly, observed NO₂ concentrations from diffusion tubes or continuous monitors must be converted to NO_x to enable valid comparisons. Defra provides a standard method for converting between NO₂ and NO_x, which accounts for local and regional variations in NO_x, NO₂ and ozone (O₃), as well as changes in the proportion of NO_x emitted directly as NO₂ (known as f-NO₂).

Background pollutant concentration maps, regularly updated by Defra, are used to estimate the remaining contribution from road traffic. By comparing the monitored and modelled road-traffic-related NO_x contributions, an adjustment factor can be derived and applied to improve model accuracy. A well-verified ADMS-Roads model should typically produce predictions within ±10% of measured concentrations.

The software version used in this assessment is the latest published version of ADMS-Roads, version 5.0.1, which was released by CERC in February 2022.

Appendix 3

Modelling Procedure and Input Data

Appendix 3: Modelling Procedure and Input Data

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

Appendix 3.1: Traffic Data

Traffic flows in the vicinity of the site have been obtained from the Department for Transport's traffic database for the year 2023. High traffic growth factors have been applied to this data to predict traffic flows for the proposed opening year (2026).

Since lower traffic speeds increase emissions from vehicles, it is necessary to take into account the reduction in traffic speeds around junctions. TG22 suggests that *"there is no simple factor that can be applied to the average speed to calculate a speed applicable to congested periods"* and that one should exercise professional judgement when taking into account congestion and decreasing speeds around junctions. However, in the absence of any more detailed site-specific information, TG22 does suggest that *"For a busy junction, assume that traffic approaching the junction slows to an average of 20kph ...(for) approach distances of approximately 25m"*. This is the approach adopted at this site.

All road links within 200 m of a receptor have been included in the model. Road widths have been modelled in accordance with OS mapping data. However, based on observations, road widths are adjusted to take into account any restrictions to flow, such as parked cars.

Since road-traffic emissions on roads with significant gradients (>2.5%) can increase significantly, especially in relation to HGVs, significant gradients are taken into account in the modelling. At this site, road gradient effects were not considered to be significant.

The wake effects of traffic induced turbulence have been included in the modelling as standard. This takes into account the fact that increased traffic volumes and speeds produce more turbulence, which has effects on dispersion.

Input road links, traffic flows, the percentage of Heavy Goods Vehicles (HGVs) and traffic speeds are shown below.

Model Input Data

Road	AADT 2023	AADT 2026	% HGV	Speed km/h
Southampton St 1	15169	15862	2.8	20
Southampton St 2	15169	15862	2.8	48
Southampton St 3	15169	15862	2.8	20
Pell St 1	6662	6966	1.4	32
Pell St 2	6662	6966	1.4	48
Pell St 3	6662	6966	1.4	20

Road	AADT 2023	AADT 2026	% HGV	Speed km/h
Southampton St 4	7538	7882	2.9	48
Southampton St 5	7538	7882	2.9	20
Crown St 1	10933	11432	2.5	20
Crown St 2	10933	11432	2.5	48
Crown St 3	10933	11432	2.5	20
London St 1	6866	7180	7.3	20
London St 2	6866	7180	7.3	48
London St 3	6866	7180	7.3	20
A329 1	12631	13208	2.3	64
A329 2	12631	13208	2.3	48
A329 3	12631	13208	2.3	20
A329 4	19182	20058	2.3	20
A329 5	19182	20058	2.3	48

Appendix 3.2: Meteorological Data

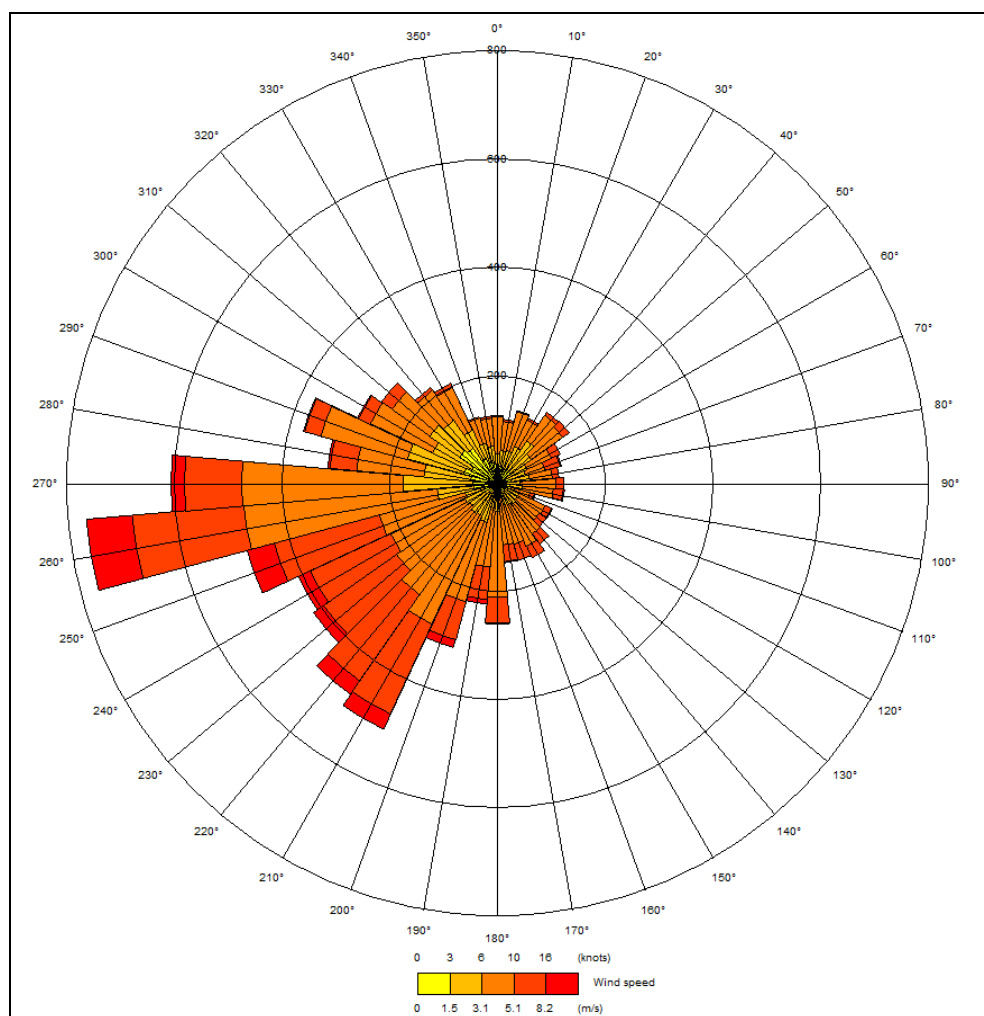
TG22 suggests that a single year's meteorological data will be sufficient to predict air pollution concentrations.

Meteorological data was obtained from London Heathrow Airport for 2019 operated by the Met Office (Surface Station Number 3772 – ICAO airport code EGLL – 24m above sea level. It is considered that this weather station is likely to be representative of conditions within the area local to the development site.

Data was collected in accordance with internationally accepted weather observation techniques, specifically the METAR weather format, which is an internationally recognised standardised weather format commonly used in the aviation industry. The meteorological data consists of hourly sequential data of wind speed, wind direction, surface temperature, precipitation rate and cloud cover data. In line with the standards, all data is passed through numerous quality control checks. At this site, the data was over 99% complete, with very little missing data.

The Meteorological 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 – London Heathrow Airport



Appendix 3.3: Emission Factors

The model utilises emission factors contained within EFT v12.0, published in November 2023. This represents the most up to date emissions factors available. The Emissions Factors Toolkit (EFT) is published by Defra and the Devolved Administrations to assist local authorities in carrying out Review and Assessment of local air quality as part of their duties under the Environmental Act 1995. It can be used by anyone to predict pollution concentrations at a given point, in conjunction with a detailed dispersion model.

The EFT provides emission rates through to 2030 and takes into consideration data from the National Atmospheric Emissions Inventory (NAEI) such as fleet composition based on European emission standards from pre-Euro I to Euro 6/VI (including Euro 6 subcategories) and scaling factors reflecting improvements in the quality of fuel and some degree of retrofitting.

The EFT allows users to calculate road vehicle pollutant emission rates for NO_x, PM₁₀, PM_{2.5} and CO₂ for a specified year, road type, vehicle speed and vehicle fleet composition. EFT v12.0 uses the latest COPERT 5.6 NO_x and PM emissions factors, updated from COPERT 5.3. The EFT is updated regularly to reflect changes in vehicle fleet composition and emissions factors.

Appendix 3.4: Street Canyons

ADMS-Roads is designed to be used to model concentrations at different locations assuming that there are no obstacles to air flow. Dispersion modelling in urban areas is difficult due to the presence of buildings, trees, walls, etc. that modify the wind flow and alter the dispersion of traffic emissions. This is especially the case in so called 'street canyons', where buildings, or other obstacles, can trap pollutants and restrict dispersion. ADMS-Roads includes additional modules to account for the restricted dispersion.

Although street canyons have been defined as narrow streets where the height of buildings on both sides of the road are greater than the road width, there are numerous examples whereby broader streets may be considered as street canyons. It also does not require buildings on both sides of a road to restrict dispersion. A wall or a bank with trees will also affect dispersion, as will overhanging trees.

Background concentrations influence pollutant levels within street canyons when the air mass at rooftop level moves into the canyon, leading to increased ventilation and flushing of the polluted air from the traffic. Similarly, gaps between buildings allow increased wind flows to enter the canyon and can re-circulate pollutants away from the junctions but causing increased concentrations further away. The opposite effect may occur if the gap is at a junction, where road traffic emissions are carried into the canyon, resulting in higher concentrations.

The concentrations depend of the wind direction with respect to the orientation of the street canyon; when the wind is perpendicular to the road higher concentrations occur on the leeward side. Wind blowing along a road will reduce concentrations as it ventilates the canyon. In reality, street canyons in are generally not regular in shape, the buildings on opposite sides of the road are of different heights, the width varies along the street and there are gaps between buildings.

LAQM.TG22 states *"Where a street can be partially classified as a street canyon, for example, where there are gaps in between buildings, monitoring in such locations may indicated elevated concentrations. It is therefore recommended that local authorities consider these links as street canyons; otherwise predicted concentrations are likely to be under-estimated"* (paragraph 7.413).

At this site, street canyon effects were not considered to be significant.

Appendix 3.5: Advanced Modelling Parameters

The following modelling parameters have been used in the ADMS-Roads Model:

Parameter	Value	Justification
Latitude	51.45°	Latitude of site
Surface Roughness ^{Note 1}	1 m	Recommended for cities and built-up areas
Minimum Monin-Obukhov Length	30 m	Recommended for towns and cities
Surface Albedo	0.23	The default for non-snow-covered ground
Priestley-Taylor Parameter	1.0	Model default

Note 1: A surface roughness of 0.2 has been applied to the meteorological measurement site, as it is considered to be a less built up area than the proposed development site.

Appendix 3.6: Air Pollutant Background Concentrations

The total pollutant concentration at a receptor comprises both:

1. the contribution from explicit local emission sources such as roads and chimney-stacks, and
2. those that are transported into an area by the wind from further away.

If all of the local sources are removed, all that remains is that which comes in from further away; this component is called the 'background concentration'. In many situations, the background contribution may represent a significant or dominant proportion of the total pollutant concentration.

When predicting air pollutant concentrations for an assessment such as this, the contribution from sources local to the proposed development is predicted by the dispersion model, which is then combined with an estimate of the background concentration to give a total pollutant concentration at a given location.

Air pollution background concentration maps are published by Defra to assist local authorities in carrying out their duties under the LAQM process. The background maps estimate background pollutant concentrations at 1 km² resolution for the whole of the UK, for a reference year which is then used to make projections of future years. The current version of the background maps (reference year 2021) contains estimates for NO_x, NO₂, PM₁₀ and PM_{2.5} for the period 2021 through to 2040.

The background maps also provide an estimated breakdown of the contributions of different sources of pollution, meaning that the contribution of major road sources that have been explicitly modelled as part of the assessment can be removed, to avoid double-counting these contributions.

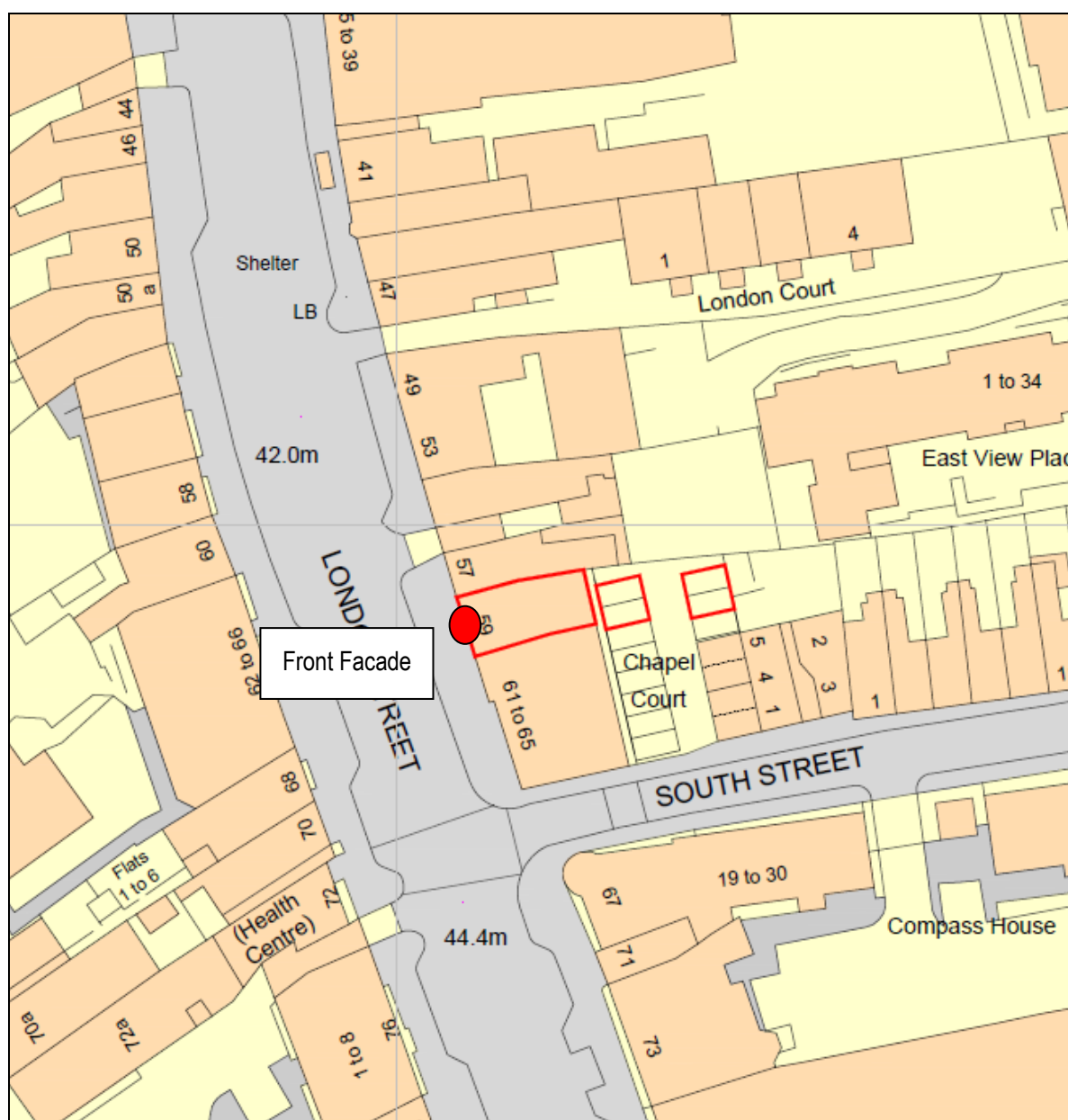
The background concentrations used in the assessment, with local road sources within each grid square removed, are shown in the table below.

1 km ² grid square centre (X,Y)	Modelled receptors within grid square	Pollutant	Predicted 2023 Annual Average Background Concentration (µg/m ³)
471500, 172500	Verification points: RD026, RD052	NO ₂	11.40
		PM ₁₀	13.51
		PM _{2.5}	8.23
471500, 173500	All on-site receptors	NO ₂	13.41
		PM ₁₀	13.01
		PM _{2.5}	7.95

Appendix 3.7: Receptor Locations

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

It is good practice to include receptors in the model that represent those locations where concentrations are likely to be highest. Consequently, the receptors include those locations closest to the kerbside, nearest to junctions or locations where traffic is stationary, slowed or congested and where appropriate include receptors on both sides of a road to take into account the fact the wind directions are predominately in one direction and the greatest annual mean impacts are generally downwind.

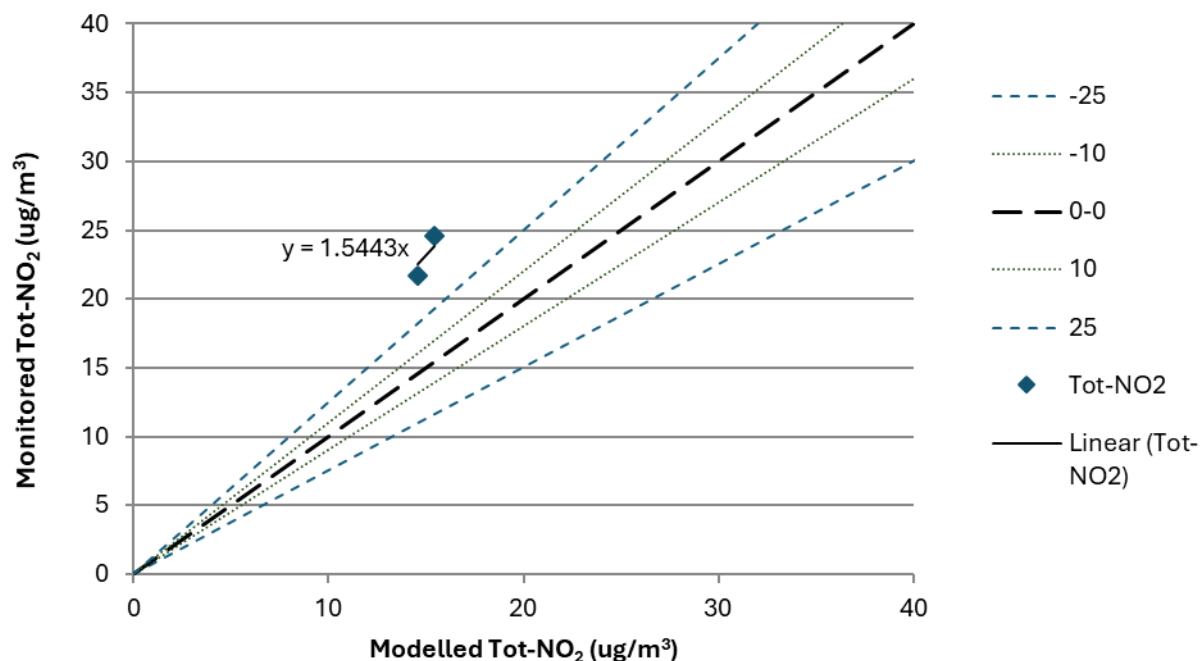


Appendix 3.8: Verification and Adjustment

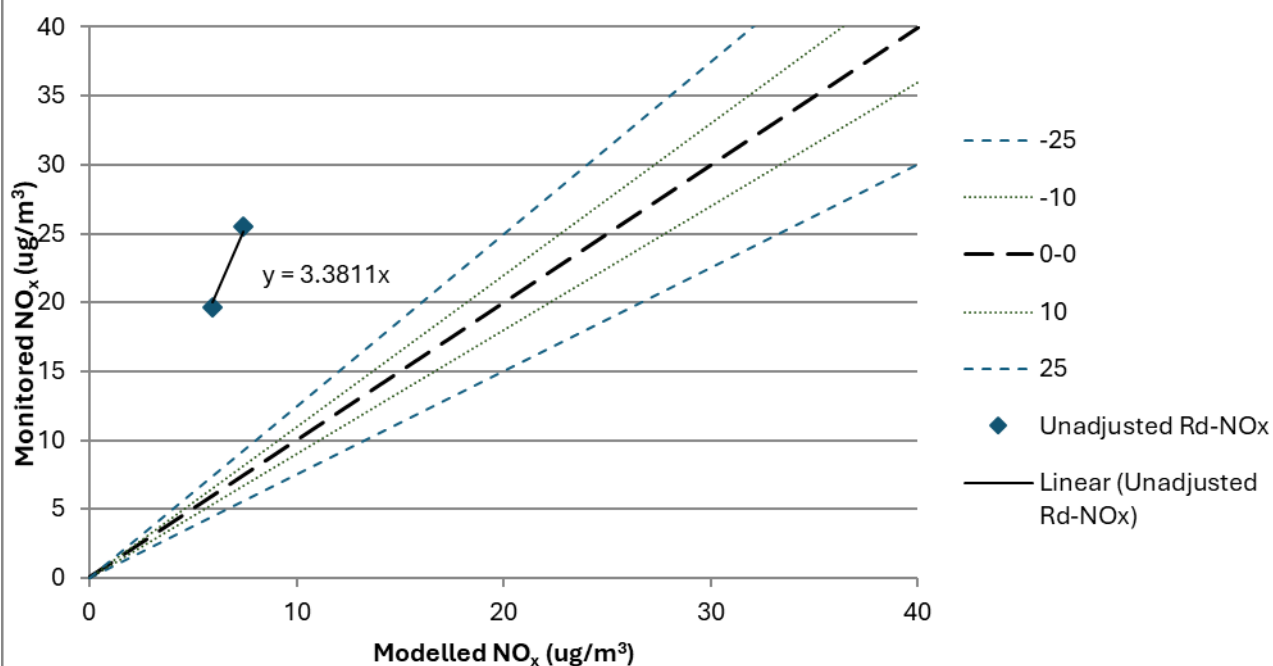
Verification of the air pollutant model was carried out in accordance with LAQM Technical Guidance TG22 using the data from the diffusion tube located in the vicinity of the site for 2023. The exercise required the modelling of the diffusion tube location for 2023 and comparing the modelled results with the monitoring results. The verification data is summarised below and shows that pollutant concentrations were underpredicted using the model; therefore, an adjustment factor of 3.3811 was applied to the model contribution of NO_x.

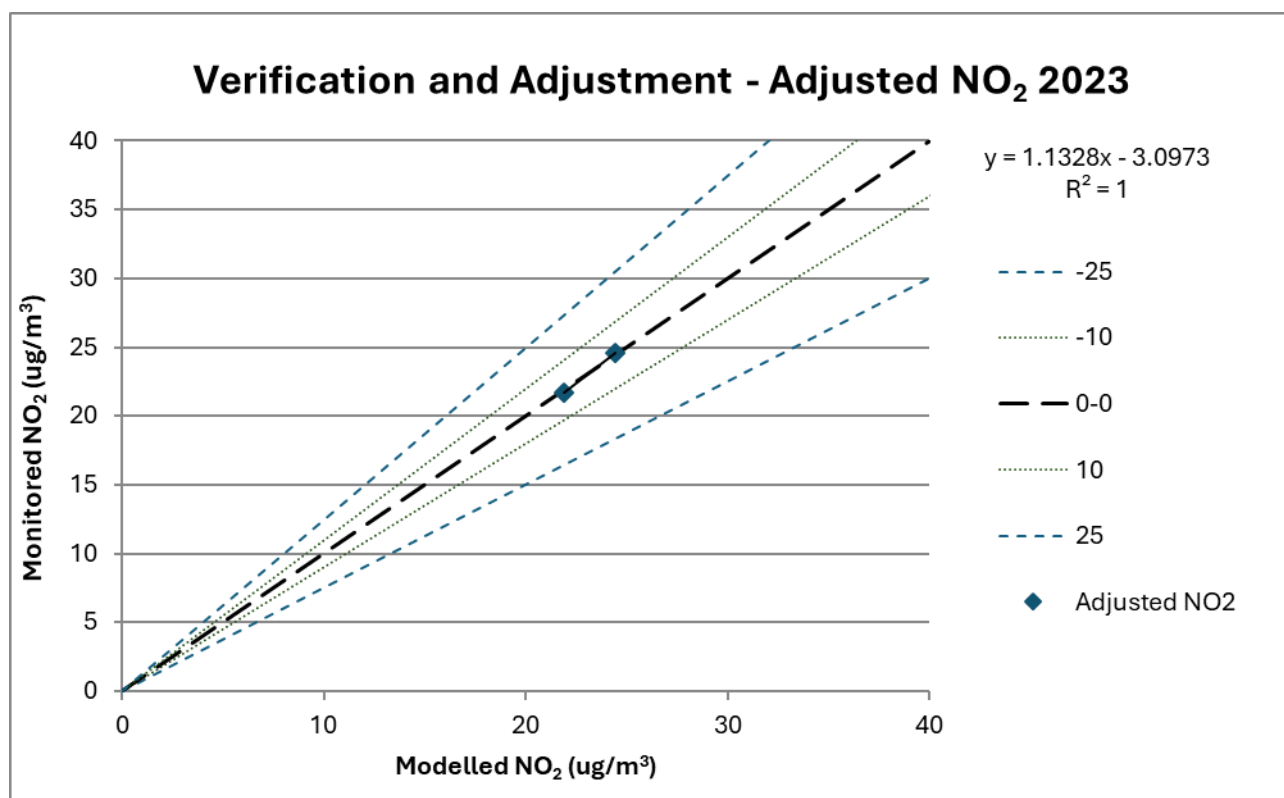
	Modelled Rds NO _x	Modelled Tot-NO ₂	Monitored Tot-NO ₂	%Diff Mod/Mon Tot-NO ₂	Modelled Rd-NO _x	Monitored Rd-NO _x	NO _x ADJ Corr1	Adj Mod Rd-NO _x	Adj Mod Tot-NO ₂	Monitored Tot-NO ₂	%Diff Mod/Mon Adj Tot- NO ₂
RD026	5.92	14.6	21.7	-32.72	5.92	19.62	3.31	20.01	21.89	21.70	0.88
RD052	7.44	15.41	24.6	-37.36	7.44	25.48	3.42	25.17	24.45	24.60	-0.61

Verification and Adjustment - Total NO₂ 2023



Verification and Adjustment - Unadjusted Road NO_x 2023





Appendix 3.9: Model Uncertainty

TG22 recommends the use of statistical parameters to assess uncertainty in the verified model. The table below describes the three parameters it recommends and the corresponding value for the verified model at this site.

Parameter	Value	Description
Correlation Coefficient	N/A	Used to measure the linear relationship between predicted and observed data. The ideal value (an absolute relationship) is 1.
Root Mean Square Coefficient	0.2	RMSE defines the average error/uncertainty of the model verification and is in the same units as the model outputs ($\mu\text{g}/\text{m}^3$). Values should be $<10\mu\text{g}/\text{m}^3$ or ideally $<4\mu\text{g}/\text{m}^3$ where concentrations are near the AQO. The ideal value is $0\mu\text{g}/\text{m}^3$.
Fractional Bias	-0.001	Identifies if the model shows a systematic tendency to over/under predict concentrations. The ideal value is 0 and range between ± 2 . Negative values suggest an over prediction whilst positive values suggest under prediction.

The correlation coefficient between two points is by default ideal. TG22 notes that for sites such as this validated with smaller datasets, the root mean square coefficient is the main parameter used. The table above notes that the root mean square coefficient is 0.2, i.e. less than 4 and therefore the model can be used with a high level of confidence. The Fractional Bias is just less than 0, indicating that on average, the validated model is likely to overpredict very marginally, but overall should be highly accurate.

Appendix 3.10: PM₁₀ Exceedances

The number of exceedances of 50 µg/m³ as a 24-hour mean PM₁₀ 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 exceedances of 50 µg/m³ as a 24-hour mean PM₁₀ concentration and B is the annual mean PM₁₀ concentration.