

**Bridge Farm,
Twyford**

**Prepared for
Croudace Homes Limited**

by

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November 2024



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ACRONYMS AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADMS-Roads	A comprehensive air pollution model for investigating air pollution problems due to networks of roads that may be in combination with industrial sites
AQA	Air Quality Assessment
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
ATC	Automated Traffic Count
DEFRA	Department for Environment, Food, and Rural Affairs
DEV	Development generated traffic
DMRB	Design Manual for Roads and Bridges
EPUK	Environmental Protection UK
EU	European Union
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LAQM.TG(16)	Local Air Quality Management Technical Guidance
LGV	Light Goods Vehicle
LPA	Local Planning Authority
MCC	Manual Classified Traffic Count
NAQO	National Air Quality Objectives
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
NPPF	National Planning Policy Framework
PM ₁₀ / PM _{2.5}	Particulate matter with an aerodynamic diameter less than 10 microns (PM ₁₀) or less than 2.5 microns (PM _{2.5}), expressed in units of µg/m ³
PPG	Planning Practice Guidance
SMA	Stuart Michael Associates Limited
SO ₂	Sulphur dioxide
TEMPO	Trip End Model Presentation PROgram
WBC	Wokingham Borough Council
µgm ⁻³	Micrograms per cubic meter



1.0 INTRODUCTION

1.1 Stuart Michael Associates Limited (SMA), Consulting Engineers, has been appointed by Croudace Homes Limited (the Applicant) to update an Air Quality Assessment for the consented residential development at land at Bridge Farm, Twyford.

1.2 This report will help discharge planning condition 53 (air quality) of the reserve matters application pursuant to Outline permission (Granted: 05.07.23 - LPA reference: 212720): *Outline application (all matters reserved except access to the site) for the development of up to 200 dwellings, including 40% affordable housing and associated infrastructure, open space, biodiversity enhancements, landscaping and green infrastructure, following demolition of existing agricultural buildings. (Means of access into the site from New Bath Road to be considered)*

1.3 Planning condition 53 states that:

53. Air Quality

The reserved matters shall include an updated assessment of air quality (having regard to the existing assessment - report by SMA ref: 5563/AQA issue status 02 dated October 2021) to be submitted to and approved in writing by the Local Planning Authority. The Air Quality Assessment shall demonstrate any likely changes in air quality exposure to air pollutants as a result of the proposed development and the exposure of receptors to the existing air pollution. The assessment is to compare the air quality following completion of the development with that expected at the time without the development. The assessment will need to include:

1. assessment of the existing air quality in the study area (existing baseline);
2. prediction of the future air quality without the development in place (future baseline);
3. prediction of the future air quality with the development having regard to proposed number of dwellings, road layout in place (with development) and associated traffic flows; and
4. details of mitigation as required
5. have regard for current technical guidance (at time of reserved matters application)

Reason: To protect residents from air pollutants, in accordance with Section 15 of the National Planning Policy Framework, Core Strategy policies CP1 and CP3, and Managing Development Delivery Local Plan policy CC06.

- 1.4 Refer to **Appendix 1** for a copy of the Illustrative Master Plan.

Site Description

- 1.5 The site is located to the north west of Twyford, West Berkshire. It is bounded to the north by the A4 New Bath Road and to the east by the Twyford to Henley railway line. Open agricultural land is located south and west of the site. Refer to **Figure 1** for the site location.

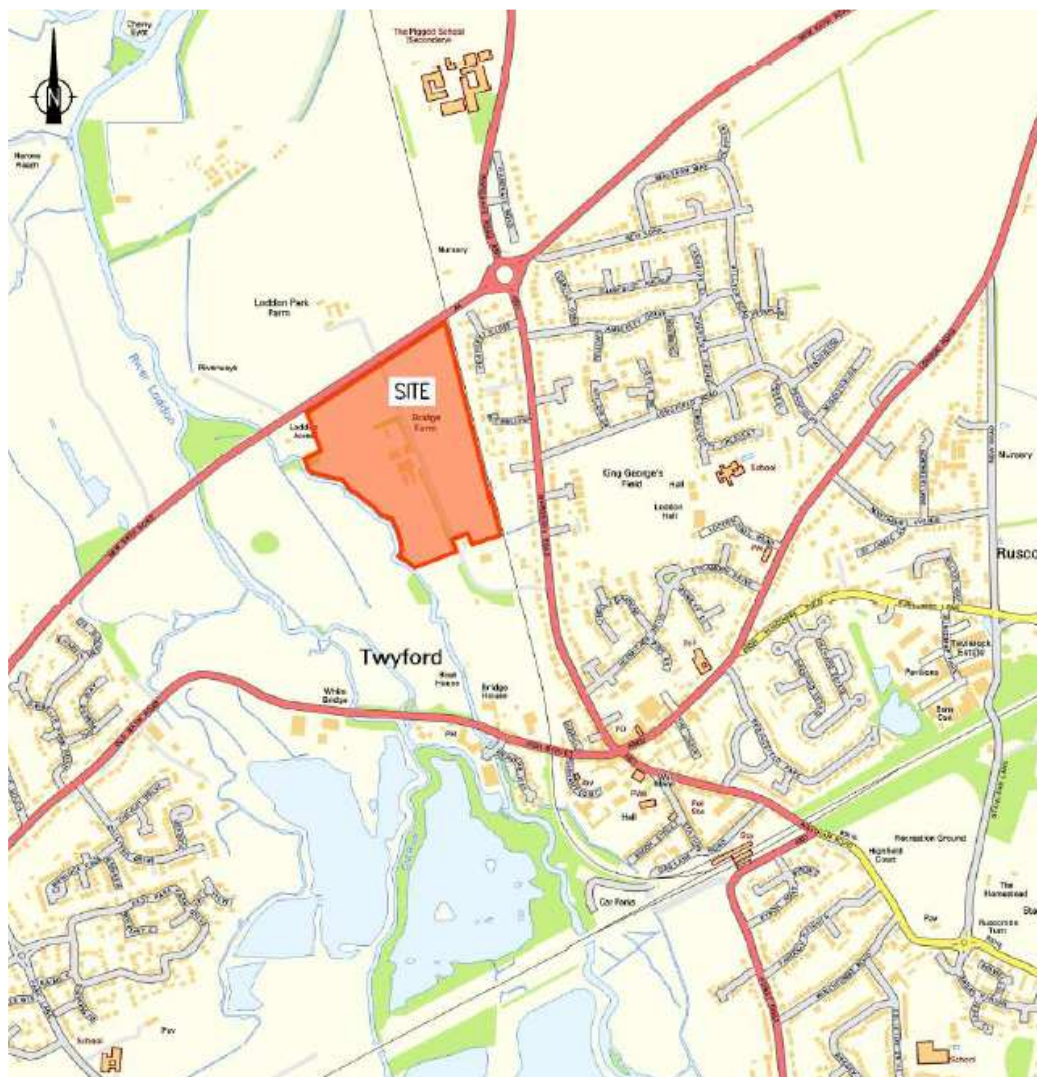


Figure 1.1: Site Location Plan

- 1.6 The proposed development site is located within the administrative boundary of Wokingham Borough Council (WBC), which is the Local Planning Authority (LPA)



for the area. WBC is responsible for the review and assessment of air quality within the vicinity of this site.

- 1.7 WBC have declared three Air Quality Management Areas (AQMA) within its Borough. These are located in Wokingham Town Centre, Twyford Village Centre Crossroads and along, and 60m either side of, the M4 throughout the whole of the Borough. The southern area of the development site is located approximately 550m north east of the Twyford AQMA.

Assessment Methodology

- 1.8 The report addresses the effects of air pollutant emissions from road traffic using the adjacent roads and the way they impact the site and surrounding area. Also considered are the emissions associated with the construction of the proposed Development.
- 1.9 The report has been split into two parts; the first part assesses the impact of the development on surrounding sensitive receptors and the second part assesses the constraints on the development (i.e. how the existing environment will impact on the development).
- 1.10 Road traffic flows on the local highway network have been obtained from permanent automatic traffic counters (ATC) and from surveys undertaken by the Transport Consultants. Where necessary, the surveyed traffic flows have been growthed to the assessment years using TEMPRO and adjusted using NTM.
- 1.11 The dispersion modelling software ADMS Roads has been used to determine the concentrations of pollutants at the development site and assess the likely changes in the concentrations of pollutants. Background concentrations of pollutants have been obtained from the Department for Environment Food and Rural Affairs (DEFRA) website.
- 1.12 Construction dust impacts on local receptors have been assessed using the method detailed in the Institute of Air Quality Management (IAQM) publication *"Guidance on the assessment of dust from demolition and construction"* (2024)
- 1.13 The principles in the IAQM document Land Use Planning & Development Control: Planning for Air Quality January 2017 have been considered and followed where deemed appropriate.



Report Outline

- 1.14 The report assesses the overall levels of oxides of nitrogen (NO_x), nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10 microns (PM_{10}) and 2.5 microns ($\text{PM}_{2.5}$) within the development site and at sensitive receptor locations. The base year for the development is 2024 and the future year of assessment is 2029, which is the predicted year of opening. Verification has been undertaken for 2019.



2.0 LEGISLATION AND PLANNING POLICY CONTEXT

Introduction

- 2.1 Poor air quality is the largest environmental risk to public health. Over recent years, UK air quality has improved significantly as a result of concerted action. Total UK emissions of nitrogen oxides (NO_x) have fallen by 77% since 1970. There has not been much change since 2020 due to the Covid-19 restriction which continued to reduce traffic on many roads in early 2021. Between 1990 and 2021 there was an average reduction of 4% which demonstrates that there is a downward trend in NO_x emissions in the UK*.
- 2.2 In the UK, emissions from road transport account for a substantial proportion of national air pollutant emissions. Road transport accounted for 31% of national carbon dioxide (CO₂) emissions in 2020 even though emissions fell by 3.1% between 2000 and 2018. Emissions from road transport of nitrogen dioxide (NO₂) and particulate matter smaller than 10µm in diameter (PM₁₀) also fell between 2000 and 2018[†]. Total pollutant emissions from cars peaked in 1990/91 and declined to 2009. *“Average CO₂ emissions from cars registered for the first time were steadily falling since 2003, but began to rise from mid-2016 through to 2019. This increase was broadly due to a shift towards registering larger cars (which have higher emissions) and increases in emissions for popular petrol car models. The introduction of WLTP in September 2018 caused a marked increase in average CO₂ emissions. However, changes from September 2018 are not directly comparable with previous periods”[‡].*
- 2.3 Private car ownership has grown from 24.4 million in 2000 to 38.7 million at the end of 2019. At the end of December 2022, there were 40.7 million licensed vehicles in the UK, which was a 1.0% increase compared to the end of December 2021, and a 2.3% increase compared to the end of December 2020.
- 2.4 Of the licensed vehicles using the highway network, cars accounted for 81.5%, light goods vehicles (<3.5t) 11.3%, HGV's (>3.5t) 1.3%, motorcycles 3.5%, Bus's and Coaches 0.4%, and “other vehicles” 2.1% of all motor vehicle traffic at the end of 2022[§].

* DEFRA National Statistics Release: Emissions of air pollutants in the UK, 1970 to 2021 – Statistical Release: Updated 22nd February 2023

[†] Department for Transport Statistics: Road Traffic Estimates: Great Britain 2021 – Released 28th September 2022

[‡] Department for Transport (DfT), Vehicle licensing Statistics: Annual 2019 – Published 30th April 2020

[§] DfT Statistics - Vehicle Licensing Statistics: Annual 2022



- 2.5 The percentage of different fuel type usage for private cars has significantly changed since the mid-1990s. At the end of 2022 there were 11.7 million diesel cars, accounting for 35% of the total, up from 11% in 1997 but down from a peak of 40% in 2016, 2017 and 2018. Alternative fuel vehicles which include gas, electricity, or a combination such as gas bi-fuel and hybrid electric were up to 2.5 million by the end of 2022.
- 2.6 At the end of December 2022, there were 1.103 million licensed Ultra-Low Emission Vehicles (ULEVs) in the UK. This was an increase of 49% compared to the end of 2021, when there were 0.739 million.
- 2.7 During 2022, 391,000 new ULEVs were registered for the first time, which is a 22% increase when compared with the previous year. This amounted to 18% of all new vehicle registrations in 2022, up from 14% in 2021**.

National Air Quality Strategy

- 2.8 In 1997 the United Kingdom National Air Quality Strategy (NAQS) was published and for the first time. The document set out an analysis of the magnitude and potential health and environmental problems associated with, amongst other things, air pollutant emissions resulting from road traffic.
- 2.9 It proposed a schedule of air quality objectives which were to be met in the years up to 2005. In setting these objectives, health and socio-economic cost-benefit factors were considered, together with the practical and pragmatic aspects of whether targets would be achievable. Whilst it was identified in the NAQS that the objectives for benzene, 1,3-butadiene, lead (Pb) and carbon monoxide (CO) could be achieved as a result of improvement measures already put in place, complying with targets for NO₂ and PM₁₀ would be more difficult.
- 2.10 Considering the additional measures that would have to be introduced to counter these apparent shortfalls, the Government voiced the following thought:
- “Changes in planning and transport policies (are needed) which would reduce the need to travel and reliance on the car”.* Regarding the necessity for encouraging a shift away from private car usage, the Strategy commented, in terms of the new package approach to transport funding:
- “As a general rule, traffic demand management and restraint measures should be included and this, together with proposals to promote and enhance other

** DfT Statistics - Vehicle Licensing Statistics: Annual 2022)



modes of transport, should aim to achieve modal shifts away from the private car.”

- 2.11 The Environment Act 1995 sections 82-84 requires that Local Authorities shall carry out reviews of air quality within their administrative areas and, where it is assessed that the air quality objectives may not be complied with in the future, an Air Quality Management Area (AQMA) must be declared. The Local Authority must then formulate an Action Plan, setting out the measures that will be employed to achieve compliance with the objectives.
- 2.12 A review of the UK Air Quality Strategy was undertaken in 1998 and a consultation document was published in January 1999 which outlined proposals for amending the Strategy. In August 1999, in response to the consultation, the Government then published a draft Air Quality Strategy for England, Scotland, Wales and Northern Ireland. The Air Quality Regulations (England) 2000 were enacted in April 2000, and the Air Quality (England) (Amendment) Regulations 2002 gives legal force to the air quality standards set out in the Strategy. A new strategy was released in July 2007 with various amendments to the air quality objectives. The proposals, in brief, consisted of recommendations to adopt the provisions of the EU Air Quality Daughter Directives. The National Air Quality Objectives (NAQO's) included in the Regulations are set out in Appendix 2.
- 2.13 Given the significant influence that motor vehicle exhausts exert on air quality in the UK and the apparent links between elevated levels of certain air pollutants and premature mortality, current and emerging Government policy is geared towards several essential objectives, which are:
- continued action to reduce pollutant emissions from vehicles across the EU, which can be exemplified by the plethora of Directives concerning limitation of motor vehicle emissions since the 1970's and specific targeted initiatives such as the Auto-Oil Study programme;
 - concerted action at a National level to reduce private car trips in urban and inter-urban uses and encourage use of alternative forms of transportation;
 - action at a local level to manage transportation and air quality in order to reduce the number of car trips in urban areas specifically and to aim for compliance with the NAQS by the appointed dates;
 - and



- to ensure that Local Authorities in the execution of their development control responsibilities take account of the consequent air quality impacts.

2.14 It is evident that continued growth in private car ownership and usage will result in further deterioration of air quality in urban areas and increasing emissions of greenhouse gases. Whilst current technological improvements will extend the reduction in emissions, additional measures will be required in order to prevent re-growth of emissions, both to meet ambient air quality targets in urban areas and to offer an alternative to the car for urban journeys. Consequently, where new development can be in close proximity to public transport and local services, a contribution to the UK's target of reducing emissions will have been made.

2.15 Levels of lead (Pb) and sulphur dioxide (SO₂) are also controlled by the NAQO. Lead levels have reduced significantly since its reduced use as a fuel additive, and the abolition of four-star petrol in January 2000 means that the amount of Pb in petrol is reduced to a negligible level. SO₂ is predominantly associated with emissions from industrial processes and when assessing the effects of traffic, neither SO₂ nor Pb need be assessed.

National Planning Policy Framework

2.16 Paragraphs 192 to 194 of the NPPF (NPPF – December 2023) is considered relevant to this assessment:

“192. 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.

193. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses



and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

194. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”.

Planning Practice Guidance (PPG)

2.17 The Planning Practice Guidance (PPG) provides guidance on the policy governing Environmental Impact Assessment of air quality and the process by which Environmental Impact Assessment is carried out. The PPG states:

“The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂).

The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:

- fine particulate matter (PM_{2.5})
- ammonia (NH₃)
- nitrogen oxides (NO_x)
- sulphur dioxide (SO₂)
- non-methane volatile organic compounds (NMVOCs)

As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity.”



The Environment Act 2021

- 2.18 The Environment Act was passed into UK law in November 2021 with the aim of protecting and enhancing the environment for future generations. The Act establishes the Office for Environmental Protection (OEP), the new green watchdog for England (and Northern Ireland), which will be responsible for 'holding to account' government and public bodies on their environmental obligations.
- 2.19 Amongst other things, the Act introduced a duty on the government to bring forward at least two air quality targets by October 2022, which were set in secondary legislation. The first aim was to reduce the annual average level of fine particulate matter (PM_{2.5}) in ambient air. The second was a long-term target (set a minimum of 15 years in the future).
- 2.20 The Environment Improvement Plan 2023 (First revision of the 25 Year Environment Plan) reiterated the ambition to reduce PM_{2.5} concentrations in the future. The Plan sets the following long-term and interim targets.

Long-term targets;

- *"By the end of 2040, we will achieve a maximum Annual Mean Concentration Target (AMCT) of 10 micrograms of PM_{2.5} or below per cubic metre (µgm⁻³); and*
- *By the end of 2040, we will reduce population exposure to PM_{2.5} by 35% compared to 2018 levels".*

Interim targets:

"By the end of January 2028:

- *The highest annual mean concentration in the most recent full calendar year must not exceed 12 µgm⁻³ of PM_{2.5}.*
- *Compared to 2018, the reduction in population exposure to PM_{2.5} in the most recent full calendar year must be 22% or greater".*

Additional Guidance

- 2.21 The Local Air Quality Management Technical Guidance LAQM.TG(22) (August 2022 update) is designed to support local authorities in carrying out their duties under the Environment Act 1995. These duties require local authorities to periodically review and assess air quality in their area.



2.22 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS, 2007) sets out air quality objectives and policy options to further improve air quality in the UK. It provides options which are intended to provide important benefits to UK Air Quality.

2.23 The effects of dust generation from construction will be assessed at the detailed AQA in accordance with the methodology presented in the Institute of Air Quality Management (IAQM) publication "Guidance on the assessment of dust from demolition and construction" (2024). Local Council Policy.

(Core Strategy 2010)

2.24 WBC presents its key elements of vision for planning policies for development of our borough until March 2026 in the Core Strategy. This includes 21 policies and strategies to provide new housing, schools, roads, places to work and other services.

CP1 – Sustainable Development

2.25 Planning permission will be granted for development proposals that... "avoid areas where pollution (including noise) may impact upon the amenity of future occupiers".

Twyford Neighbourhood Plan

2.26 The Twyford Neighbourhood Plan covers the area of Twyford parish. The plan was made (adopted) by the council on 20 July 2023. Within the Neighbourhood Plan is Policy TW6 which relates to air quality.

Policy TW6: Improving Air Quality

"A. In addition to existing planning policy provisions on the requirement to submit air quality assessments, development within or adjacent to the Twyford Crossroads Air Quality Management Area, as shown on the Policies Map, should demonstrate how they contribute towards the aims and objectives set out in the latest version of Wokingham Borough Council's air quality action plan.

B. Where applicable, development proposals should aim to be at least 'Air Quality Neutral' and not cause or contribute to worsening air quality, including in the Twyford Crossroads Air Quality Management Area.



Development proposals that would result in a significant increase in air pollution within or adjacent to the Twyford Crossroads Air Quality Management Area will only be supported in exceptional circumstances. This should be demonstrated through an air quality assessment, and if necessary, proposed mitigation measures.”



3.0 METHODOLOGY AND ASSESSMENT CRITERIA

Assessment of the Prevailing Air Quality

3.1 This section summarises the methodology used to consider whether there are “Significant” air pollution impacts on sensitive receptors or constraints on development. In order to determine the extent to which air quality issues will affect the sensitive receptors, the study has considered the following:

- Any air quality measurements carried out in Wokingham Borough (which are in the public domain);
- The Review and Assessment of air quality carried out by WBC for the area, as submitted to the Department for the Environment, Food and Rural Affairs (DEFRA);
- Predictions of air pollutant concentrations adjacent to the site utilising the ADMS Roads dispersion modelling program.

Assessment Criteria

3.2 The NAQO levels are derived from air quality standards set to protect health. The objectives address social and economic factors as well as the health standards.

3.3 For the purposes of this development proposal, the NAQO will form the basis of the air quality assessment. The NAQO levels are based on an assessment of the effects of each pollutant on public health. Therefore, they are a good indicator in assessing whether the air quality in the vicinity of a road is likely to be detrimental to human health.

3.4 The effects of dust generation from construction have been undertaken following the methodology presented in the Institute of Air Quality Management (IAQM) publication “Guidance on the assessment of dust from demolition and construction” (2024).

3.5 In determining whether air pollutant levels may constrain development, the results of the study have been compared against the acceptability criteria.

Impact Magnitude and Impact Descriptors (Significance) – Air Quality Assessments

Construction Phase

3.6 During the construction phase, there will be a number of activities undertaken that have the potential to generate and/or re-suspend dust and PM₁₀. At the time



of assessment, the exact activities to be undertaken during construction are unknown. However, in order to evaluate the magnitude and extent of potential adverse impacts likely to result from the proposed development, the following construction activities have been assumed:

- storage of materials;
- laying of hard surfaces;
- construction of buildings; and
- vehicle movements to and from the Site.

3.7 The magnitude of the potential impacts of a construction site on air quality is mainly determined by its size, the range of activities undertaken across the site, proximity to sensitive receptors, complexity of terrain and any barriers between sources and receptors.

3.8 A qualitative assessment of the potential impacts during construction has been undertaken using information in guidance documents produced by IAQM.

3.9 According to this guidance; a human receptor refers to any location where a person may experience the annoyance effects of airborne dust or dust soiling or exposure to PM over a time period relevant to the air quality objectives. In terms of annoyance effects, this will most commonly relate to residential dwellings and schools.

3.10 Activities on construction sites can be divided into four types to reflect their different potential impacts, with the potential for dust emissions to be assessed only for each activity taking place:

- Site Preparation;
- Earthworks;
- Construction; and
- Trackout.

3.11 The assessment methodology considers three separate dust effects:

- annoyance due to soiling;
- harm to ecological receptors; and
- the risk of health effects due to a significant increase in exposure to PM₁₀ (including PM_{2.5}).



3.12 Account is also to be taken of the distance of the receptors that may experience these effects. The assessment procedure assumes no mitigation measures are applied except those required by legislation.

3.13 The potential dust emission magnitude for the proposed Development Site is determined for the four construction activities using the criteria presented in IAQM guidelines. The magnitude is based on the scale of the anticipated works and classified as “Small”, “Medium” or “Large”. Example definitions are presented in **Table 3.1**.

Table 3.1: Example definitions for Potential Dust Emission Magnitude

Phase of Construction	Demolition	Earthworks	Construction	Trackout
Magnitude				
Large	Total building volume >75,000m ³ , potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12m above ground level;	Total site area >110,000 m ² , potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6m in height	Total building volume >75,000 m ³ , on site concrete batching, sandblasting	>50 HDV (>3.5t) outward movements ^a in any one day, 10 potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	Total building volume 12,000 m ³ – 75,000 m ³ , potentially dusty construction material, demolition activities 6-12m above ground level	Total site area 18,000 m ² – 110,000 m ² , moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3m - 6m in height	Total building volume 12,000 m ³ – 75,000 m ³ , potentially dusty construction material (e.g. concrete), on site concrete batching	20-50 HDV (>3.5t) outward movements ^a in any one day, 10 moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	Total building volume <12,000m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6m above ground, demolition during wetter months	Total site area <18,000 m ² , soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height	Total building volume <12,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber)	<20 HDV (>3.5t) outward movements ^a in any one day, 10 surface material with low potential for dust release, unpaved road length <50 m

^a A vehicle movement is a one way journey. i.e. from A to B, and excludes the return journey.

3.14 The sensitivity of the area takes account of several factors: the specific sensitivities of receptors in the area; the proximity and number of those receptors; in the case of PM₁₀, the local background concentration; and site-specific factors,



such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust. The sensitivities of people to dust soiling effects are presented in **Table 3.2** and **Table 3.3** for the sensitivities of people to the health Effects of PM₁₀. Sensitivities of receptors to ecologic effects are presented in **Table 3.4**.

Table 3.2: Sensitivities of People to Dust Soiling Effects

Sensitivity	Criteria
High	• users can reasonably expect enjoyment of a high level of amenity; or • the appearance, aesthetics or value of their property would be diminished by soiling; and • the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.
Medium	• users would expect¹ to enjoy a reasonable level of amenity, but would not reasonably expect¹ to enjoy the same level of amenity as in their home; or • the appearance, aesthetics or value of their property could be diminished by soiling; or • the people or property wouldn't reasonably be expected¹ to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • indicative examples include parks and places of work.
Low	• the enjoyment of amenity would not reasonably be Expected¹; or • property would not reasonably be expected¹ to be diminished in appearance, aesthetics or value by soiling; or • there is transient exposure, where the people or property would reasonably be expected¹ to be present only for limited periods of time as part of the normal pattern of use of the land. • indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks² and roads.
¹ People's expectations will vary depending on the existing dust deposition in the area	
² Car parks can have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with work place or residential parking might have a high level of sensitivity compared to car parks used less frequently and for shorter durations, such as those associated with shopping. Cases should be examined on their own merits	



Table 3.3: Sensitivities of People to the Health Effects of PM₁₀

Sensitivity	Criteria
High	- locations where members of the public are exposed over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).¹ - indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
Medium	- locations where the people exposed are workers², and exposure is over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). - indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation.
Low	- locations where human exposure is transient³ - indicative examples include public footpaths, playing fields, parks and shopping streets.
¹ This follows Defra guidance as set out in LAQM.TG(22).	
² Notwithstanding the fact that the air quality objectives and limit values do not apply to people in the workplace, such people can be affected to exposure of PM ₁₀ . However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. For this reason workers have been included in the medium sensitivity category.	
³ There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain	

Table 3.4: Sensitivities of Receptors to Ecological Effects

Sensitivity	Criteria
High	- locations with an international or national designation and the designated features may be affected by dust soiling; or - locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain.¹ - Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	- locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or - locations with a national designation where the features may be affected by dust deposition. - Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	- locations with a local designation where the features may be affected by dust deposition. - Indicative example is a local Nature Reserve with dust sensitive features.
¹ Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.	



3.15 The “Sensitivity of an Area” to dust soiling effects on people and property is determined by using the criteria presented in **Table 3.5**. The “Sensitivity of an Area” to human health impacts is presented in **Table 3.6**. The “Sensitivity of an Area” and to ecological impacts is presented in **Table 3.7**.

Table 3.5: Sensitivity of the area to dust soiling effects on people and property

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



Table 3.6: Sensitivity of the area to human health impacts

Receptor Sensitivity	Annual Mean PM ₁₀ conc.	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 μgm^{-3} (>18 μgm^{-3} in Scotland)	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 μgm^{-3} (16-18 μgm^{-3} in Scotland)	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 μgm^{-3} (14-16 μgm^{-3} in Scotland)	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 μgm^{-3} (<14 μgm^{-3} in Scotland)	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 μgm^{-3} (>18 μgm^{-3} in Scotland)	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 μgm^{-3} (16-18 μgm^{-3} in Scotland)	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 μgm^{-3} (14-16 μgm^{-3} in Scotland)	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 μgm^{-3} (<14 μgm^{-3} in Scotland)	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>=1	Low	Low	Low	Low	Low

Table 3.7: Sensitivity of the area to ecological impacts

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

3.16 **Figure 3.1** illustrates that there are Dust sensitive receptors within the vicinity of the site boundary, **Figure 3.2** illustrates that there are PM₁₀ sensitive receptors within the vicinity of the site boundary.

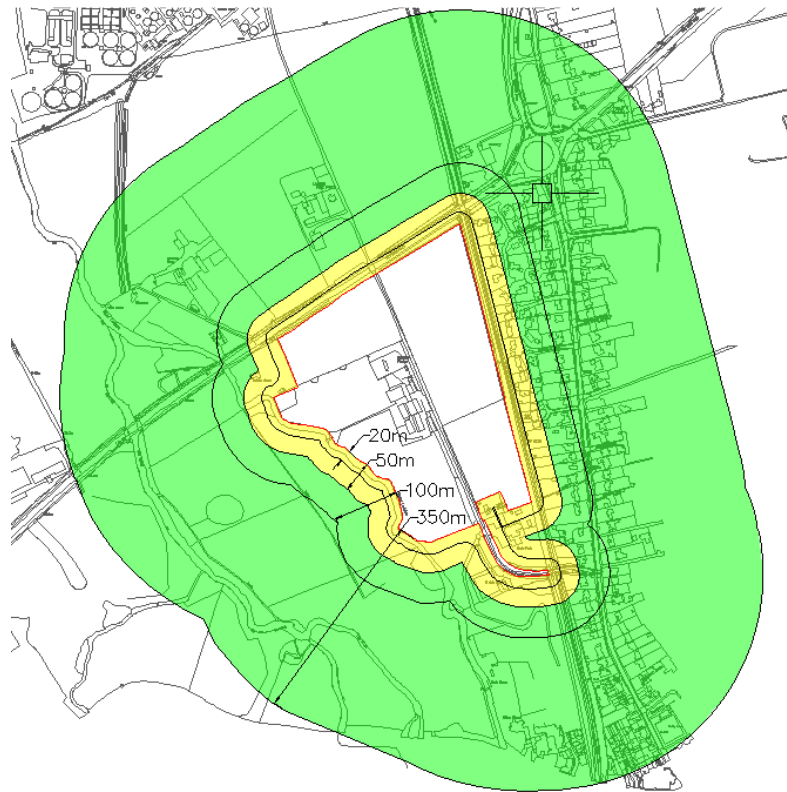


Figure 3.1: Sensitivity to Dust Soiling Effects on People and Property

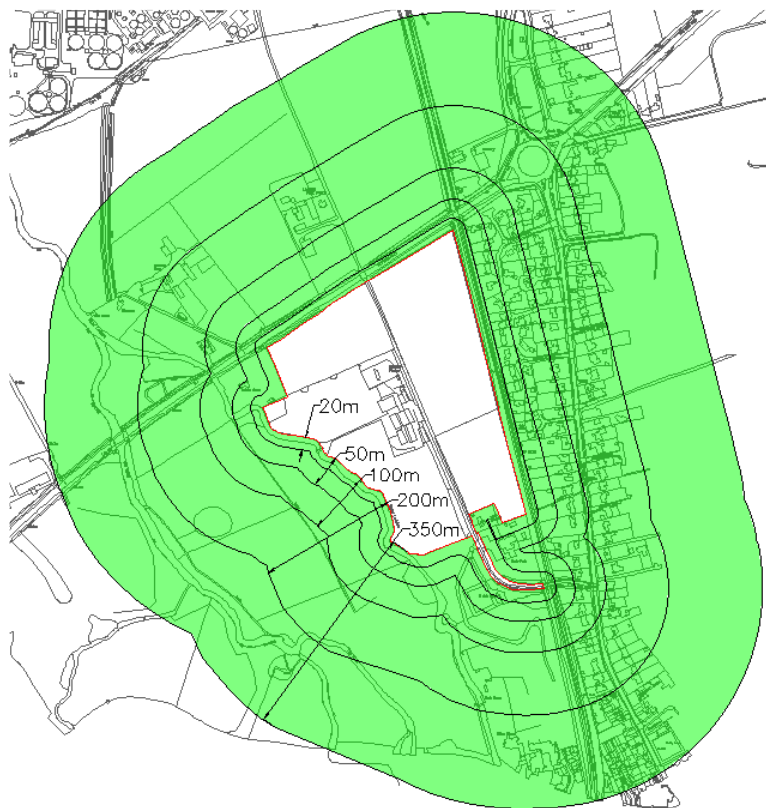


Figure 3.2: Sensitivity of the Area to Human Health Effects of PM₁₀



- 3.17 Once the potential dust emissions magnitude and the sensitivity of the area have been determined the results can be combined to define the risks of impact using the criteria in the following tables.

Table 3.8: Risk of Dust Impacts – Demolition

Sensitivity of Area	Dust Emission Magnitude		
	<i>Large</i>	<i>Medium</i>	<i>Small</i>
<i>High</i>	High Risk	Medium Risk	Medium Risk
<i>Medium</i>	High Risk	Medium Risk	Low Risk
<i>Low</i>	Medium Risk	Low Risk	Negligible

Table 3.9: Risk of Dust Impacts – Earthworks and Construction

Sensitivity of Area	Dust Emission Magnitude		
	<i>Large</i>	<i>Medium</i>	<i>Small</i>
<i>High</i>	High Risk	Medium Risk	Medium Risk
<i>Medium</i>	Medium Risk	Medium Risk	Low Risk
<i>Low</i>	Medium Risk	Low Risk	Negligible

Table 3.10: Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	<i>Large</i>	<i>Medium</i>	<i>Small</i>
<i>High</i>	High Risk	Medium Risk	Medium Risk
<i>Medium</i>	Medium Risk	Low Risk	Low Risk
<i>Low</i>	Medium Risk	Low Risk	Negligible

- 3.18 The proposed development's site-specific results and significance of these tables are discussed in Section 5 of this Report.

Operational Phase

- 3.19 The impact of local traffic growth, development generated traffic and other potential sources of air pollution have been assessed for the magnitude of change and for the extent to which change in air quality from existing to future levels would be significant.
- 3.20 Descriptors for the magnitude of change in annual mean concentrations of NO₂ and PM₁₀ and the number of days with PM₁₀ concentrations greater than 50 µgm⁻³ are presented in **Table 3.11**.



Table 3.11: Descriptors for the magnitude in changes in annual mean concentrations of NO₂ and PM₁₀ and the number of days with PM₁₀ concentrations greater than 50 µgm⁻³

Magnitude of Change	Annual Mean NO ₂ /PM ₁₀	Days PM ₁₀ >50 µgm ⁻³
Large	Increase/decrease >4 µgm ⁻³	Increase/decrease >4 days
Medium	Increase/decrease 2 - 4 µgm ⁻³	Increase/decrease 2 - 4 days
Small	Increase/decrease 0.4 - 2 µgm ⁻³	Increase/decrease 1 - 2 days
Imperceptible	Increase/decrease <0.4 µgm ⁻³	Increase/decrease <1 day

3.21 Following on from the determination of the magnitudes of the impact of change of NO₂ and PM₁₀ levels, the assessment of the significance of the impact with reference to the NAQO Levels can be undertaken. Descriptors of the changes to annual mean concentrations of NO₂ and PM₁₀ and the number of days with PM₁₀ concentrations greater than 50 µgm⁻³ are presented in **Table 3.12**.

Table 3.12: Impact descriptors for changes to annual mean concentrations of NO₂ and PM₁₀ and the number of days with PM₁₀ concentrations greater than 50 µgm⁻³

<i>Absolute Concentration in Relation to Objective/Limit Value</i>	Change in Concentration /Number of Days		
	<i>Small</i>	<i>Medium</i>	<i>Large</i>
Increase with Scheme			
Above Objective/Limit Value with Scheme (>40 µgm ⁻³ />35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Scheme (36-40 µgm ⁻³ />32-35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (30-36 µgm ⁻³ />26-32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with Scheme (<30 µgm ⁻³ /<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value Without Scheme (>40 µgm ⁻³ />35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value Without Scheme (36-40 µgm ⁻³ />32-35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value Without Scheme (30-36 µgm ⁻³ />26-32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value Without Scheme (<30 µgm ⁻³ /<26 days)	Negligible	Negligible	Slight Beneficial
Note – an “Imperceptible” change would be described as “Negligible”			



- 3.22 Detailed in Table 3.11 and Table 3.12 are the magnitude and “Significance” of changes in NO₂ and PM₁₀ levels. The tables have been extracted from the Environmental Protection UK (formerly National Society for Clean Air (NSCA)) publication “*Development Control: Planning for Air Quality (2010 Update)* – Table 5 and Appendix 3”.
- 3.23 The updated IAQM guidance^{††} includes an abbreviated version of Table 3.11 and Table 3.12 and replaces numerical change / concentration with percentage change in concentrations which can be applied to NO₂, PM₁₀ and the number of days with PM₁₀ concentrations greater than 50 µgm⁻³ and PM_{2.5}. A copy of IAQM Table 6.3 is presented below.

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Traffic Data

- 3.24 The future concentrations of NO_x, NO₂, PM₁₀, PM_{2.5} at representative sensitive receptors in the vicinity of the existing highway network have been predicted using the ADMS - Roads (Version 5.0.1) dispersion model based on forecast traffic flows for the local road network.
- 3.25 Road traffic data for the local highway network has been collected using automatic traffic count (ATC), the Transport Consultants and from publicly available traffic data . Road traffic data has been growthed using growth factors derived from NTM and adjusted for local factors using TEMPRO.

^{††} Land-Use Planning & Development Control: Planning for Air Quality January 2017 (v1.2)



- 3.26 One existing and two future scenarios have been assessed: “Base” (2024); “Future Base” (2029 - do nothing) and “Future with Development” (2029 - do something) scenarios.
- 3.27 The “Base” scenario vehicle flows on the local highway network used in the assessment are detailed in **Table 3.13**.

Table 3.13: AADT Traffic flow data (no development generated traffic) 2024

Link Ref.	Description	LGV + Cars	HGV + Buses
1	A4 New Bath Road (West)	20,985	568
2	A3032 Old Bath Road	7,284	182
3	A321 Wargrave Road (South)	6,058	265
4	A321 Wargrave Road (North)	5,310	167
5	A4 New Bath Road (East)	14,478	410
6	A3032 London Road (South)	5,571	111
7	A3032 London Road (North)	3,084	66
8	B3024 Ruscombe Road	1,465	26
9	B3024 Waltham Road	1,465	26
10	B478 Thames Street	13,206	100
11	B3018 Waltham Road	5,785	85
12	A321 Hurst Road	6,878	85
13	A321 Church Street	5,785	85
14	A3032 High Street	7,284	182

- 3.28 The local highway network has been modelled as distinctive links where vehicle speeds change, width of roads change and at junctions. Also included are changes in vehicle speed due to pedestrian crossings and traffic lights.

Background Concentrations of Air Pollutants

- 3.29 Background concentrations of air pollutants for the dispersion modelling were obtained from the UK National Air Quality Information Archive (DEFRA website), in accordance with Local Air Quality Management Technical Guidance TG(22). Data sets for 2018 (based background maps for years 2018 – 2030) have been published by DEFRA. Identified in **Table 3.14** are the background concentrations of NO_x, NO₂, PM₁₀ and PM_{2.5} for the years 2024 and 2029.



Table 3.14: Background pollutant concentrations for 2024 and 2029

Grid Reference		2024				2029			
<i>Easting</i>	<i>Northing</i>	<i>NO_x</i>	<i>NO₂</i>	<i>PM₁₀</i>	<i>PM_{2.5}</i>	<i>NO_x</i>	<i>NO₂</i>	<i>PM₁₀</i>	<i>PM_{2.5}</i>
478500	178500	14.49	10.89	13.54	9.15	13.20	9.99	13.34	9.00
478500	176500	16.45	12.22	14.40	9.61	14.76	11.06	14.21	9.46
475500	175500	17.50	12.85	13.51	9.24	16.13	11.94	13.31	9.08
478500	175500	18.51	13.51	13.75	9.29	17.19	12.63	13.57	9.13



4.0 BASELINE CONDITIONS

Air Quality Review and Assessment

- 4.1 As previously indicated, Local Authorities have been required to carry out a review of local air quality within their boundaries to assess areas that may fail to comply with the NAQO. In areas 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.
- 4.2 The review of air quality takes on several prescribed stages, of which each stage is reported. The review and assessment of air quality is the responsibility of Wokingham Borough Council (WBC).
- 4.3 At the time of undertaking the AQ assessment the latest WBC Air Quality Annual Status Report (ASR) was published in June 2024.
- 4.4 Three AQMAs have been declared in WBC for exceedances of annual average concentrations of NO₂. These are located in Wokingham Town Centre, Twyford Village Centre Crossroads and along and 60m either side of the M4 throughout the whole of the Borough. The nearest AQMA is approximately 550m from the southern boundary at the Crossroads of the A321 Wargrave Road and the A3032 London Road/High Street in Twyford Village. Refer to **Figure 4.1** for the location of the Twyford AQMA.
- 4.5 The development site is not located in an AQMA. However, development generated traffic does have the potential to impact on the Twyford AQMA.

Air Quality Monitoring

- 4.6 WBC undertakes a combination of continuous and passive monitoring of NO₂ at a number of sites within its administrative boundary. No particulate matter (PM₁₀) monitoring is currently undertaken. Detailed below are the results of the continuous and passive monitoring of NO₂ up to the end of 2023.

Continuous Monitoring

- 4.7 WBC undertook continuous monitoring of NO₂ at two sites within their administrative boundary (Site IDs: CM2 – Peach Street, Wokingham and CM3 – Twyford Cross Roads). The CMs are a chemiluminescent type monitor recording NO₂ concentrations, located "Roadside" (CM2) and "Kerbside" (CM3). Refer to

Figure 4.1 for the location of the automatic monitoring site in Twyford and the monitoring results at CM3.

Figure D.0.6 Map of Twyford Crossroads AQMA Air Quality Monitoring sites

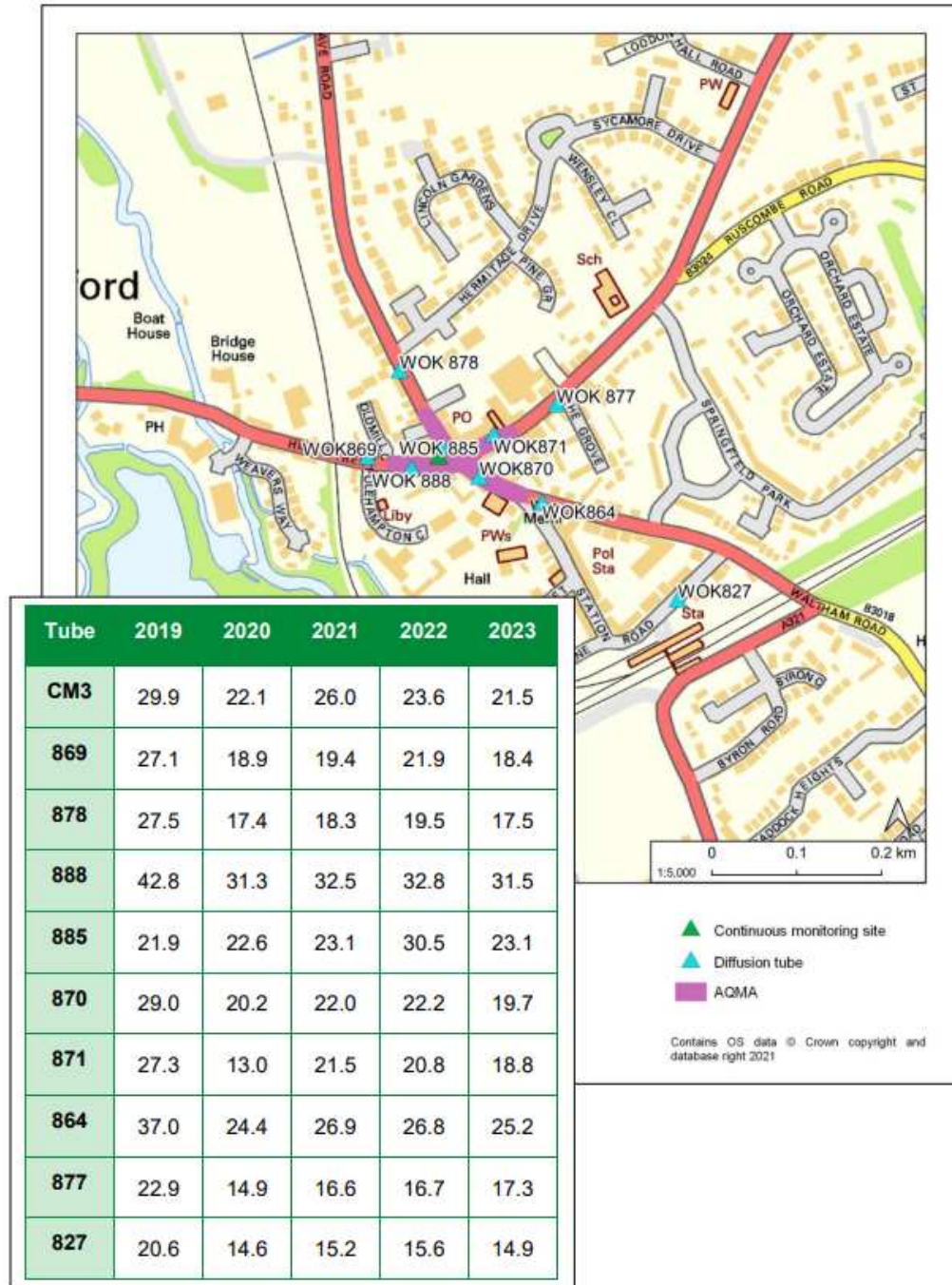


Figure 4.1: Twyford AQMA and Automatic Monitoring Site (CM3) – (Ref. WBC ASR 2024)

4.8 From Figure 4.1, it can be seen that annual mean concentrations of NO₂ at CM3 are below the NAQO level of 40 µgm⁻³ up to the end of 2023.



4.9 Presented in **Figure 4.2** are the annual trends in NO₂ concentrations up to the end of 2023 within Twyfordy AQMA.

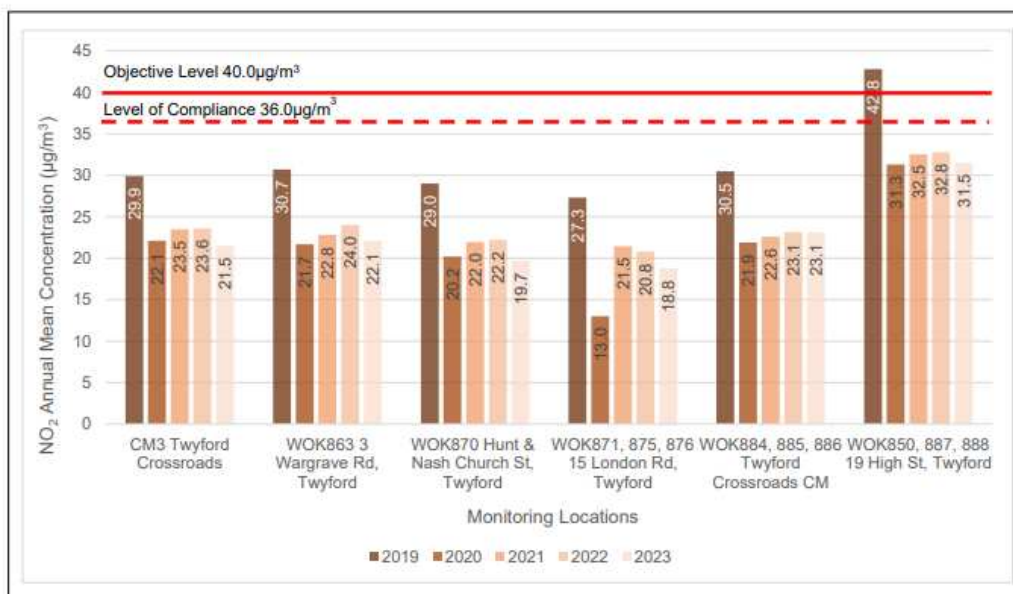


Figure 4.2: Annual Trends in NO₂ Concentrations up to the end of 2023 within Twyford AQMA

4.10 From Figure 4.2 it can be seen that overall concentrations of NO₂ have reduced since 2020 when compared to 2019 levels. It is widely accepted that the reductions can be attributed to the effects of the Covid pandemic on travel patterns. From 2020, concentrations have steadily increased up to the end of 2022 but are still below pre pandemic levels and well below the NAQO level of 40 µgm⁻³. There was a drop in concentrations in 2023 when compared to the previous year.

Passive Monitoring - Diffusion Tubes

4.11 WBC also operates a network of non-automatic (passive) monitoring sites within its administrative boundary and at the end of 2023 there were 46 active sites monitoring NO₂ via diffusion tube (DT). Four DT sites were triplicated during 2023. Refer to **Figure 4.3** for the locations of the diffusion tubes closest to the development site.

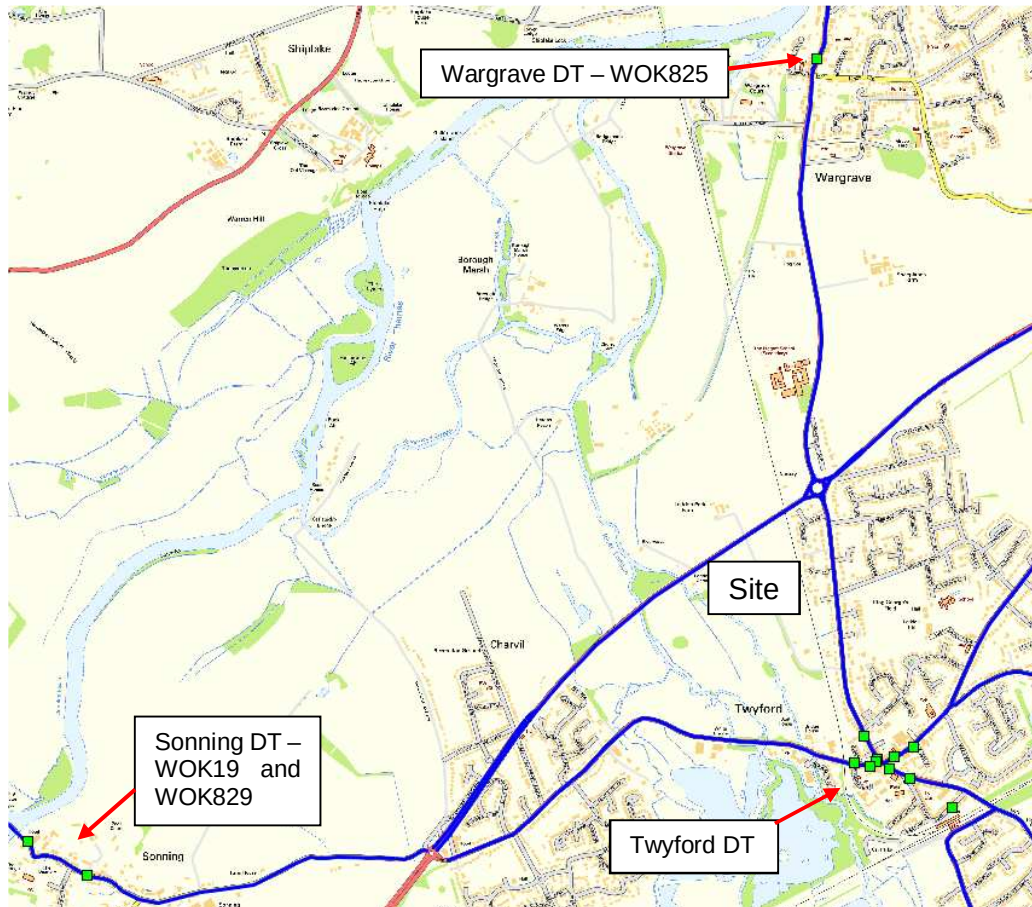


Figure 4.3: Non-Automatic (DT) Monitoring Sites close to the Development Site

- 4.12 The DT locations within WBC administrative area are a mixture of “Kerbside”, “Roadside”, “Suburban”, “Urban Centre” and “Other” concentrations. The closest DTs to the development site are located within the Twyford AQMA.
- 4.13 Presented in **Table 4.1** are recorded concentrations of NO₂ available for 2019 to 2023 in Twyford, Sonning and Wargrave and where concentrations are at or above the NAQO level the cells have been shaded light grey.



Table 4.1: Measured Annual Mean NO₂ Concentrations (µg/m³) – DT

Site ID	Location	Within AQMA?	Annual mean concentrations (µg/m ³)				
			2019	2020	2021	2022	2023
CM3	Twyford Cross Roads	YES	29.9	22.1	23.5	26	21.5
WOK19	"Thames Street (by bridge) Sonning"	NO	28.9	18.7	19.9	22.2	21.8
WOK825	High Street south Wargrave	NO	31.1	21.3	23.2	23.8	22.3
WOK827	Station Rd, Twyford	NO	20.6	14.6	15.2	15.6	14.9
WOK829	Long Acre Thames Street Sonning	NO	28.6	20.7	23.1	24	20.8
WOK850	19 High Street Twyford 1	YES	41.2	31.3	32.5	32.8	31.5
WOK863	3 Wargrave Road Twyford	YES	30.7	21.7	22.8	24	22.1
WOK864	1 Waltham Road Twyford 1	NO	36.9	24.4	26.9	26.8	25.2
WOK869	Mulle 26 High Street Twyford	NO	27.1	18.9	19.4	21.9	18.4
WOK870	Hunt&Nash Church Street Twyford	YES	29	20.2	22	22.2	19.7
WOK871	15 London Road Twyford 1	YES	27.0	13	21.5	20.8	18.8
WOK875	15 London Road Twyford 2	YES	27.7	13	21.5	20.8	18.8
WOK876	15 London Road Twyford 3	YES	27.3	13	21.5	20.8	18.8
WOK877	Almshouses London Road Twyford	NO	22.9	14.9	16.6	16.7	17.3
WOK878	17 Wargrave Road Twyford	NO	25.7	17.4	18.3	19.5	17.5
WOK884	Twyford Xroads 1	YES	30.5	21.9	22.6	23.1	23.1
WOK885	Twyford Xroads 2	YES	30.8	21.9	22.6	23.1	23.1
WOK886	Twyford Xroads 3	YES	30.1	21.9	22.6	23.1	23.1
WOK887	19 High Street Twyford 2	YES	43.8	31.3	32.5	32.8	31.5
WOK888	19 High Street Twyford 3	YES	43.3	31.3	32.5	32.8	31.5
WOK889	1 Waltham Road Twyford 2	NO	37.9	24.4	26.9	26.8	25.2
WOK890	1 Waltham Road Twyford 3	NO	36.2	24.4	26.9	26.8	25.2

- 4.14 From Table 4.1 it can be seen that all annual mean concentrations of NO₂ were below the NAQO level of 40 µg/m³ up to the end of 2023. Refer to **Figure 4.4** for the location of the triplicated DT (WOK850, WOK887 and WOK888).



Figure 4.4: Triplicated DT (WOK850, WOK887 and WOK888) on the High Street, Twyford

- 4.15 Wokingham Boroughs 2024 ASR concluded that:

“In conclusion, there were no exceedances of the annual mean objective (40µg/m³) in the last 12 months within the Twyford Crossroads, Wokingham Town Centre and M4 AQMAs. There have been no exceedances for five years in the M4 AQMA and for four years in both the Wokingham Town Centre and Twyford AQMAs. According to DEFRA (from the 2023 ASR appraisal), it is now deemed appropriate to revoke both the Twyford and M4 AQMAs as the results show three or more, consecutive years of data below the level of concern, 36µg/m³. However, Wokingham Town Centre has only shown 1 year below 36µg/m³, so the AQMA will remain in place (see Table 2.1 for more information). The data collected also indicated that no further extension is needed to be made to the AQMAs and we do not need to look at declaring any more.

The current Air Quality Action Plan is being implemented with more being actions progressed each year, see Table 2.3. The new draft plan has been submitted for appraisal by DEFRA. One of Wokingham Borough Council's priorities is to “tackle



traffic congestion in specific areas of the Borough” and one of its underpinning principles is to “improve health, wellbeing and quality of life”.

Dispersion Modelling – ADMS-Roads

- 4.16 The existing and future concentrations of pollutants within the assessment area for all scenarios have been modelled using the Atmospheric Dispersion Modelling System software ADMS-Roads (Version 5.0.1). The software is PC based and models the release of pollutants from road and industrial sources into the atmosphere.
- 4.17 ADMS-Roads is designed to allow the modelling of simple scenarios such as single carriageway roads up to complex scenarios such multiple lane roads and junctions. Allowance is made in the model for initial release of pollutants which are affected by vehicle wake, traffic induced turbulence and street canyons. Boundary layer structure based on the Monin-Obukhov length and the boundary layer height are incorporated in the model which allows for a realistic representation of the changing characteristics of dispersion with height.
- 4.18 Multiple road traffic sources were used in the model to represent the changing concentration of traffic, the different speeds of traffic and the changing road geometry.
- 4.19 Meteorological data for 2019 was obtained from the MET Office. The best representative observation station for the development site is a weather station located in Farnborough. The MET data has been used for the verification of the model, base modelling and future years and a wind rose for 2019 is presented in **Appendix 3**.
- 4.20 Background pollutant concentrations for the kilometre squares covering the assessment area were obtained from the DEFRA website and the concentrations for 2024 and 2029 are presented in Table 3.14.
- 4.21 Concentrations were modelled at the development site, the location of the DT sites within the Twyford AQMA and specific receptors within Twyford, Sonning and Wargrave. Modelling outputs are between 1.5 metres and 2.5 metres above ground height.
- 4.22 Copies of the model inputs are available on request.



Model Verification

- 4.23 Model verification has been undertaken using the guidance provided in LAQM.TG(22). The process requires the comparison of the monitored roadside contribution of NO₂ with the modelled roadside contribution of NO₂. TG(22) recommends that the greatest number of monitoring data should be used for verification.
- 4.24 To verify the model adjacent to the roads that would be affected by the proposed development traffic, predictions have been made at locations representative of the CM3 and DT for the base year 2019 using ADMS-Roads dispersion modelling. The locations of the CM and DTs are illustrated on **Figure 4.1** and the results of the predictions are presented in Table 4.2.

Table 4.2: Predicted air quality concentrations at the CM3 and DT for 2019

Site ID		NO _x	NO ₂
		Annual mean µgm ⁻³	Annual mean µgm ⁻³
CM3	Twyford Cross Roads	27.2	16.0
WOK19	"Thames	34.6	17.8
WOK825	Street (by bridge) Sonning"	22.7	14.1
WOK829	High Street south Wargrave	28.8	17.1
WOK850	Long Acre Thames Street Sonning	28.5	17.6
WOK863	19 High Street Twyford 1	25.5	15.5
WOK864	3 Wargrave Road Twyford	45.9	22.5
WOK869	1 Waltham Road Twyford 1	30.5	18.1
WOK870	Hunt&Nash Church Street Twyford	25.7	16.8
WOK871	15 London Road Twyford 1	26.0	15.7
WOK877	Almshouses London Road Twyford	23.8	15.1
WOK878	17 Wargrave Road Twyford	23.1	14.9
WOK884	Twyford Xroads 1	27.2	16.0
NAQO		-	40

- 4.25 If the pollutant concentrations in Table 4.2 are compared to the NAQO, it can be seen that concentrations of NO₂ are predicted to be well below the NAQO level of 40 µgm⁻³.
- 4.26 ADMS-Roads has been used to calculate NO_x and NO₂ concentrations for 2019 which have been verified against the recorded NO_x and NO₂ levels at the CM and



DTs. The results from the monitoring and the ADMS-Roads modelling are presented in Table 4.3.

Table 4.3: Comparison of the monitored (CM3 and DT) and modelled (ADMS) concentrations of NO₂

Site ID	Monitor Type	Background NO ₂	2019 Monitored NO ₂	2019 Modelled NO ₂	Difference [(monitored - modelled)/monitored] x100 (%)
CM3	CM	14.6	29.9	16.0	-46.5%
WOK19	DT	15.9	28.9	19.8	-31.6%
WOK825	DT	12.8	31.1	14.3	-54.0%
WOK829	DT	15.9	28.6	17.1	-40.1%
WOK850	DT	15.9	42.8	17.6	-58.9%
WOK863	DT	14.6	30.7	15.5	-49.4%
WOK864	DT	15.9	36.9	22.5	-39.1%
WOK869	DT	15.9	27.1	18.1	-33.2%
WOK870	DT	15.9	29	16.8	-42.0%
WOK871	DT	14.6	27.3	15.7	-42.5%
WOK877	DT	14.6	22.9	15.1	-34.0%
WOK878	DT	14.6	25.7	14.9	-42.1%
WOK884	DT	14.6	30.5	16.0	-47.5%

- 4.27 With reference to Table 4.3, the model is under predicting concentrations of NO₂ by between 31.6% and 58.9%.
- 4.28 Within TG(22) there is guidance on how to apply an adjustment factor to the road contribution NO_x to reduce the inaccuracy of the results from the modelling. Using the TG(22) 'Boxes 7-17 to 7-19' method, the modelled road contribution NO_x is not predicting an accurate contribution of NO_x to the overall contribution. Therefore, a correction factor will need to be applied to the modelled road contribution NO_x to bring it to within comparable levels with the monitored data.
- 4.29 A Road-NO_x adjustment factor of 2.6543 was determined as the slope of the best fit between the 'measured' road contribution and 'modelled' road contribution NO_x, forced through zero. The comparison is presented in **Figure 4.5**.

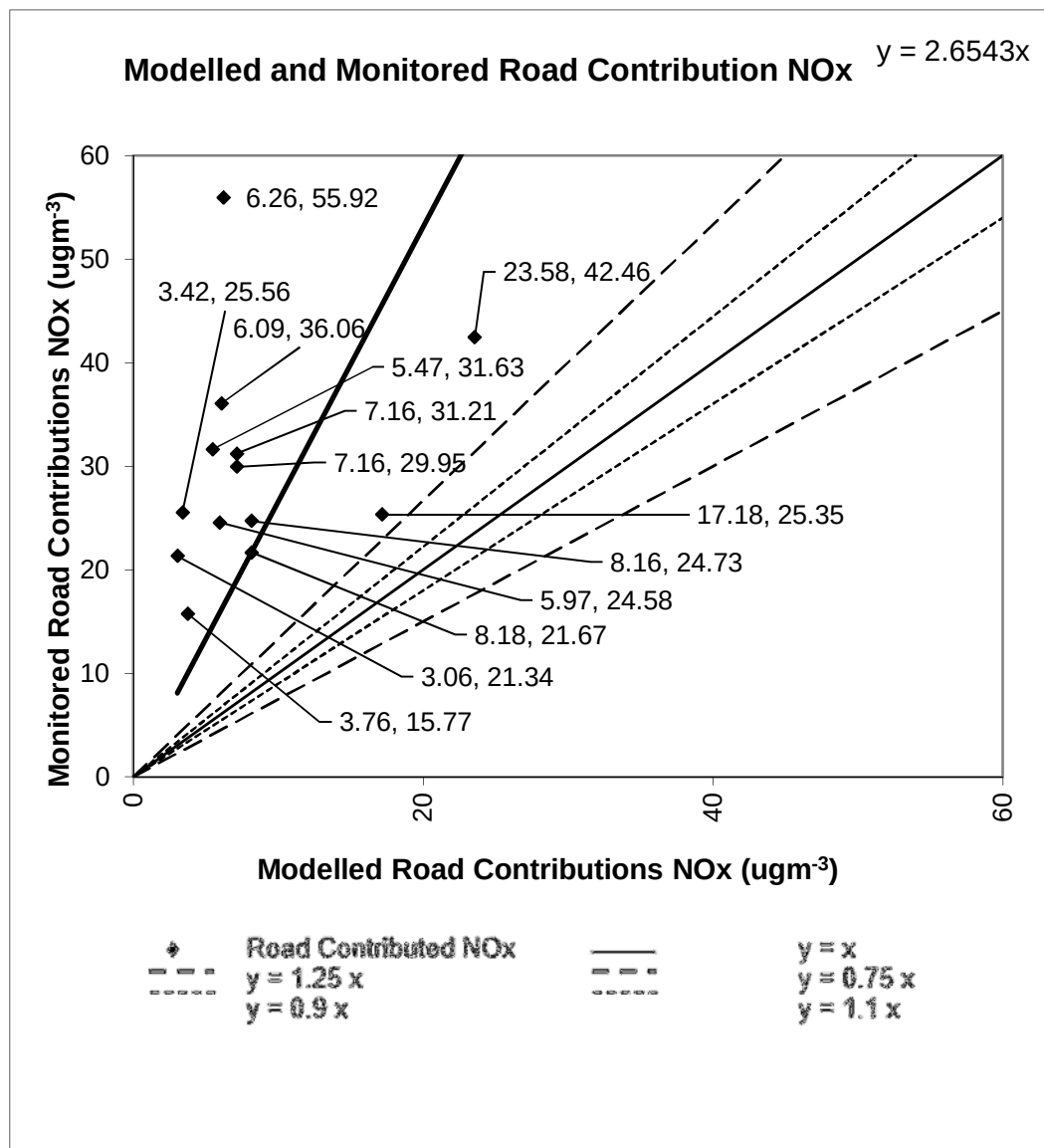


Figure 4.5: Comparison of Measured Road NO_x and Unadjusted Modelled Road NO_x

4.30 Presented in **Table 4.4** is the comparison of the monitored NO₂ concentrations and the adjusted ADMS-Roads modelled NO₂ concentrations.



Table 4.4: Comparison of the Monitored (CM3 & DT) and the Adjusted Modelled (ADMS) Concentrations of NO₂

Site ID	Monitor Type	Background NO ₂	2019 Monitored NO ₂	2019 Adjusted Modelled NO ₂	Difference - [(monitored - modelled)/monitored] x100 (%)
CM3	CM	14.6	29.9	23.89	-20.1%
WOK19	DT	15.9	28.9	36.93	27.8%
WOK825	DT	12.8	31.1	20.79	-33.2%
WOK829	DT	15.9	28.6	26.37	-7.8%
WOK850	DT	15.9	42.8	24.01	-43.9%
WOK863	DT	14.6	30.7	21.76	-29.1%
WOK864	DT	15.9	36.9	43.83	18.8%
WOK869	DT	15.9	27.1	26.39	-2.6%
WOK870	DT	15.9	29.0	20.4	-29.7%
WOK871	DT	14.6	27.3	22.39	-18.0%
WOK877	DT	14.6	22.9	19.57	-14.5%
WOK878	DT	14.6	25.7	18.65	-27.4%
WOK884	DT	14.6	30.5	23.89	-21.7%

4.31 The comparison of the monitored NO₂ and the adjusted modelled NO₂ concentrations are illustrated on **Figure 4.6**.

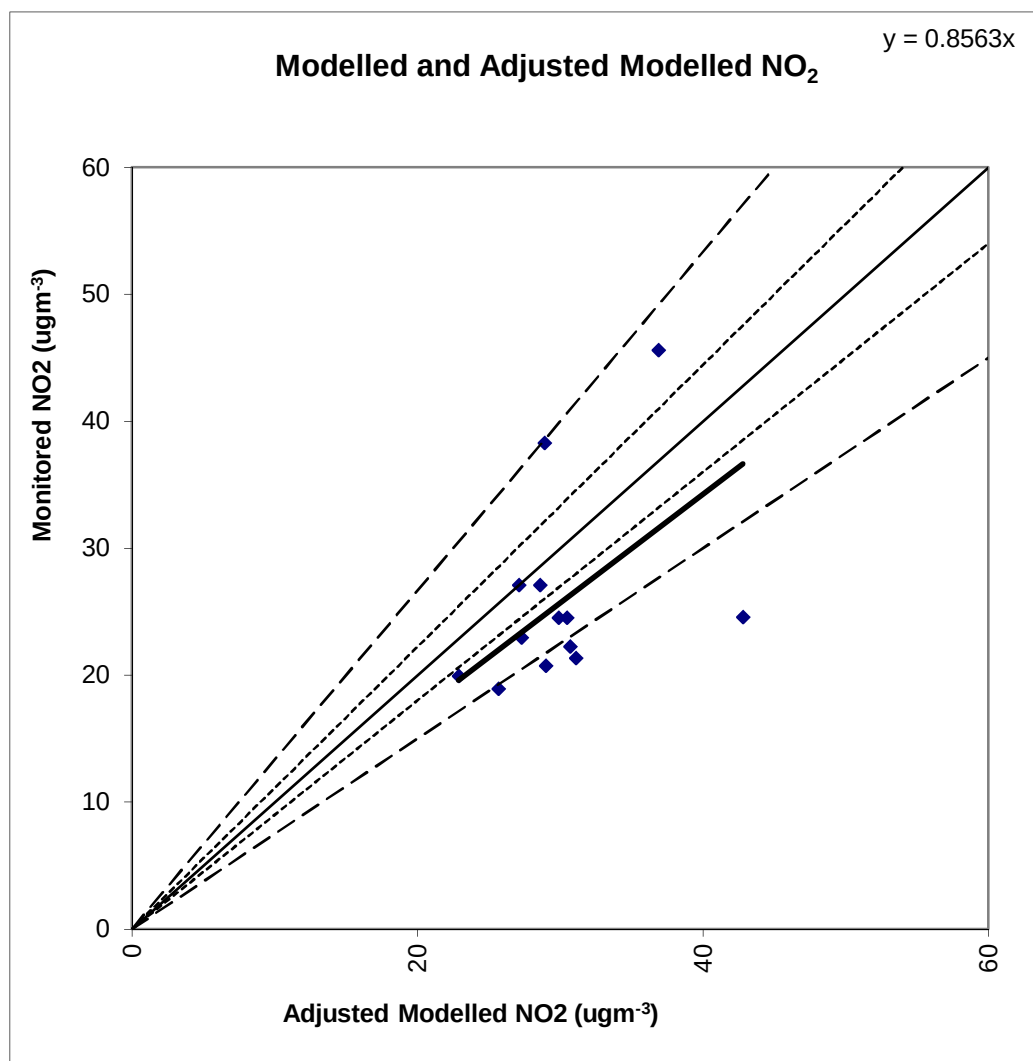


Figure 4.6: Comparison of Measured NO₂ and Adjusted Modelled NO₂

- 4.32 With reference to Figure 4.6, there is no systematic over or under-prediction of concentrations of NO₂ following adjustment of the road concentration NO_x.

Pollutant Concentrations

- 4.33 To characterise the air pollutant concentrations adjacent to the roads that would be affected by the proposed development traffic, predictions have been made at WBC DTs in close proximity to the site. This has been undertaken for the 'Base Year' 2024 using ADMS-Roads dispersion modelling. The locations of the DT receptors are illustrated on Figure 4.3.
- 4.34 Background concentrations for future assessments years have been kept the same as the Verification year 2019. The reason for using the base year background concentrations is due to recorded local concentrations of NO₂ not decreasing significantly as predicted over the past six years, and a worst case scenario has therefore been modelled.



4.35 The results of the predictions are presented in **Table 4.5**. Where concentrations are above the NAQO the cells have been shaded light grey.

Table 4.5: Predicted Air Quality Concentrations at Sensitive Receptors 2024

Receptor Number and Name		NO _x	NO ₂	PM ₁₀		PM _{2.5}
		Annual mean µgm ⁻³	Annual mean µgm ⁻³	Annual mean µgm ⁻³	Days >50 µgm ⁻³	Annual mean µgm ⁻³
1	CM3	32.7	21.3	16.0	0.3	10.8
2	WOK19	49.9	30.6	16.1	0.3	10.8
3	WOK825	25.3	17.1	15.0	0.1	10.2
	WOK829	22.6	16.9	14.9	0.1	10.1
6	WOK850	36.5	23.3	15.5	0.2	10.5
7	WOK863	29.3	19.5	15.9	0.3	10.7
8	WOK864	32.8	21.4	15.3	0.2	10.4
9	WOK869	62.3	35.6	16.3	0.4	11.0
10	WOK870	34.3	22.2	15.4	0.2	10.4
11	WOK871	25.8	17.6	15.7	0.2	10.6
12	WOK877	31.0	20.4	16.0	0.3	10.7
13	WOK878	26.6	18.1	15.8	0.3	10.6
14	WOK884	27.3	18.4	15.8	0.2	10.6
NAQO		-	40	40	35	25

4.36 If the pollutant concentrations in Table 4.5 are compared to the NAQO, it can be seen that concentrations of NO₂ and PM₁₀ are predicted to be well below the NAQO level of 40 µgm⁻³. The number of days when the concentration of PM₁₀ is greater than 50 µgm⁻³ is well below the Air Quality Objective level of 35 days.



5.0 AIR QUALITY ASSESSMENT

- 5.1 The assessment has been split into two parts, the potential “Impacts” of development generated traffic and construction activities and the “Constraints” on the development.
- 5.2 The “Impact” section of the assessment assesses whether development generated traffic flows on the highway network are likely to result in a significant change in annual mean concentration of NO₂ and PM₁₀ at sensitive off-site receptors. Also assessed are the potential dust impacts and PM₁₀ changes on sensitive receptors.
- 5.3 The “Constraints” part of the assessment compares the predicted concentration of NO₂ and PM₁₀ within the development site against NAQO levels and assesses whether predicted levels within the site are above the objective levels.

Impacts

Dust Assessment: Predicted Construction Impacts

- 5.4 The main sources of dust and PM₁₀ during construction activities are:
- Haulage routes, vehicles and construction traffic;
 - Materials handling, storage, stockpiling, potential spillage and disposal;
 - Exhaust emissions from site plant;
 - Site preparation;
 - Construction and fabrication processes; and
 - Internal and external finishing and refurbishment.
- 5.5 The majority of the releases are likely to occur during the typical “working-week”. The construction impact assessment has been split into two sections. The first deals with the potential impacts from dust soiling and changes in PM₁₀ concentrations due to on-site works and the second deals with the effect of emissions from construction traffic.

Dust soiling and changes in PM₁₀ concentrations

- 5.6 The site will require earthworks, construction and trackout of vehicles associated with all phases of the Site. The resulting dust emission magnitudes are:



- Earthworks – **Large** (Total site area >10,000 m², moderately dusty soil type, 5-10 heavy earth moving vehicles active at any one-time, total material moved greater than 100,000 tonnes);
- Construction – **Medium** (Total building volume 25,000 m³ - 100,000 m³, potentially dusty construction material (e.g. concrete), on site concrete batching);
- Trackout – **Medium** (10-50 HGV outward movements in any one day, moderately dusty surface material).

5.7 Using the information presented in Section 3 and the criteria presented in Table 3.5, Table 3.6 and Table 3.7, the sensitivity of the construction for the proposed development can be defined. The results of defining the sensitivity of the area are presented in **Table 5.1**.

Table 5.1: Outcome of Defining the Sensitivity of an Area

Potential Impact	Sensitivity of the Surrounding Area			
	<i>Demolition</i>	<i>Earthworks</i>	<i>Construction</i>	<i>Trackout</i>
Dust Soiling	N/A	Medium	Medium	Medium
Human Health	N/A	Low	Low	Low
Ecological	N/A	Negligible	Negligible	Negligible

5.8 From Table 5.1 it can be seen that the predicted sensitivity of the surrounding area to dust soiling is “Medium” during the earthworks and construction phases and during trackout. The sensitivity of the surrounding area to changes in PM₁₀ affecting human health is “Low” during the construction and earthworks phase and during trackout. As there are no ecological receptors within 50m of the development, the predicted sensitivity impact is “Negligible”.

5.9 The dust emission magnitude determined in paragraph 5.6 is combined with the sensitivity of the area summarised in Table 5.1 to determine the risk of impacts with no mitigation applied. The risk of impacts are summarised in **Table 5.2**.



Table 5.2: Summary Dust Risk Table to Define Site-Specific Mitigation

Potential Impact	Risk			
	<i>Demolition</i>	<i>Earthworks</i>	<i>Construction</i>	<i>Trackout</i>
<i>Dust Soiling</i>	N/A	High	Medium	Low
<i>Human Health</i>	N/A	Medium	Low	Low
<i>Ecological</i>	N/A	Negligible	Negligible	Negligible

- 5.10 During the Earthworks phase of development, there is a High Risk of annoyance caused by dust soiling and a Medium Risk of health effects due to increase exposure in PM₁₀.
- 5.11 During the Construction phase of development, it has been assessed that there is a Medium Risk of potential annoyance to people and property caused by dust soiling and a Low Risk of health effects due to an increase exposure in PM₁₀. Therefore, mitigation may be required.
- 5.12 During the Trackout processes, there is a Low Risk of dust soiling and a Low Risk to human health effects due to an increase exposure in PM₁₀.
- 5.13 For those cases where the risk category is Negligible (i.e. ecological), no specific mitigation measures is required beyond specific legislation.

Predicted Operational Impacts

- 5.14 The air quality impact of the proposed development on the surrounding area has been assessed by considering the changes in traffic flows which will occur on the existing highway network with the development in place.
- 5.15 Potential impacts from the proposed development would occur following the completion of the proposed development in 2029. Therefore, the year of assessment is 2029 “do nothing” and “do something”. For this development a Transport Assessment (TA) has been undertaken and part of the assessment was the collection and analysis of road traffic data from automated traffic counts (ATC), and the proposed development.

Traffic Generation –2029 with development

- 5.16 Road traffic data has been provided in part by the Transport Consultants SMA. The remaining traffic data was collected using permanent ATCs and publicly available traffic data for the local highway network. The “Base” traffic flows have been growthed using TEMPRO and NTM, which takes into account traffic from Committed Development projects. Worst-case flows arising from development



generated traffic has then been added to the 2029 traffic flows and a summary is presented in **Table 5.3**.

Table 5.3: Changes in traffic flow “with” and “without” the development in 2029

Link Ref.	Description	2029 AADT			
		“do nothing”	“do something”	Change	% Change
1	A4 New Bath Road (West)	27505	28040	534	1.9
2	A3032 Old Bath Road	9781	9781	0	0.0
3	A321 Wargrave Road (South)	7855	7953	98	1.2
4	A321 Wargrave Road (North)	7310	7509	199	2.7
5	A4 New Bath Road (East)	19658	20005	347	1.8
6	A3032 London Road (South)	7467	7467	0	0.0
7	A3032 London Road (North)	5344	5344	0	0.0
8	B3024 Ruscombe Road	2105	2105	0	0.0
9	B3024 Waltham Road	2105	2105	0	0.0
10	B478 Thames Street	15209	15209	0	0.0
11	B3018 Waltham Road	6810	6908	98	1.4
12	A321 Hurst Road	9126	9126	0	0.0
13	A321 Church Street	6810	6908	98	1.4
14	A3032 High Street	9781	9781	0	0.0

- 5.17 From Table 5.3 it can be seen that, with the completion of the development, there is predicted to be an increase of between 0.0% and 2.7% in 24 hour traffic flows along the links within the assessment area. The greatest predicted change in traffic flows are on A321 Wargrave Road (North) (2.7%).

Background Concentrations – 2029

- 5.18 From Table 4.1, it can be seen that there has been no significant change in measured concentrations of NO₂ in the past five years. Therefore, the background concentrations in NO_x, NO₂, PM₁₀ and PM_{2.5} for 2019 have been used for the future 2029 assessment.



Screening Assessment – 2029 with development

- 5.19 Sensitive receptors adjacent to the development site and where there is predicted to be an impact from the development have been assessed for the two scenarios, “do nothing” and “do something”. The results from the assessment are presented in **Table 5.4** and **Table 5.5**.

Table 5.4: Predicted air quality concentrations at sensitive receptors in 2029 “do nothing”

Receptor Number and Name		NO _x	NO ₂	PM ₁₀		PM _{2.5}
		Annual mean µgm ⁻³	Annual mean µgm ⁻³	Annual mean µgm ⁻³	Days >50 µgm ⁻³	Annual mean µgm ⁻³
1	CM3	28.8	19.1	16.3	0.4	10.9
2	WOK19	38.7	25.0	16.4	0.5	10.9
3	WOK825	23.1	15.8	15.2	0.1	10.3
4	WOK829	29.5	20.5	15.7	0.2	10.6
5	WOK850	28.8	19.3	15.4	0.2	10.4
6	WOK863	27.1	18.3	16.1	0.4	10.8
7	WOK864	47.3	28.4	16.7	0.6	11.1
8	WOK869	30.7	20.2	15.6	0.2	10.5
9	WOK870	26.0	17.8	15.2	0.1	10.3
10	WOK871	27.6	18.5	16.2	0.4	10.8
11	WOK877	24.7	17.0	15.9	0.3	10.7
12	WOK878	24.7	17.0	15.9	0.3	10.6
13	WOK884	28.8	19.1	16.3	0.4	10.9
NAQO		-	40	40	40	25



**Table 5.5: Predicted air quality concentrations at sensitive receptors in 2029
“do something”**

Receptor Number and Name		NO _x	NO ₂	PM ₁₀		PM _{2.5}
		Annual mean µgm ⁻³	Annual mean µgm ⁻³	Annual mean µgm ⁻³	Days >50 µgm ⁻³	Annual mean µgm ⁻³
1	CM3	28.8	19.1	16.3	0.4	10.9
2	WOK19	38.7	25.0	16.4	0.5	10.9
3	WOK825	23.2	15.9	15.2	0.1	10.3
4	WOK829	29.5	20.5	15.7	0.2	10.6
5	WOK850	28.8	19.3	15.4	0.2	10.4
6	WOK863	27.1	18.3	16.1	0.4	10.8
7	WOK864	47.6	28.5	16.7	0.6	11.1
8	WOK869	30.7	20.2	15.6	0.2	10.5
9	WOK870	26.0	17.9	15.2	0.1	10.3
10	WOK871	27.6	18.5	16.2	0.4	10.8
11	WOK877	24.7	17.0	15.9	0.3	10.7
12	WOK878	24.8	17.1	15.9	0.3	10.7
13	WOK884	28.8	19.1	16.3	0.4	10.9
NAQO		-	40	40	40	25

5.20 Presented in **Table 5.6** are the predicted change in concentrations of NO₂ and PM₁₀ and the change in the number of days where concentrations of PM₁₀ are greater than 50 µgm⁻³.



Table 5.6: Predicted change in air quality concentrations at sensitive receptors in 2029 “do something”

Receptor Number and Name		NO ₂		PM ₁₀		
		Change in annual mean μgm^{-3} (%)		Change in annual mean μgm^{-3} (%)		Change in days >50 μgm^{-3} (%)
1	CM3	0.01	(0.05)	0.00	(0.00)	0.00 (0.00)
2	WOK19	0.00	(0.00)	0.00	(0.00)	0.00 (0.00)
3	WOK825	0.08	(0.51)	0.02	(0.13)	0.00 (0.00)
4	WOK829	0.00	(0.00)	0.00	(0.00)	0.00 (0.00)
5	WOK850	0.00	(0.00)	0.00	(0.00)	0.00 (0.00)
6	WOK863	0.02	(0.11)	0.00	(0.00)	0.00 (0.00)
7	WOK864	0.14	(0.49)	0.03	(0.18)	0.01 (1.72)
8	WOK869	0.00	(0.00)	0.00	(0.00)	0.00 (0.00)
9	WOK870	0.02	(0.11)	0.00	(0.00)	0.00 (0.00)
10	WOK871	0.01	(0.05)	0.00	(0.00)	0.00 (0.00)
11	WOK877	0.01	(0.06)	0.00	(0.00)	0.00 (0.00)
12	WOK878	0.03	(0.18)	0.00	(0.00)	0.00 (0.00)
13	WOK884	0.01	(0.05)	0.00	(0.00)	0.00 (0.00)

5.21 From Table 5.6 it can be seen that changes in concentration of NO₂ are predicted to be 0.14 μgm^{-3} or less and changes in concentration of PM₁₀ are predicted to be 0.03 μgm^{-3} or less. It can also be seen that the change in the number of days where the concentration of PM₁₀ is predicted to be more than 50 μgm^{-3} will be 0.01 days or less.

Magnitude of Change – 2029 with development

5.22 Comparing the results in Table 5.6 with the magnitude of change in Table 3.11 it can be seen that all the receptors are predicted to experience a change in annual mean NO₂ concentrations which is “Imperceptible” (<0.4 μgm^{-3}).

5.23 It can also be seen that the receptors are predicted to experience an increase in annual mean PM₁₀ concentrations which is “Imperceptible” (<0.4 μgm^{-3}) or “No Change” and an “Imperceptible” (<1 day) increase or “No Change” in the number of days where PM₁₀ levels are greater than 50 μgm^{-3} .



“Significance” of Change – 2029 with development

- 5.24 The “Significance” of the predicted changes in NO₂ and PM₁₀ annual mean concentrations are presented in **Table 5.7**.

Table 5.7: NO₂ – Significance of change in annual mean concentrations following the completion of the proposed development in 2029

Receptor Number and Name		NO ₂		
		Change in annual mean (µgm ⁻³)	Magnitude of change	“Significance” of change
1	CM3	0.01	Imperceptible	Negligible
2	WOK19	0.00	No Change	No Change
3	WOK825	0.08	Imperceptible	Negligible
4	WOK829	0.00	No Change	No Change
5	WOK850	0.00	No Change	No Change
6	WOK863	0.02	Imperceptible	Negligible
7	WOK864	0.14	Imperceptible	Negligible
8	WOK869	0.00	No Change	No Change
9	WOK870	0.02	Imperceptible	Negligible
10	WOK871	0.01	Imperceptible	Negligible
11	WOK877	0.01	Imperceptible	Negligible
12	WOK878	0.03	Imperceptible	Negligible
13	WOK884	0.01	Imperceptible	Negligible

- 5.25 With reference to the overall concentration of NO₂ presented in Table 5.5 being close to the NAQO level of 40 µgm⁻³ and the magnitude of change being “Imperceptible” the “Significance” of change in NO₂ concentrations is considered “Negligible”.



Table 5.8: PM₁₀ – Significance of change in annual mean concentrations following the completion of the proposed development in 2029

Receptor Number and Name		PM ₁₀		
		Change in annual mean (µgm ⁻³)	Magnitude of change	“Significance” of change
1	CM3	0.00	No Change	No Change
2	WOK19	0.00	No Change	No Change
3	WOK825	0.02	Imperceptible	Negligible
4	WOK829	0.00	No Change	No Change
5	WOK850	0.00	No Change	No Change
6	WOK863	0.00	No Change	No Change
7	WOK864	0.03	Imperceptible	Negligible
8	WOK869	0.00	No Change	No Change
9	WOK870	0.00	No Change	No Change
10	WOK871	0.00	No Change	No Change
11	WOK877	0.00	No Change	No Change
12	WOK878	0.00	No Change	No Change
13	WOK884	0.00	No Change	No Change

5.26 With reference to the overall concentrations of PM₁₀ presented in Table 5.5 being well below the objective level of 40 µgm⁻³ and the magnitude of change presented in Table 5.8 being “Imperceptible” or “No Change”, the “Significance” of change in PM₁₀ concentration is considered to be “Negligible” or “No Change”.



6.0 MITIGATION

Construction Phase

- 6.1 Monitoring during the construction phase should be considered in the management of operations to ensure that the nuisance thresholds are not exceeded at nearby sensitive locations. However, it is important to note that such limits are subjective (as “nuisance” caused by dust does not currently have a statutory limit applied to it).
- 6.2 Monitoring of dust could be achieved using a variety of sampling techniques, for example deposit (“Frisbee”) gauges, glass slides or high-volume air samplers located around the site perimeter and at the sensitive locations up to 400 metres from the site boundary.
- 6.3 In addition, there are a number of Best Practice mitigation measures that can be used by contractors to ensure that the impacts experienced in close proximity to the construction site are minimal. Sample mitigation:
- 6.4 Specific to demolition (for information only):
- Ensure effective water suppression is used during demolition operations;
 - Avoid explosive blasting, using appropriate manual or mechanical alternatives;
 - Bag and remove any biological debris or damp down such material before demolition; and
- 6.5 Effective site planning:
- Erect solid barriers to site boundary;
 - Dust generating activities to be located away from sensitive receptors;
 - All site personnel will be fully trained;
 - There will be a trained and responsible manager on site during working times to maintain a logbook and carry out site inspections;
 - There will be no run off of mud or water from the site;
 - Relevant legislation and guidance will be adhered to; and
- 6.6 Construction Traffic
- All vehicles to switch off engines (no idling);
 - On road vehicles will comply to set emission standards;



- Effective vehicle cleaning and specific wheel-washing on leaving site;
- All loads entering site must be covered;
- All non-road mobile machinery (NRMM) should use ultra-low sulphur diesel where available; and

6.7 Site Activities

- Minimise dust generating activities where possible;
- Use water as a dust suppressant where applicable;
- Stockpiles will be covered, enclosed, seeded or kept them sheeted; and
- If applicable, any concrete crushers/batchers will have the required permits.

6.8 It is recommended that liaison with Wokingham Borough Council Environmental Health Department be maintained throughout the construction process. In addition, the main contractor should nominate a representative (possibly the site manager) to act as a point of contact with the Council, the construction team and the local community to ensure that any air quality related issues that occur during the construction period can be dealt with efficiently, effectively and promptly.

6.9 All other site sub-contractors should also nominate or appoint a suitable team member responsible for liaison with the lead contractor's representative and to ensure that sub-contractor construction activities are managed effectively.

6.10 Details of the proposed methodology for achieving this and procedures to follow should be set out in a Construction Environmental Management Plan (CEMP). This would be held on-site and would include relevant contact names, details, lines of communication and mitigation action plans. The document should be available to all site personnel who should be made aware of its existence and provide an undertaking that they will adhere to the guidance provided therein.

6.11 The mitigation of PM₁₀ releases due to material disturbance will be achieved in the same manner as the control of dust releases. By achieving effective control of sources of dust release, PM₁₀ releases can be minimised.

6.12 The most effective control of particulate releases from site plant will be achieved by ensuring that it is maintained in good working order and is of the appropriate capacity and specification for the job being carried out. It should also be located



away from the site perimeter, thereby maximizing the distance between source and receptor.

- 6.13 There may be occasions where breakdown of site plant could cause short-term releases of excess particulate matter (smoke) and odour. Short-term releases may also occur during start up (of diesel engines, etc.). Regular visual checks and routine maintenance should be applied in accordance with the plant specification, to ensure that these releases are minimised. Faulty site plant should be decommissioned until repairs have been carried out and have been tested and found to be operating satisfactorily.
- 6.14 Detailed mitigation measures to control construction traffic should be discussed with officers from Wokingham Council, in order to establish the most suitable access routes for the site traffic and service vehicles. The most effective mitigation will be achieved by ensuring that construction traffic vehicles are kept clean and sheeted when on public highways (through the use of wheel washers) and avoid using sensitive roads. Timing of large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial. Clear signposting to the site access for construction traffic should also be provided and direct traffic along routes agreed with the Council.
- 6.15 Early morning delivery vehicles, which may arrive prior to the site opening, should be prevented from waiting on the approach roads to the site. If site deliveries arrive prior to the site opening, they should wait at a suitable location, and if possible, turn the engine off.
- 6.16 With the implementation of the appropriate mitigation measures detailed above, but not restricted to the information detailed above, the residual effects will normally be “Not Significant”.

Mitigation: Operational Phase

- 6.17 Taking into the account predicted No Change or “Negligible” increases in NO_2 and PM_{10} concentrations at sensitive receptors due to the development generated traffic following the completion of the development, and the fact that concentrations of NO_2 and PM_{10} are predicted to be below the NAQO level of $40 \mu\text{g m}^{-3}$, no additional mitigation is proposed.
- 6.18 Within the development site, concentrations of NO_2 and PM_{10} are predicted to be well below the NAQO level of $40 \mu\text{g m}^{-3}$. Therefore, there are no proposals to mitigate air quality within the site



7.0 SUMMARY AND CONCLUSIONS

- 7.1 Stuart Michael Associates Limited (SMA), Consulting Engineers, has been engaged by Croudace Homes to update the Air Quality Assessment for site proposed development site on land at Bridge Farm, Twyford.
- 7.2 The assessment has been undertaken to demonstrate the impact on concentrations of NO₂ and PM₁₀ at sensitive receptors as a result of development generated traffic. Annual average concentrations have been compared to the National Air Quality Objective Levels and the magnitude and significance of change has also been assessed against national guidelines.
- 7.3 Constraints on development have been assessed using background concentrations, existing and future emissions from road at the proposed development site.
- 7.4 Also assessed are the likely impacts from the construction of the development. The impact assessment has been undertaken using the method detailed in the Institute of Air Quality Management (IAQM) publication "Guidance on the assessment of dust from demolition and construction" (2024).
- 7.5 Concentrations of NO₂ and PM₁₀ at twelve diffusion tubes (DT) and the Twyford continuous monitoring site (CM3) have been assessed using ADMS Roads. The 2019 NO₂ concentrations from CM3 and the twelve DT have been used to verify the results from the modelling.
- 7.6 Base concentrations have been calculated for 2024 and two scenarios have been assessed for the future year 2029. The first is a "Do Nothing" scenario with committed development generated traffic but no development generated traffic and the second scenario is "Do Something" with committed development generated traffic and development generated traffic. The two scenarios have been assessed to gauge the magnitude of change in concentrations NO₂ and PM₁₀ and the significance of those changes.
- 7.7 Development generated road traffic data has been obtained from the Transport Consultants. Future traffic flows have been growthed to obtain the future year 2029.
- 7.8 Following the completion of the development, there is predicted to be an increase of between 0% and 2.7% in 24 hour traffic flows along the links within the assessment area.



- 7.9 The concentrations of NO₂ in 2029 are predicted to be below the objective level of 40 µgm⁻³. The magnitude of change in annual mean concentrations at all the receptors due to development generated traffic is predicted to be “No change” or “Imperceptible”. Therefore the “Significance” of change is considered to be “No Change” or “Negligible”.
- 7.10 Concentrations of PM₁₀ are predicted to be below the objective level of 40 µgm⁻³ at the receptor locations and the magnitude of change due to development generated traffic is No Change. Therefore, the significance is considered No Change.
- 7.11 During the Earthworks phase of development, there is a High Risk of annoyance caused by dust soiling and a Medium Risk of health effects due to increase exposure in PM₁₀.
- 7.12 During the Construction phase of development, it has been assessed that there is a Medium Risk of potential annoyance to people and property caused by dust soiling and a Low Risk of health effects due to an increase exposure in PM₁₀.
- 7.13 During the Trackout processes, there is a Low Risk of dust soiling and a Low Risk to human health effects due to an increase exposure in PM₁₀.
- 7.14 For those cases where the risk category is Negligible (i.e. ecological), no specific mitigation measures is required beyond specific legislation.
- 7.15 With the implementation of the appropriate mitigation measures during construction which are detailed in Section 6, the residual effects will normally be not significant.
- 7.16 Within the development site concentrations of NO₂ are predicted to be well below the NAQO levels 40 µgm⁻³ and no mitigation measures are required.
- 7.17 In conclusion, the results of the air quality assessment demonstrate that the impacts from development generated traffic are negligible or result in no change. Air quality within the site is well below the NAQO levels and presents no constraints on development. Therefore, planning permission should not be withheld on air quality grounds.

8.0 APPENDICES

Appendix 1 – Illustrative Master Plan





Appendix 2 – National Air Quality Objectives (NAQO)

National air quality objectives and European Directive limit and target values for the protection of human health						
Pollutant	Applies	Objective	Concentration measured as ¹⁰	Date to be achieved by (and maintained thereafter)	European Obligations	Date to be achieved (by and maintained thereafter)
Particulates (PM ₁₀)	UK	50 µg/m ³ not to be exceeded more than 35 times a year	24 hour mean	31 December 2004	50 µg/m ³ not to be exceeded more than 35 times a year	1 January 2005
	UK	40 µg/m ³	annual mean	31 December 2004	40 µg/m ³	1 January 2005
	Indicative 2010 objectives for PM ₁₀ (from the 2000 strategy and Addendum) have been replaced by an exposure reduction approach for PM _{2.5} (except in Scotland – see below)					
	Scotland	50 µg/m ³ not to be exceeded more than 7 times a year	24 hour mean	31 December 2010	50 µg/m ³ not to be exceeded more than 35 times a year	1 January 2005
	Scotland	18 µg/m ³	annual mean	31 December 2010	40 µg/m ³	1 January 2005
Particulates (PM _{2.5}) Exposure Reduction	UK (except Scotland)	25 µg/m ³	annual mean	2020	Target value - 25 µg/m ³	2010
	Scotland	10 µg/m ³		31 December 2020	Limit value - 25 µg/m ³	1 January 2015
	UK urban areas	Target of 15% reduction in concentrations at urban background		Between 2010 and 2020	Target of 20% reduction in concentrations at urban background.	Between 2010 and 2020

National air quality objectives and European Directive limit and target values for the protection of human health						
Pollutant	Applies	Objective	Concentration measured as ¹	Date to be achieved by (and maintained thereafter)	European Obligations	Date to be achieved by (and maintained thereafter)
Nitrogen dioxide	UK	200 µg/m ³ not to be exceeded more than 18 times a year	1 hour mean	31 December 2005	200 µg/m ³ not to be exceeded more than 18 times a year	1 January 2010
	UK	40 µg/m ³	annual mean	31 December 2005	40 µg/m ³	1 January 2010
Ozone	UK	100 µg/m ³ not to be exceeded more than 10 times a year	8 hour mean	31 December 2005	Target of 120 µg/m ³ not to be exceeded by more than 25 times a year averaged over 3 years	31 December 2010
Sulphur dioxide	UK	266 µg/m ³ not to be exceeded more than 35 times a year	15 minute mean	31 December 2005	-	-
	UK	350 µg/m ³ not to be exceeded more than 24 times a year	1 hour mean	31 December 2004	350 µg/m ³ not to be exceeded more than 24 times a year	1 January 2005
	UK	125 µg/m ³ not to be exceeded more than 3 times a year	24 hour mean	31 December 2004	125 µg/m ³ not to be exceeded more than 3 times a year	1 January 2005
Polycyclic Aromatic Hydrocarbons	UK	0.25 ng/m ³ B[a]P	as annual average	31 December 2012	1.0 ng/m ³	31 December 2012



National air quality objectives and European Directive limit and target values for the protection of human health						
Pollutant	Applies	Objective	Concentration measured as ¹	Date to be achieved by (and maintained thereafter)	European Obligations	Date to be achieved by (and maintained thereafter)
Benzene	UK	16.25 µg/m ³	running annual mean	31 December 2003	-	-
	England and Wales	5 µg/m ³	annual average	31 December 2010	5 µg/m ³	1 January 2010
	Scotland, Northern Ireland	3.25 µg/m ³	running annual mean	31 December 2010	-	-
1,3-butadiene	UK	2.25 µg/m ³	running annual mean	31 December 2003	-	-
Carbon monoxide	UK	10 mg/m ³	maximum daily running 8 hour mean/in Scotland as running 8 hour mean	31 December 2003	10 mg/m ³	1 January 2005
Lead	UK	0.5 µg/m ³	annual mean	31 December 2004	0.5 µg/m ³	1 January 2005
		0.25 µg/m ³	annual mean	31 December 2008	-	-

National air quality objectives and European Directive limit and target values for the protection of vegetation and ecosystems						
Pollutant	Applies	Objective	Concentration measured as ¹	Date to be achieved by (and maintained thereafter)	European Obligations	Date to be achieved by (and maintained thereafter)
Nitrogen oxides	UK	30 µg/m ³	annual mean	31 December 2000	30 µg/m ³	19 July 2001
Sulphur dioxide	UK	20 µg/m ³	annual mean	31 December 2000	20 µg/m ³	19 July 2001
	UK	20 µg/m ³	winter average	31 December 2000	20 µg/m ³	19 July 2001
Ozone: protection of vegetation and ecosystems	UK	Target value of 18,000 µg/m ³ based on AOT40 to be calculated from 1 hour values from May to July, and to be achieved, so far as possible, by 2010	Average over 5 years	1 January 2010	Target value of 18,000 µg/m ³ based on AOT40 to be calculated from 1 hour values from May to July, and to be achieved, so far as possible, by 2010	1 January 2010



Appendix 3

