Persimmon Homes West Midlands

Brookhouse Lane

Air Quality Feasibility Assessment

Report No. 444018-01 (00)

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RSK GENERAL NOTES

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Title: Air Quality Feasibility Assessment

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Abbreviations

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System – Roads (a dispersion modelling software application)
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Standard
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EC	European Commission
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LAQM TG.16	Local Air Quality Management Technical Guidance (2016)
LDV	Light Duty Vehicle
NPPF	National Planning Policy Framework
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
$PM_{2.5}$	Particulate matter of size fraction approximating to <2.5mm diameter
PM10	Particulate matter of size fraction approximating to <10mm diameter
RSK	RSK Environment Limited
SPG	Supplementary Planning Guidance
TG	Technical Guidance
UK-AIR	UK Atmospheric Information Resource
SSDC	South Staffordshire District Council

Contents

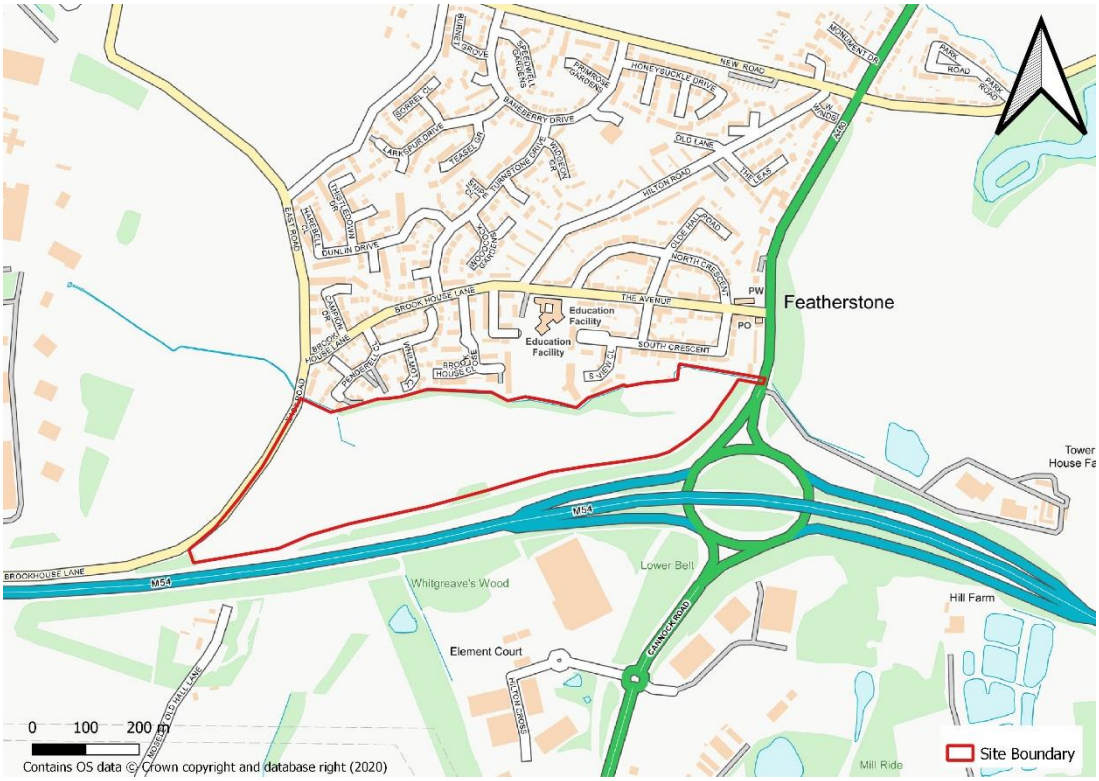
1 INTRODUCTION

1.1 Background

RSK Environment Ltd (RSK) was commissioned to undertake an air quality feasibility study of the proposed residential development at land off Brookhouse Lane, Featherstone. **Figure 1-1** shows the location and redline boundary of the proposed development site. The application site lies within the jurisdiction of South Staffordshire District Council (SSDC).

This report presents the findings of a review of the existing baseline air quality conditions in the local area and consideration of potential air quality impacts or constraints during the construction and operational phase of the proposed development.

Figure 1-1: Proposed Development Site Location Plan



2 LEGISLATION, PLANNING POLICY & GUIDANCE

2.1 Key Legislation

2.1.1 Air Quality Strategy

UK air quality policy is published under the umbrella of the Environment Act 1995, Part IV and specifically Section 80, the National Air Quality Strategy. The latest *Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air*, published in July 2007 sets air quality standards and objectives for ten key air pollutants to be achieved between 2003 and 2020.

The EU Air Quality Framework Directive (1996) established a framework under which the EU could set limit or target values for specified pollutants. The directive identified several pollutants for which limit or target values have been, or will be set in subsequent 'daughter directives'. The framework and daughter directives were consolidated by Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which retains the existing air quality standards and introduces new objectives for fine particulates ($PM_{2.5}$).

2.1.2 Air Quality Standards

The air quality standards (AQSs) in the United Kingdom are derived from EC directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. The Air Quality Limit Values Regulations 2003 and subsequent amendments implement the Air Quality Framework Directive into English Law. Directive 2008/50/EC was translated into UK law in 2010 via the Air Quality Standards Regulations 2010.

The relevant[1] standards for England and Wales to protect human health are summarised in **Table 2-1**.

Table 2-1: Air Quality Standards Relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit (µg/m^3)
Nitrogen dioxide (NO_2)	1 calendar year	-	40
	1 hour	18	200
Fine particles (PM_{10})	1 calendar year	-	40
	24 hours	35	50
Fine particles ($PM_{2.5}$)	1 year	-	25

[1] Relevance, in this case, is defined by the scope of the assessment.

2.1.1 The Environment Act

These objectives are to be used in the review and assessment of air quality by local authorities under Section 82 of the Environment Act (1995). If exceedances are measured or predicted through the review and assessment process, the local authority must declare an Air Quality Management Area (AQMA) under Section 83 of the act, and produce an Air Quality Action Plan (AQAP) to outline how air quality is to be improved.

2.2 Planning Policy

The land use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality concern that relates to land use and its development can, depending on the details of the proposed development, be a material consideration in the determination of planning applications.

2.2.1 National Planning Policy Framework

In 2019 the revised National Planning Policy Framework (NPPF) was published, superseding the previous NPPF with immediate effect. The NPPF includes a presumption in favour of sustainable development.

Section 15 of the NPPF deals with Conserving and Enhancing the Natural Environment, and states that the intention is that the planning system should prevent '*development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability*' and goes on to state that '*new development* [should be] *appropriate for its location' and 'the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account*.'

With specific regard to air quality, the NPPF 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."*

2.2.2 Local Planning Policy

South Staffordshire Council Core Strategy (Local Plan)

Core Policy 2 *'Protecting and Enhancing the Natural and Historic Environment'* of the SSCs Local Plan states that:

"Development or initiatives will generally be supported which,

…

d) protect and improve water and air quality."

Furthermore, Core Policy 11 *'Sustainable Transport'* of the SSCs Local Plan states that:

"Development proposals will, either individually or collectively, have to make appropriate provision for:

…..

- *Improving air quality and reducing the impact of travel upon the environment, I particular reducing carbon emissions that contribute to climate change."*

2.3 Best Practice Guidance Documents

2.3.1 Guidance on the Assessment of Dust from Demolition and Construction

The Institute of Air Quality Management (IAQM) published a guidance document in 2014 (Holman *et al*., 2014) on the assessment of construction phase impacts. The guidance was produced to provide advice to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measure appropriate to the level of risk identified.

2.3.2 Local Air Quality Management Review and Assessment Technical Guidance

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their air quality review and assessment work. This guidance, referred to in this document as the Local Air Quality Management Technical Guidance (Defra, 2016) ('LAQM TG.16')

2.3.3 Land-Use Planning & Development Control: Planning for Air Quality

Environmental Protection UK's (EPUK) and the IAQM jointly published a revised version of the guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' in 2017 (herein the 'EPUK-IAQM guidance') to facilitate consideration of air quality within local development control processes. It provides a framework for air quality considerations, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance includes methods for undertaken an air quality assessment and an approach for assessing the significance of effects. The guidance note is widely accepted as an appropriate reference method for this purpose.

3 STUDY APPROCH

3.1 Overall Approach

The approach taken for assessing the potential air quality impacts of the proposed development may be summarised as follows:

- Baseline characterisation of local air quality;
- Identification of potential construction and operational phase constraints related to air quality;
- Consideration of possible mitigation measures, where appropriate; and
- Recommendation for any further work.

3.2 Baseline Characterisation

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources.

A desk-based study has been undertaken using data obtained from continuous monitoring stations and diffusion tube monitoring sites maintained by SSC. Estimated background data from the LAQM Support website maintained by Defra are also included. Detailed baseline background air quality characterisation is included in Section 4.

3.3 Construction Phase and Operation Phase

The development site is bounded by existing residential units to the north. During construction phase, construction works for the proposed development have the potential to lead to the release of fugitive dust and particulate matter. it is considered that likely that the proposed development may have a potential impact on these residential receptors during construction phase.

The M54, which is the major source of air pollution in the local area, is located adjacent to the proposed development to the south. Therefore, the proposed development may have the potential be affected by local air quality, considering its proximity to the M54.

Further discussions of the potential construction and operational phase constraints are included in section 5.

4 BASELINE AIR QUALITY CHARACTERISATION

4.1 Emission Sources and Key Air Pollutants

The proposed development site is located in an area where the main source of air pollution is likely to be road traffic exhaust emissions (especially from the M54). There are no known industrial sites in the immediate vicinity of the application site likely to have a significant impact on local air quality. Thus, the principal pollutants relevant to this assessment are considered to be NO_2, PM_{10} and $PM_{2.5}$, generally regarded as the most significant air pollutants released by vehicular combustion processes, or subsequently generated by vehicle emissions in the atmosphere through chemical reactions.

4.2 Presence of AQMAs

The proposed development is located within the administrative area of SSDC. Following a review of local air quality, it is understood that there is currently one AQMA (i.e. Oak Farm AQMA) declared within SSDC, due to exceedances of the annual mean NO_2 AQS. The Oak Farm AQMA is located in Hatherton, approximately 5km to the north of the proposed development. The nearest AQMA to the development is the Wolverhampton Air Quality Management Area 2005, which was declared within the neighbouring council, City of Wolverhampton Council (CWC). The Wolverhampton Air Quality Management Area 2005 is located less than 500m from the proposed development site.

4.3 Baseline Monitoring Data

According to the 2019 SSDC Air Quality Annual Status Report there was one automatic monitoring station and a diffusion tube network of 13 locations in 2018. None of these monitoring locations are within 3.5km from the proposed development site.

The neighbouring council, CWC, had 9 automatic monitoring stations and a diffusion tube network of 63 sites in 2018. The closest monitoring location is located approximately 2.1 km from the proposed development site.

The annual average NO_2 concentrations for the diffusion tube sites within 2.5 km from the proposed development site are reproduced in **Table 4-1**. It is noted that the measured annual mean NO_2 concentrations at all the diffusion tube monitoring locations are below the annual mean NO_2 AQS. Among these monitoring sites, monitoring location STA11 is the closest monitoring location to the development site and it's located approximately 200m from the M54 and is therefore considered to be most representative of conditions at the proposed development site.

Table 4-1: Annual Average Measured Pollutant Concentrations at the Monitoring Locations in CWC

Site ID	Site Type	Approx. distance from proposed development (km)	Annual Average NO_2 (µg/m^3)	
			2017	2018
STA11	Roadside	2.1	39	36
STA10	Roadside	2.3	23	26
STA12	Roadside	2.3	37	33

Note: Results shown in **bold** exceed the air quality objective.

4.4 LAQM Background Data

In addition to the local monitoring data, estimated background air quality data available from the LAQM-Tools website, may also be used to establish likely background air quality conditions at the proposed development site.

This website provides estimated annual average background concentrations of nitrogen oxide (NO_x), NO_2, PM_{10} and $PM_{2.5}$ on a 1km^2 grid basis. **Table 4-2** identifies estimated annual average background concentrations for the grid square containing the proposed development site for years 2020-2022. No exceedances of the NO_2, PM_{10} or $PM_{2.5}$ air quality objectives (AQO) are predicted at the development site.

Table 4-2: Estimated Background Annual Average NO_2, PM_{10} and $PM_{2.5}$ Concentrations at the Proposed Development Site

Assessment Year	Estimated Annual Average Pollutant Concentrations Derived from the LAQM Support Website (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
2020	17.5	14.9	9.4
2021	16.7	14.7	9.2
2022	16.0	14.6	9.1
Air Quality Objective	**40**	**40**	**25***

Notes: Presented concentrations for 1km^2 grid centred on 393500, 304500; approximate centre of development site is 393629, 304779.; *Target objective only.

5 ASSESSMENT OF IMPACTS

5.1 Construction Phase

5.1.1 Exhaust Emissions from Plant and Vehicles

The operation of vehicles and equipment powered by internal combustion engines results in the emission of exhaust gases containing the pollutants NO_x, PM_{10}, volatile organic compounds, and carbon monoxide. The quantities emitted depend on factors such as engine type, service history, pattern of usage and fuel composition.

Based on the temporary nature of the construction activities, it is considered unlikely that vehicle movements associated with staff commutes to and from the site would have a significant impact on local air quality. Moreover, plant would be used to facilitate earthworks and construction. The operation of site equipment and machinery will result in emissions to atmosphere of exhaust gases, but with suitable controls and site management such emissions are unlikely to be significant.

5.1.2 Fugitive Construction Dust and Particulate Matter

Fugitive dust emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture, road surface conditions and weather conditions. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust.

Fugitive dust arising from construction is mainly of a particle size greater than the PM_{10} fraction (which can potentially impact upon human health), however it is noted that construction activities may contribute to local PM_{10} concentrations. Appropriate dust control measures can be highly effective for controlling emissions from potentially dust generating activities identified above, and adverse effects can be greatly reduced or eliminated.

As discussed in section 3.3, due to the proximity of the proposed development to existing nearby residential units, it is considered that an assessment of construction phase impacts (following the IAQM construction dust guidance) will be required to be carried out to support the planning application, and appropriate mitigation measures should be identified based on the assessment results.

5.2 Operational Phase

5.2.1 Emissions to Air from Operational Phase Traffic

Table 5-1 presents the EPUK-IAQM screening criteria for when an air quality assessment might be required. Should the criteria within **Table 5-1** be exceeded then it is likely that a detailed assessment of operational phase impacts will be required.

During the operational phase, air quality impacts are likely to be associated with traffic emissions as a result of any changes in traffic flows or flow composition the development may bring. Detailed information regarding development traffic generation is not available at this stage. However, based on the size of the development, it is considered likely that the proposed development will generate additional traffic flows of more than 500 AADT on the surrounding road network.

Additionally, the proposed development site is in close proximity to Wolverhampton AQMA, as well as being located adjacent to the M54. Therefore, it is considered likely that an operational phase traffic emissions assessment, likely to include detailed dispersion modelling, will be required to consider the potential impact of the development on local air quality, should any future application for planning consent be made.

Table 5-1: Air Quality Screening Criteria from EPUK-IAQM Guidance

The Development will	Indicative Criteria to Proceed to an Air Quality Assessment
Cause a significant change in Light Duty Vehicle (LDV) traffic slows on local roads with relevant receptors.	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere.
Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors.	A Change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100AADT elsewhere.
Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA
Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100AADT elsewhere.
Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.	Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. - In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

5.2.2 Exposure of Future Occupants to Air Pollution

The potential exposure of future users of the proposed development to poor air quality has been considered by undertaking a qualitative review of the baseline conditions (**Section 4**) and considering the presence of sensitive receptors within the proposed development.

The application site is located adjacent to the M54. As discussed in section 4, the nearest diffusion tube (i.e. STA11) to the development site, monitored annual mean NO_2 concentrations of 36 µg/m^3 in 2018, which is close to the annual mean NO_2 objective (i.e. 40 µg/m^3).

It should be noted that diffusion tube STA11 is located approximately 200m away from the M54, and the proposed development site is located approximately 50m away from the M54. It is acknowledged within LAQM.TG(16) that concentrations fall-off rapidly with distance from the source, and therefore it is considered highly likely that annual mean NO_2 concentrations at the development site could be higher than the measured annual mean NO_2 concentrations at diffusion tube STA11 (i.e. 36 µg/m3). Therefore, it is considered that an air quality exposure assessment will be required to determine an appropriate 'standoff distance' from the M54 to ensure that the future residents would not be exposed to pollutant concentrations which exceed the relevant AQS objectives.

6 FUTURE ASSESSMENT RECOMMENDATIONS

6.1 Overall Approach

The recommended approach for assessing the potential air quality impacts of a proposed development may be summarised as follows:

- Correspondence with the local authority;
- Baseline characterisation of local air quality;
- Qualitative impact assessment of the construction phase of the development;
- Quantitative assessment of air quality impacts during the operational phase of the proposed development and exposure assessment of future proposed receptors using dispersion modelling software package ADMS roads; and
- Recommendation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

6.2 Construction Phase

The dust emitting activities can typically be effectively controlled by appropriate dust control measures and any adverse effects can be greatly reduced or eliminated. It is expected that once specific information related to construction work is available, a risk impact assessment from construction dust for demolition, earthworks, construction and trackout is assessed with reference to the IAQM criteria and appropriate mitigation identified.

A dust management plan (DMP), which may be part of a Construction Environmental Management Plan (CEMP), for the construction phase should be prepared and agreed with the local authority to ensure that the potential for adverse environmental effects on local receptors is minimised.

The DMP should include *inter alia*, measures for controlling dust and general pollution from site construction operations, and include details of any monitoring scheme, if appropriate. Controls should be applied throughout the construction period to ensure that emissions are mitigated.

6.3 Operational Phase

As identified in Section 5.2, due to the size of the proposed development, and its proximity to M54, it is considered that a detailed air quality dispersion modelling assessment, using ADMS-Roads, will be required to consider the potential impact of the development may have on local air quality and determine an appropriate ‘standoff distance’ from the M54 to ensure that the future residents would not be exposed to pollutant concentrations which exceed the relevant AQS objectives

It is recommended that mitigation measures to support low or zero emissions vehicles and encourage sustainable transport choices should be included. Domestic space and

water heating should be low or zero emissions, with all gas-fired boilers to meet a minimum standard of <40mgNO_x/kWh.

7 CONCLUSIONS

An air quality feasibility study for a proposed residential development has been undertaken with reference to existing air quality in the area and relevant air quality legislation, policy and guidance.

Construction phase impacts of the proposed development may potentially arise due to fugitive dust emissions. It is recommended that the risk of dust impacts is assessed according to a widely used method published by the IAQM as part of any future application for planning consent. With implementation of appropriate mitigation measures, significant residual effects are not anticipated.

It is recommended that operational phase air quality impacts of development at the proposed site are assessed with reference to the '*Land-Use Planning & Development Control: Planning for Air Quality*' guidance published by EPUK-IAQM as part of any future application for planning consent. This guidance suggests that a detailed assessment of the impact of increased road traffic emissions is likely to be required where 'significant' traffic flows are likely to be generated by a proposed development.

Current air quality in the area of the proposed development site has been characterised using publicly available data. No exceedances of any of the relevant AQSs are captured at nearby monitoring locations. However, due to the location of the proposed development site (i.e. adjacent to the M54), a detailed air quality assessment is likely to be required to assess air quality at the site and the potential for the introduction of new exposure to poor air quality; and (where the screening criteria are exceeded) the impact of increased road traffic exhaust emissions on local air quality.

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