Report

Roundstone Park, Southwater

Air Quality Assessment & Mitigation Statement

For Churchill Living Limited

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Contents

1	Introduction	1
2	Policy Context	3
3	Pollutants of Concern	4
4	Baseline Conditions	6
5	Air Quality Assessment	10
6	Calculation of Emissions and Damage Costs	11
7	Mitigation	13
8	Achieving Compliance with the $PM_{2.5}$ Targets	14
9	Conclusions	15
10	References	16
11	Glossary	18
12	Appendices	19
A1	EPUK & IAQM Planning for Air Quality Guidance	20
A2	Policy	25
A3	Professional Experience	28

Tables

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM_{10} and $PM_{2.5}$ 5

Table 2: Environment Act $PM_{2.5}$ Targets 5

Table 3: Summary of Annual Mean NO_2 Monitoring (2019-2023) ($\mu g/m^3$) 7

Table 4: Number of Hours with NO_2 Concentrations Above 200 $\mu g/m^3$ 7

Table 5: Summary of Annual Mean PM_{10} and $PM_{2.5}$ Monitoring (2019-2023) ($\mu g/m^3$) 8

Table 6: Number of Days with PM_{10} Concentrations Above 50 $\mu g/m^3$ 9

Table 7: Estimated Annual Mean Background Pollutant Concentrations in 2025 ($\mu g/m^3$) 9

Table 8: Damage Cost Calculation 11

Figures

Figure 1: Development Location 1

Figure 2: Monitoring locations 7

1 Introduction

1.1 This report describes the potential air quality impacts associated with the residential development of Roundstone Park in Southwater. The development is described as:

"*Demolition of existing buildings and erection of 36 Retirement Living Apartments and 6 Retirement Cottages, including a Lodge Manager's office, communal facilities, a guest suite, parking and landscaping*".

1.2 Air quality needs to be considered to ensure that the development does not generate any adverse impacts off-site and to ensure that new residents are not exposed to exceedances of the air quality objectives.

1.3 The location of the development is shown in Figure 1.



Figure 1: Development Location

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

1.4 The development has been granted planning permission (DC/22/0096) by Horsham District Council with a number of conditions. Condition 18 states:

***Pre-Occupation Condition**: No part of the development hereby permitted shall be occupied until a scheme of air quality mitigation has been submitted to and been approved in writing by the Local Planning Authority. The details shall have regard to the Council's latest Air Quality & Emissions Reduction Guidance document. The approved scheme shall be installed prior to first occupation of the development and shall thereafter remain as such.*

***Reason**: To mitigate the impact of the development on air quality within the District and to sustain compliance with and contribute towards EU limit values or national objectives for pollutants in accordance with Policies 24 & 41 of the Horsham District Planning Framework (2015).*

1.5 The air quality assessment and mitigation outlined in this report has therefore been prepared to discharge the above condition, taking into account all relevant local and national guidance and regulations.

1.6 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)[1] recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality effects. The approach, as described in Appendix A1, first considers the size of a development; if the development is for fewer than ten homes or covers less than 1,000 m^2 of other land uses and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment. The development is above the development size threshold, and therefore the potential impacts on air quality from traffic generated by the development needs to be considered. The IAQM have set out screening criteria, below which it can be assumed that there will not be significant impacts on air quality. The criteria for outside an Air Quality Management Area (AQMA) are a change in traffic flows of more than 500 AADT of Light Duty Vehicles (LDVs) or more than 100 AADT of Heavy Duty Vehicles (HDVs).

1.7 The energy strategy for the development is for all energy supply to be electric; there will be no centralised combustion plant and thus there will be no significant point sources of emissions within the development.

[1] The IAQM is the professional body for air quality practitioners in the UK.

2 Policy Context

2.1 All European legislation referred to in this report is written into UK law and remains in place. The following Policy, Legislation and Guidance has been followed when preparing this document. For details of each, please see Appendix A2

- Air Quality Strategy 2007
- Air Quality Strategy 2023
- Clean Air Strategy 2019
- Environment Act 2021
- Environmental Improvement Plan 2023
- Planning Policy
- Local Policies
- Air Quality Action Plans
    - i) National Air Quality Plan
    - ii) Local Air Quality Action Plan

3 Pollutants of Concern

3.1 The main air pollutants of concern are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$). These are the pollutants most related to road traffic emissions and known to have adverse health impacts. UK-wide objectives for NO_2 and PM_{10} were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter.

3.2 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2022). The annual mean objectives for nitrogen dioxide and PM_{10} are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM_{10} is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

3.3 For $PM_{2.5}$, the objective set by Defra for local authorities is to work toward reducing concentrations without setting any specific numerical value. In the absence of a numerical objective, it is convention to assess local air quality impacts against the limit value[2], originally set at 25 µg/m^3 and currently set at 20 µg/m^3.

3.4 Defra has also recently set two new targets, and two new interim targets, for $PM_{2.5}$ concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean $PM_{2.5}$ concentration of 10 µg/m^3 by the end of 2040 (referred to as the annual mean concentration target or AMCT), with the interim target being a value of 12 µg/m^3 by the start of 2028[3]. The second set of targets relate to reducing overall population exposure to $PM_{2.5}$. By the end of 2040, overall population exposure to $PM_{2.5}$ should be reduced by 35% compared with 2018 levels (referred to as the population exposure reduction target or PERT), with the interim target being a reduction of 22% by the start of 2028.

3.5 In late 2024 Defra published Interim Planning Guidance on the $PM_{2.5}$ targets (Defra, 2024a). This states that:

"The purpose of the targets is to improve air quality by reducing levels of $PM_{2.5}$ across the country, therefore improving public health. While achievement of the targets will be assessed at relevant monitoring sites, the targets apply to ambient (outdoor) air throughout England. Applicants and Local Planning Authorities should therefore consider the impact of developments on air quality in all ambient air, whether a monitor is present or not."

3.6 In order to address the new targets it is not sufficient to assess solely whether a scheme is likely to lead to an exceedance of a legal limit. Instead, developments need to implement appropriate mitigation measures from the design stage, ensuring the minimum amount of pollution is emitted and that exposure is minimised.

[2] EU Directive 2008/50/EC sets limit values for NO_2, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations (2010). The limit values for NO_2 and PM_{10} are the same numerical concentrations as the UK objectives, but achievement of the limit values is a national obligation rather than a local one and concentrations are reported to the nearest whole number. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values.
[3] Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m^3 would not exceed the 10 µg/m^3 target.

3.7 Pending publication of the new guidance, Defra advises applicants to provide evidence that they have identified key sources of air pollution within the scheme and taken appropriate action to minimise emissions of $PM_{2.5}$ and its precursors as far as possible. More detailed assessment is expected for development closer to populations and/or having higher emissions. Defra has posed two questions to be used as prompts to support the interim assessment process:

"How has exposure to $PM_{2.5}$ been considered when selecting the development site?; and

What actions and/or mitigations have been considered to reduce $PM_{2.5}$ exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of $PM_{2.5}$ and its precursors?"

3.8 The relevant air quality criteria for this assessment are provided in Table 1 and the respective Environment Act $PM_{2.5}$ targets in Table 2.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Value
Nitrogen Dioxide	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
PM_{10}	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3
$PM_{2.5}$	Annual Mean	20 µg/m^3 [a]

[a] There is no numerical $PM_{2.5}$ objective for local authorities (see Paragraph 3.3). Convention is to assess against the UK limit value which is currently 20 µg/m^3.

Table 2: Environment Act $PM_{2.5}$ Targets

Metric	Target	Target year
AMCT	Interim target: 12 µg/m^3	2028
	Legally binding target: 10 µg/m^3	2040
PERT	Interim target: 22% reduction in exposure compared to 2018	2028
	Legally binding target: 35% reduction in exposure compared to 2018	2040

4 Baseline Conditions

Relevant Features

4.1 The development is located in the village of Southwater, approximately 4 km south-west of Horsham town centre. The development is bounded by Worthing Road to the west and existing residential areas to the north, south, and east. It is the site of a former caravan dealership with associated parking; the majority of the area is now unoccupied with a single building on the eastern edge.

4.2 The development is not located within, or near to, an AQMA.

Industrial Sources

4.3 No significant industrial sources have been identified that are likely to affect the development in terms of air quality.

Local Air Quality Monitoring

Monitoring Sites

4.4 Horsham District Council operates three automatic monitoring stations within its area. The closest is the Horsham Park Way roadside station (HO2) located in Horsham town centre which measures NO_2 and PM_{10} concentrations. The only automatic monitoring station operated within Horsham District Council's area which directly measures concentrations of $PM_{2.5}$ is located in Storrington (HO4), approximately 14.4 km south-east of the development.

4.5 The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Socotec (using the 50% TEA in acetone method). These include one deployed in Southwater on Worthing Road (site 49), approximately 500 m south of the development.

4.6 The monitoring locations are shown in Figure 2.

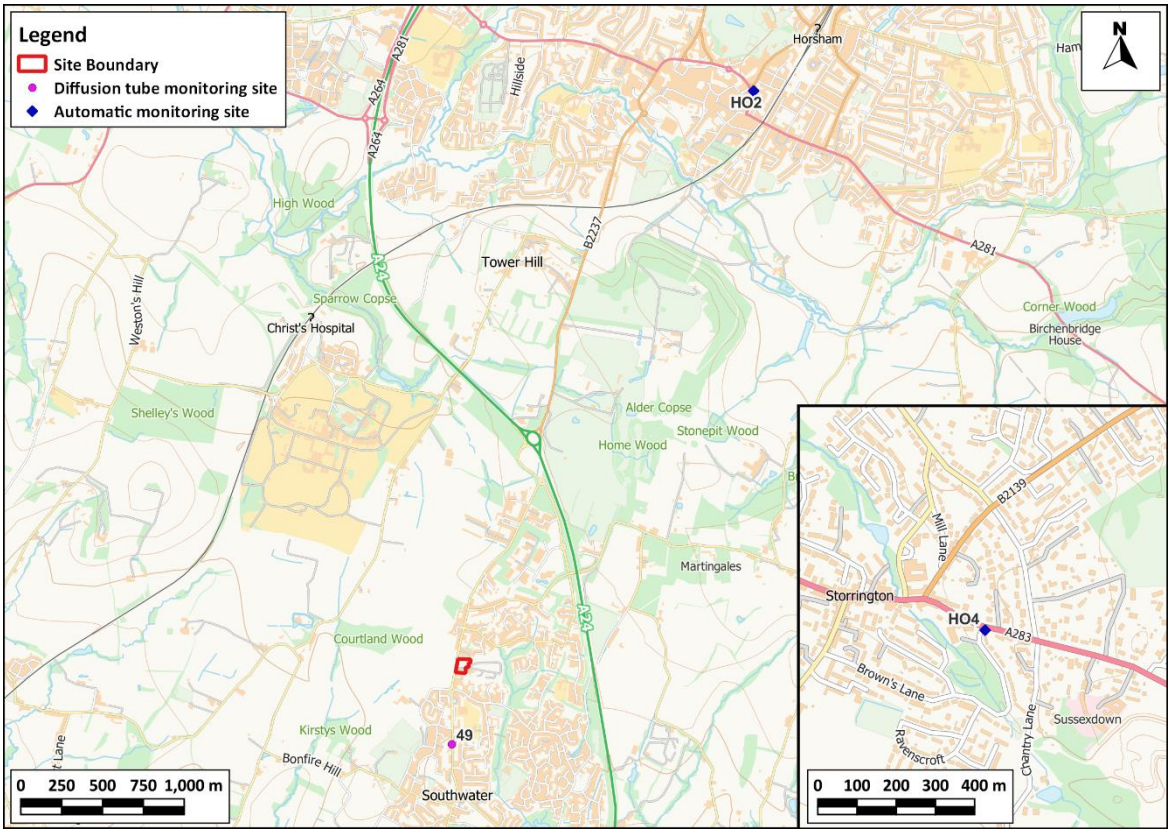

Figure 2: Monitoring locations

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

4.7 The monitoring data presented below have been taken from the Horsham Council's 2024 Annual Status Report (Horsham District Council, 2024).

Nitrogen Dioxide

4.8 Annual mean results for the years 2019 to 2023 are summarised in Table 3, while results relating to the 1-hour mean objective are summarised in Table 4.

Table 3: Summary of Annual Mean NO_2 Monitoring (2019-2023) (µg/m³)

Site No.	Site Type	Location	2019	2020	2021	2022	2023
49	Roadside	Worthing Road, Southwater	23.5	21.1	21.7	19.4	19.0
HO2	Roadside	Horsham Park Way, Horsham	24.4	18.8	21.1	17.7	16.2
Objective			40				

Table 4: Number of Hours with NO_2 Concentrations Above 200 µg/m³

Site No.	Site Type	Location	2019	2020	2021	2022	2023
HO2	Roadside	Horsham Park Way, Horsham	0	0	0	0 (66.3)	0

Site No.	Site Type	Location	2019	2020	2021	2022	2023
Objective			18 (200) [a]				

[a] Values in brackets are 99.8th percentiles, which are presented where data capture is <85%.

4.9 The concentrations presented in Table 3 and Table 4 show no exceedances of the respective annual mean and 1-hour mean objectives between 2019 and 2023. There is also an overall decreasing trend; NO_2 concentrations measured in 2023 were lower than those measured in 2019 at both monitoring sites.

4.10 While 2020 results have been presented in this Section for completeness, they are not relied upon in any way as they will not be representative of 'typical' air quality conditions due to the considerable impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations.

Particulate Matter (PM_{10} and $PM_{2.5}$)

4.11 Annual mean PM_{10} and $PM_{2.5}$ results for the years 2019 to 2023 are summarised in Table 5, while results relating to the daily mean objective are summarised in Table 6. There have been no exceedances of the respective objectives in the last 5 years, and the HO4 site already meets the AMCT (to be achieved by 2040 nationally).

Table 5: Summary of Annual Mean PM_{10} and $PM_{2.5}$ Monitoring (2019-2023) (µg/m³)

Site No.	Site Type	Location	2019	2020	2021	2022	2023
PM_{10}							
HO2[a]	Roadside	Horsham Park Way	19.3	15.7	17.5	19.3	20.5
HO4	Roadside	Storington AURN	-	-	-	14.0	13.7
Objective			40				
$PM_{2.5}$							
HO2[a]	Roadside	Horsham Park Way	13.5	11.0	12.3	13.1	14.6
HO4	Roadside	Storington AURN	-	-	-	7.3	7.7
Objective / AMCT [c]			20 [b] / 10				

[a] Values estimated from measured PM_{10} data using a nationally derived correction multiplying ratio of 0.7 (2019-2021), national factor 6.4 (2022), national factor 5.9 (2023), as presented in Horsham District Council's 2024 Annual Status Report (Horsham District Council, 2024).

[b] The 20 µg/m³ $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

[c] To be met by 2040

Table 6: Number of Days with PM_{10} Concentrations Above 50 µg/m³

Site No.	Site Type	Location	2019	2020	2021	2022	2023
HO2	Roadside	Horsham Park Way	5	0	0	0	0
HO4	Roadside	Storrington AURN	-	-	-	0 (21.5)	0
Objective			35 [a]				

[a] Values in brackets are 90.4th percentiles, which are presented where data capture is <85%.

Background Concentrations

4.12 Background concentrations have been defined using Defra's 2021-based background maps (Defra, 2024b). These cover the whole of the UK on a 1x1 km grid.

4.13 Estimated background concentrations at the development are set out in Table 7 and are all well below the objectives.

Table 7: Estimated Annual Mean Background Pollutant Concentrations in 2025 (µg/m³)

Year	NO_2	PM_{10}	$PM_{2.5}$
2025	7.4	10.7	6.3
Objective / AMCT [a]	40	40	20 [b] / 10

[a] To be met by 2040

[b] The 20 µg/m³ $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

5 Air Quality Assessment

Operational Impacts Approach to Assessment

5.1 The project's Transport Consultants (Paul Basham Associates Ltd) have determined that the development will generate 83 LDV trips as an AADT[4]. Thus, road traffic impacts from the development on the surrounding area have been assessed qualitatively, as the traffic generated by the site is below the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in the Introduction.

5.2 The impacts of nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations from the existing road network on new residents of the development have also been assessed qualitatively, taking account of local air quality monitoring data.

Impacts at Existing Receptors

5.3 The development is expected to generate a total of 83 daily LDV trips; these daily trip rates are below the screening threshold of 500 LDVs recommended for use outside of an AQMA in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) (see Appendix A1). The development will generate very few operational heavy vehicle trips. As such, it is judged that the relevant screening thresholds will not be exceeded and there is no requirement for a detailed assessment of road traffic impacts at existing receptors. It can therefore be concluded that the development will not have a significant impact on local roadside air quality.

Impacts of Existing Sources on Future Occupants of the Development

5.4 The development is located well away from any busy roads, in an area where pollutant concentrations would be expected to be close to background levels. Background concentrations at the site are well below the objectives (see Table 7). In addition, nearby monitoring shows local concentrations have been well below the respective NO_2, PM_{10} and $PM_{2.5}$ objectives over the last five years.

5.5 It can be therefore considered that future residents of the development will experience acceptable air quality; both background concentrations and local monitoring show concentrations well below the respective objectives, and thus there is no need for more detailed assessment.

[4] The Transport Statement (document number 536.0036/TS/2) presents two methodologies for calculating development-generated trips; one uses the national TRICS database, and the other uses trips measured from similar sites operated by the Client. The TRICS database resulted in a higher trip generation and has been used here to present a 'worst-case' assessment.

6 Calculation of Emissions and Damage Costs

Methodology

6.1 The Sussex-Air air quality and emissions mitigation guidance (Sussex-Air Partnership, 2021) deals with pollutants associated with transport which are regulated under Local Air Quality Management (LAQM) Regime. It sets out guidance on how to assess and mitigate any impact a new development may have on air quality; the methodology outlined in the guidance has been followed to calculate the level of mitigation, i.e., 'damage costs', required.

6.2 The calculation of damage costs has utilised EFT 2024 v12.1 (Defra, 2024b) to determine the development's transport emissions. Defra's damage cost toolkit (Defra, 2024c), has then been used to determine the associated damage costs for those emissions.

6.3 The calculation process includes:

- identifying the additional trips or vehicle numbers generated by the proposed development;
- calculating the emissions from these trips for the pollutants of concern (NOx and $PM_{2.5}$) using the EFT for each of the five years assessed. This calculation has assumed a 10 km trip length and a 50 kph average speed;
- calculating the damage costs for the specific pollutant emissions using the damage cost toolkit, based on the costs for road transport in a small urban area. The toolkit allows for reductions in emissions over time, applies a discount in line with HM Treasury's Green Book, and also adjusts for inflation; and
- extracting the 'Central' total value for each pollutant and summing these for use as the damage cost total for the scheme.

Calculations

6.4 Paul Basham Associates Ltd, who have undertaken the Transport Assessment for the development, have advised that the development will generate 83 additional vehicle trips per day, on average, on the local road network. It is expected that these will all be LDVs based on the nature of the development. The annual emissions from each of these trips in the five years from the earliest possible year of opening have been calculated using the EFT and entered into Defra's damage cost toolkit (Defra, 2024c). The calculations and results are presented in Table 8.

Table 8: Damage Cost Calculation

Year	2025	2026	2027	2028	2029
NOx					
Total Emissions (tonnes)	0.0531	0.0471	0.0414	0.0361	0.0311
Central Damage Cost (£) [a]	425	377	332	289	249
Discounted Central Cost (£)	425	371	322	276	235
Total Central Present Value (£)	1,629				
$PM_{2.5}$					
Total Emissions (tonnes)	0.0054	0.0053	0.0053	0.0052	0.0052

Central Damage Cost (£) [a]	298	294	291	289	287
Discounted Central Cost (£)	298	290	283	276	270
Total Central Present Value (£)	1,418				

[a] Road Transport Urban Small

6.5 Summing the values for NOx and $PM_{2.5}$ gives a total damage cost of **£3,047**[5].

[5] Total based on unrounded values.

7 Mitigation

Good Design and Best Practice

7.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required.

7.2 The development incorporates the following good design and best practice measures:

- setting back of the development buildings from roads by at least 8 m;
- fewer parking spaces than number of dwellings;
- provision of 7 kW electric vehicle charging points to all car parking spaces;
- provision of pedestrian and cycle access to the new development, including cycle parking; and
- use of an all-electric heating, to avoid the need for on-site combustion.

Emissions Mitigation Statement

7.3 The assessment has demonstrated that the overall air quality effect of the development will be 'not significant'; it will not introduce any new exposure into areas of unacceptable air quality, nor will the development-generated traffic emissions have a significant impact on local air quality. It is, therefore, not considered appropriate to propose mitigation of road traffic impacts on nearby receptors.

7.4 However, the Sussex-Air guidance (2021) requires mitigation measures to be implemented which are commensurate to the damage cost value calculated (see section 6). A subsidy towards local public transport for staff and residents is proposed to meet the damage cost value of £3,047 and therefore discharge condition 18 of the planning permission. The practicalities of purchasing vouchers or individual fares will be explored with Metrobus, the local bus operator, closer to the time of the development being operational.

7.5 The price of a single bus fare is currently £3[6], so at current prices 1,136 bus journeys could be purchased to meet the damage cost of £3,047.

[6] The price of a single journey is currently capped at £3 (https://www.metrobus.co.uk/), and will remain as such until the end of 2025. If the total value of the contributions hasn't been reached by the end of 2025 and ticket prices increase in 2026, the remaining number of fares will be re-calculated based on the remaining monetary contribution

8 Achieving Compliance with the $PM_{2.5}$ Targets

8.1 Annual mean $PM_{2.5}$ concentrations indicated at nearby monitoring sites are outlined in Table 5. Concentrations presented for site 'HO2' are estimated from PM_{10} measurements, which have been included for completeness but are not appropriate to assess for compliance with the $PM_{2.5}$ targets. Concentrations at site 'HO4' are already well below the AMCT target to be met by 2040.

8.2 Defra have set out in their Interim Planning Guidance (Defra, 2024a) two questions designed to consider whether a development supports the AMCT and PERT $PM_{2.5}$ targets.

8.3 The first question is *"How has exposure to $PM_{2.5}$ been considered when selecting the development site?"*. Exposure to $PM_{2.5}$ has been considered in the design of the development as the site is in an area away from significant sources of emissions.

8.4 The second question is *"What actions and/or mitigations have been considered to reduce $PM_{2.5}$ exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of $PM_{2.5}$ and its precursors?"*. Measures to reduce exposure for the development's residents to $PM_{2.5}$ include setting back the development from the roads and the use of an all-electric energy strategy. Additional mitigation measures to reduce emissions of $PM_{2.5}$ associated with the development are outlined in paragraph 7.5.

8.5 It is considered that the development complies with the requirements to deliver achievement of the AMCT and PERT by 2040 as appropriate action has been taken to minimise emissions of $PM_{2.5}$ and its precursors as far as is reasonably practicable.

9 Conclusions

9.1 The assessment has considered the impacts of the proposed development on local air quality in terms of emissions from road traffic generated by the completed and occupied development. It has also identified the air quality conditions that future residents will experience.

Operational Impacts

9.2 Air quality conditions for future residents of the development have been shown to be acceptable, with concentrations well below the air quality objectives.

9.3 The traffic generated by the development will be below industry screening thresholds and it will not introduce any combustion sources. Thus, the development will have a negligible impact on air quality at existing receptors.

Mitigation

9.4 In line with the Sussex-Air air quality and emission guidance (Sussex-Air Partnership, 2021), the emissions associated with the development have been assessed and a 'damage cost' value calculated. Mitigation to the target value of £3,407 has been set out in 7.4.

Significance

9.5 The overall operational air quality effects of the development are judged to be 'not significant'. This conclusion is based on the road traffic generated by the development being below screening criteria, while concentrations for future residents of the development will be below the objectives.

Policy Implications

9.6 Taking into account these conclusions, it is judged that the development is consistent with Paragraph 191 of the NPPF, being appropriate for its location both in terms of its effects on the local air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 192, as it will not affect compliance with relevant limit values or national objectives.

9.7 The development is also consistent with Policies 24 and 41 of the Horsham District Planning Framework (Horsham District Council, 2015)as it will not have a detrimental effect on air quality, cause increased exposure to poor air quality, or put future occupants in an area of unacceptable air quality, especially where the future occupants will be a vulnerable group (the elderly). It is also judged to not affect the Council's ability to implement either of its Air Quality Action Plans. Moreover, in line with Policy 24, this assessment has accounted for the relevant Sussex-Air guidance regarding air quality, and determined appropriate mitigation measures commensurate to the value of the 'damage cost' calculated.

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11 Glossary

AADT	Annual Average Daily Traffic
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
Defra	Department for Environment, Food and Rural Affairs
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
IAQM	Institute of Air Quality Management
kph	Kilometres Per hour
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
µg/m^3	Microgrammes per cubic metre
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO_2 + NO)
NPPF	National Planning Policy Framework
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide

12 Appendices

A1 EPUK & IAQM Planning for Air Quality Guidance

A1.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

"Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations".*

Recommended Best Practice

A1.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

"The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions".

A1.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m^2 of commercial floorspace;
- are carried out on land of 1 ha or more.

A1.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;

- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000 m^2 of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNOx/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:

    iii) Spark ignition engine: 250 mgNOx/Nm^3;

    iv) Compression ignition engine: 400 mgNOx/Nm^3;

    v) Gas turbine: 50 mgNOx/Nm^3.

A1.5 A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNOx/Nm^3 and 25 mgPM/Nm^3.

A1.6 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

"It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the "damage cost approach" used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential".

A1.7 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

"There may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

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

Impacts of the Development on the Local Area

A1.8 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1 ha.

A1.9 Coupled with any of the following:

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

A1.10 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of 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;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;

- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A1.11 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A1.12 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

"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. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.

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".

A1.13 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

"The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive 'trigger' for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality".

A1.14 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

"The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer".

A1.15 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A1.16 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

A1.17 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A1.18 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A1.19 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A3.

A2 Policy

Air Quality Strategy 2007

A2.1 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives.

Air Quality Strategy 2023

A2.2 The Air Quality Strategy: Framework for Local Authority Delivery 2023 (Defra, 2023a) sets out the strategic air quality framework for local authorities and other Air Quality Partners in England. It sets out their powers and responsibilities, and actions the government expects them to take. It does not replace other air quality guidance documents relevant to local authorities.

Clean Air Strategy 2019

A2.3 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government, in partnership with the Governments of Scotland, Wales and Northern Ireland, will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

Environment Act 2021

A2.4 The UK's new legal framework for protection of the natural environment, the Environment Act (2021) passed into UK law in November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets.

A2.5 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023 No. 96) sets two new targets for future concentrations of $PM_{2.5}$. These targets are described in Paragraph 3.4.

Environmental Improvement Plan 2023

A2.6 Defra published its 25 Year Environment Plan in 2018 (Defra, 2018a). The Environment Act (2021) requires Defra to review this Plan at least every five years. The Environmental Improvement Plan 2023 (Defra, 2023b) is the first revision. This outlines the progress made since 2018 and adds detail to the goals defined in the 2018 Plan, including that of achieving clean air.

A2.7 The Environmental Improvement Plan 2023 sets out the new air quality targets which have been set for concentrations of $PM_{2.5}$. These targets, which are described in more detail in Paragraph 3.4, include the long-term targets in the Statutory Instrument described in Paragraph A2.5, and interim targets to be achieved by 2028.

A2.8 The 2023 Plan outlines the role of local authorities in helping it meet both its targets and existing commitments. It also outlines the respective roles of industry, agricultural sectors, and the Department for Transport in providing the coordinated action required to meet both its new, and pre-existing targets and commitments.

Planning Policy

National Policies

A2.9 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2024) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

"to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy".

A2.10 To prevent unacceptable risks from air pollution, Paragraph 187 of the NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans".

A2.11 Paragraph 198 states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".

A2.12 More specifically on air quality, Paragraph 199 makes clear 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.".

A2.13 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019), which includes guiding principles on how planning can take account of the impacts of new development on air quality.

A2.14 The PPG sets out the information that may be required in an air quality assessment, making clear that:

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

Local Policies

A2.15 Horsham District Council's current Local Plan is referred to as the 'Horsham District Planning Framework' (Horsham District Council, 2015), which was adopted in November 2015. One of the six priority themes is 'A better environment for today and tomorrow'.

A2.16 Strategic Policy 24 on Environmental Protection states:

"… developments *will be expected to minimise exposure to and the emission of pollutants including noise, odour, air and light pollution and ensure that they:*

[…]

4. Minimise the air pollution and greenhouse gas emissions in order to protect human health and the environment;

5. Contribute to the implementation of local Air Quality Action Plans and do not conflict with its objectives;

6. Maintain or reduce the number of people exposed to poor air quality including odour. Consideration should be given to development that will result in new public exposure, particularly where vulnerable people (e.g. the elderly, care homes or schools) would be exposed to the areas of poor air quality; and

7. Ensure that the cumulative impact of all relevant committed developments is appropriately assessed".

A2.17 Moreover, Policy 41, concerning parking, states:

"*Adequate parking and facilities must be provided within developments to meet the needs of anticipated users. Consideration should be given to the needs of cycle parking, motorcycle parking, charging plug-in or other low emission vehicles and the mobility impaired*".

A2.18 The Sussex-Air Partnership, which includes Horsham District Council, published 'Air quality and emissions mitigation guidance for Sussex', the most recent version of which was published in April 2021 (Sussex-Air Partnership, 2021). The guidance includes the "*steps required to assess and mitigate the impact that new developments may have on local air quality*" and requires an air quality damage cost calculation for a development that is defined as 'major'. This guidance has been followed in section 6.

National Air Quality Plan

A2.19 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018b) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

A2.20 Horsham Council's Air Quality Action Plans (Horsham District Council, 2020a; Horsham District Council, 2020b) set out a series of measures by which they will seek to achieve the air quality objectives in their AQMAs. None of the policies are especially relevant to this assessment, being focussed in areas away from the development location.

A3 Professional Experience

Dr Jessica Muirhead, BSc (Hons), MSc, PhD, CSci, MIEnvSci, MIAQM

Dr Muirhead is an Associate Director with AQC with over 18 years experience in Air Quality consultancy. Prior to joining AQC in 2024, she spent eleven years at AECOM leading the Air Quality Team's Urban Regeneration and Solar Farm work streams. She has been responsible for delivering numerous air quality assessments for planning applications and Development Consent Orders (DCOs) including Environmental Impact Assessments (EIAs) across London and the UK. She spent a year as Technical Advisor to the Greater London Authority delivering training workshops to the London Boroughs, reviewing referrable planning applications and responding to queries on air quality positive and air quality neutral. Jess also has extensive experience providing technical peer reviews for a number of Planning Authorities in the UK, and for The Royal Commission for Al Ula in Saudi Arabia.

Dr Helen Robinson, BSc (Hons), MSc, PhD, MIEnvSc MIAQM

Dr Robinson is a Senior Consultant with AQC, having joined in September 2021. Since joining AQC she has prepared numerous air quality assessments, assessing impacts of proposed developments both qualitatively and quantitatively. Prior to joining AQC she was based at the University of Birmingham, completing a BSc in Geography, MSc in Applied Meteorology and Climatology, and PhD in Air Quality. Her PhD research specialised in air quality modelling where she developed a range of tools to estimate real-time pollutant concentrations on Birmingham's road network, and to quantify the impacts of Low Traffic Neighbourhoods on residential population exposure. Additionally, she provided the air quality modelling expertise on the NERC-funded project, 'GI4RAQ' (Green Infrastructure for Roadside Air Quality), to quantitively assess the impacts of 'green' interventions in street environments.

Dr Rosie Watts, BSc (Hons), MSc, PhD, MIEnvSc

Dr Watts joined AQC in 2024 as an Assistant Consultant. Following a degree in Physical Geography, Rosie completed a PhD studying wild and prescribed fires. This was an ESRC-funded, collaborative project with industry stakeholders, focusing on perceptions towards fires as a risk and the use of prescribed fires as a mitigation tool. Rosie brings with her a background in climate change and its related risks, where throughout her academic career, she developed an interest in air quality, including in relation to wildfire events. She is currently gaining experience on a range of air quality projects, including conducting Air Quality Assessments, undertaking dispersion modelling, and forming BREEAM Indoor Air Quality Plans.



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