The Old Bowling Green, Leek Road

Air Quality Assessment

Bagnall Heights Ltd

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1.0 Introduction

SLR Consulting Ltd (SLR) has been commissioned by Bagnall Heights Ltd to undertake an Air Quality Assessment (AQA) in response to formal consultation comments made by the Environmental Health Officer (EHO) at Staffordshire Moorlands District Council (SMDC), in relation to a Proposed Development comprising 9 additional care units (C2 use-class) and a communal lounge/office, on land known as The Old Bowling Green, Leek Road, Cellarhead (the 'Site').

1.1 Background

A planning application was made to SMDC on 3rd October 2023 (SMDC planning application reference: SMD/2023/0496). On 7th December 2023, the EHO submitted formal consultation comments whereby refusal on air quality grounds was recommended due to insufficient information being submitted to assess the impact of the Proposed Development with regard to air quality. The comments read:

> *"The Application is adjacent to the Cellarhead AQMA* [Air Quality Management Area] *and parts of the site (near to the road) may potentially be unsuitable for development as they could introduce new exposure to poor AQ. It is also not clear how traffic movements associated with the development will affect the air quality within the AQ*[MA]*, which has been improving in recent years.*
>
> *An Air Quality assessment should be submitted with the application to establish the suitability of the site for the proposed development and any potential additional impacts on the wider AQMA."*

As such, this AQA is intended to address these comments and to ensure that the Proposed Development does not result in adverse impacts on local air quality or introduce new sensitive receptors into an area of existing poor air quality.

The Site currently comprises vacant land which is situated within the curtilage of a complex of buildings associated with the former public house. The Site lies at the junction of the A52 Kingsley Road and the A520 Leek Road, with these roads forming the west and south boundaries. There is a large car park associated with the Site, with the eastern half associated with the former beer garden and bowling green. The Site is at the approximate National Grid Reference (NGR): x395800, y347600. The surrounding area comprises:

- Open agricultural land to the north and east; and
- The A52 Kingsley Road immediately to the south, beyond which are 22 dwellings built on the car park of the former Hope and Anchor public house (SMDC planning reference: SMD/2013/0976).

Primary vehicular access to the Site is via the A520 Leek Road, which borders the Site to the west.

1.2 Scope of Assessment

Consultation with the Environmental Health Officer (EHO) at SMDC was undertaken to agree upon the extent and methodology of the air quality assessment. The following scope of works has been undertaken as part of this Air Quality Assessment as agreed with SMDC[1]:

[1] Email correspondence between SLR Consulting Ltd and Daniel McCrory (Principal Pollution Officer, Environmental Health at High Peak Borough Council and Staffordshire Moorlands District Council), dated 19th December 2023.

- Baseline Evaluation – Assessment of existing air quality in the local area;
- Construction Phase – Identification and assessment of potential air quality impacts associated with the construction phase of the Proposed Development, limited to the assessment of construction phase road traffic and plant emissions;
- Operational Phase – Identification and assessment of potential air quality impacts associated with the operational phase of the Proposed Development;
- Site-suitability Assessment – Identification and assessment of pollutant concentrations at the Site, to ensure new receptors are not introduced into an area of existing poor air quality; and
- Mitigation Measures – Identification of mitigation measures, as appropriate.

2.0 Background Context

2.1 Legislation

A dual set of regulations, applicable to National and Local Government separately, are currently operable within the UK.

2.1.1 National Obligations

The Air Quality Standards Regulations 2010[2] (AQSR) transpose both the EU Ambient Air Quality Directive (2008/50/EC), and the Fourth Daughter Directive (2004/107/EC) within UK legislation, in order to align and mirror European obligations. The AQSR includes Limit Values which are legally binding ambient concentration thresholds, however, must be assessed at specific locations (micro and macroscale sampling points). Carriageways or central reservations of roads and any location where the public do not have access (e.g. industrial sites) are exempt. If the sampling point does not comply with the siting locations (Schedule 1: AQSR), then strict comparison cannot be made.

Following the UK's withdrawal from the EU, the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[3] was introduced to mirror revisions to supporting EU legislation. The fine particulate matter ($PM_{2.5}$) Limit Value is 20µg/m^3 (to be met by 2020).

The responsibility of achieving the AQSR (and European equivalent Directives) is a national obligation for Central Government and Devolved Administrations who undertake assessments on an annual basis. Local Authorities have no responsibility to achieve the AQSR or the European equivalent Directives, unless otherwise instructed to assist Central Government under Ministerial Direction.

In response to persistent exceedances, the Government published its 2017 plan[4] for reducing roadside nitrogen dioxide (NO_2) concentrations in order to achieve compliance in the shortest time possible. This has resulted in the introduction of Clean Air Zones across England. However, SMDC were not identified as required to conduct a feasibility study to achieve compliance.

2.1.1.1 Environment Targets (Fine Particulate Matter) Regulations

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[5] introduced an annual mean concentration target of 10µg/m^3 to be met across England by 2040. Central Government and Devolved Administrations is responsible for meeting this target, however not until 2040. Local Authorities have no responsibility to achieve this target.

2.1.2 Local Obligations

Part IV of the Environment Act 1995 (as amended) requires the Secretary of State to publish a national Air Quality Strategy (AQS) every five years and established the system of Local Air Quality Management (LAQM) for Local Authorities to regularly review and assess air quality within its area.

[2] The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.

[3] The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, Statutory Instrument No. 1313, The Stationary Office Limited.

[4] UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations, 2017.

[5] The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. UK Statutory Instruments 2023 No. 96.

The Air Quality (England) Regulations 2000 (as amended) ('the Regulations') provide the statutory basis for the Air Quality Objectives Local Authorities must adhere to under LAQM in England. $PM_{2.5}$ is not currently cited within the Regulations; Local Authorities are however required to work towards reducing $PM_{2.5}$.

The Air Quality Objectives apply at locations where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period (relevant exposure). Table B provides an indication of those locations. Where any of the prescribed Air Quality Objectives are not likely to be achieved, the authority must designate an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to prepare an Air Quality Action Plan (AQAP), which details measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the objective.

The latest AQS for England was published in 2023[6]. The AQS provides the delivery framework for air quality management across England for local authorities and summarises the air quality standards and objectives operable within England for the protection of public health and the environment.

The ambient air quality standards of relevance this assessment (collectively termed Air Quality Assessment Levels (AQALs) throughout this report) are provided in Table A. These are primarily based upon the Air Quality Objectives Local Authorities are responsible for achieving – reflective of the Local Planning Authority's duties. The $PM_{2.5}$ AQSR AQAL has also been included for completeness, to provide an indicative assessment (as the sampling point may not comply with the siting locations prescribed under Schedule 1: AQSR).

Table A: Relevant Ambient AQALs

Pollutant	AQAL (µg/m^3)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean (not to be exceeded on more than 18 occasions per annum)
Particles (as PM_{10})	40	Annual mean
	50	24-hour mean (not to be exceeded on more than 35 occasions per annum)
Particles (as $PM_{2.5}$)	20	Annual mean
Note: The $PM_{2.5}$ AQAL is not prescribed within the Air Quality (England) Regulations 2000 / 2002 and there is no requirement for local authorities to meet it. Exceedances are only valid at specific siting locations (Schedule 1: AQSR).		

Table B: Human Health Relevant Exposure

AQAL Averaging Period	AQALs should apply at	AQALs should not apply at
Annual Mean	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites

[6] Air Quality Strategy: Framework for Local Authority Delivery, Department for Environment Food and Rural Affairs, April 2023.

AQAL Averaging Period	AQALs should apply at	AQALs should not apply at
24-hour mean	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour mean	As above together with kerbside sites of regular access, car parks, bus stations etc.	Kerbside sites where public would not be expected to have regular access

2.1.3 Clean Air Strategy

The 2019 Clean Air Strategy[7] sets out the Government's proposals aimed at delivering cleaner air in England and indicates how devolved administrations intend to make emissions reductions. It sets out the comprehensive action that is required from across all parts of government and society to deliver clean air.

2.1.4 Environment Improvement Plan 2023

The 2023 Environment Improvement Plan[8] is the first revision of the UK Government's 25 Year Environment Plan (25YEP) – planned on a five-year rolling cycle. This document sets out the 5-year delivery plan to improve the natural environment. The 2023 Environment Improvement Plan builds on the 2019 Clean Air Strategy by setting environmental targets and commitments to reduce air pollution.

2.1.5 Environmental Protection Act 1990

The Environmental Protection Act 1990[9] sets out provisions for the regulation of statutory nuisances. Section 79 sets out this statutory nuisance as, 'any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance'.

Section 79 requires that, where a complaint of a statutory nuisance is made to it by a person living within its area, a Local Authority must take steps as are reasonably practicable to investigate the complaint and decide whether the odour is prejudicial to health or a nuisance. Proposed developments which result in the introduction of future sensitive receptors are however subject to the Agent of Change principle to ensure potential interactions with the existing environment and operations are assessed and mitigated to minimise restrictions being placed on existing businesses.

Fractions of dust greater than 10µm (i.e. greater than PM_{10}) in diameter typically relate to nuisance effects as opposed to potential health effects and therefore are not covered within the UK AQS. In legislation there are currently no numerical limits in terms of what level of dust deposition constitutes a nuisance.

[7] The Clean Air Strategy, Defra. January 2019.

[8] Environmental Improvement Plan 2023, Defra. 2023.

[9] The Environmental Protection Act 1990. Available at http://www.legislation.gov.uk/ukpga/1990/43/contents.

2.2 Policy

2.2.1 National Policy

2.2.1.1 National Planning Policy Framework

The December 2023 update to the National Planning Policy Framework[10] (NPPF) sets out planning policy for England. The NPPF states that the planning system should contribute to and enhance the natural and local environment, by preventing new development from contributing to or being adversely affected by unacceptable concentrations of air pollution and development should, wherever possible, help to improve local environmental conditions such as air quality.

In specific relation to air quality policy, the document states:

Chapter 15 - Conserving and Enhancing the Natural Environment

> *"Para 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."*

The NPPF is accompanied by web based supporting Planning Practice Guidance (PPG)[11] which includes guiding principles on how planning can take account of the impacts of new development on air quality. In regard to air quality, the PPG states:

> *"The Department for Environment, Food and Rural Affairs carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with relevant limit values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified."*
>
> *"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity."*

The PPG sets out the information that may be required within the context of a supporting air quality assessment, stating that "*assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality* […] *Mitigation options*

[10] National Planning Policy Framework, Ministry of Housing, Communities & Local Government. 20th December 2023.

[11] Planning Practice Guidance: Air Quality. Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government. November 2019.

where necessary, will depend on the proposed development and should be proportionate to the likely impact".

2.2.2 Local Policy

2.2.2.1 Local Plan

The Staffordshire Moorlands Local Plan[12] was adopted in September 2020, and sets out the development strategy, strategic and development management policies and land designations for the district for the period 2014 to 2033. Within the Local Plan, the following policy relates to air quality:

> *"**Policy SD4: Pollution and Water Quality***
>
> *The Council will protect people and the environment from unsafe, unhealthy and polluted environments by ensuring proposals avoid potential adverse effects; and only permitting proposals that are deemed (individually or cumulatively) to result in pollution (including air/ water/ noise/ vibration/ light/ ground contamination) if after mitigation, potential adverse effects are deemed acceptable. This may be achieved by the imposition of planning conditions or through a planning obligation.*
>
> *[…]"*

The above policy has been considered as part of this assessment.

2.3 Assessment Guidance

This assessment has been carried out in accordance with the principles contained within the guidance documents below.

- Department for Environment Food and Rural Affairs (Defra): Local Air Quality Management Technical Guidance (LAQM.TG(22))[13];
- Defra: COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021[14];
- Design Manual for Roads and Bridges LA 105[15];
- Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM): Land-Use Planning and Development Control: Planning for Air Quality[16] (hereafter referred to as the 'EPUK & IAQM guidance'); and
- IAQM: Implications of the COVID-19 pandemic on air quality monitoring and assessments[17].

[12] Staffordshire Moorlands District Council, Staffordshire Moorlands Local Plan, September 2020.

[13] Local Air Quality Management Technical Guidance (22), Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland. August 2022.

[14] Defra and the Greater London Authority, COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021. April 2021.

[15] DMRB, LA 105-Air Quality, Highways England, 2019.

[16] EPUK and IAQM, Land-Use Planning and Development Control: Planning for Air Quality, v1.2 2017.

[17] IAQM, Implications of the COVID-19 pandemic on air quality monitoring and assessments. 6th April 2021.

3.0 Assessment Methodology

3.1 Road Traffic Emissions

The assessment of air quality effects in relation to trip generation associated with the Proposed Development has been undertaken qualitatively, in accordance with EPUK & IAQM guidance.

The EPUK & IAQM guidance provides a series of indicative screening criteria where if exceeded, should warrant further consideration of associated potential impacts on air quality. If the Proposed Development is found not to exceed any of the relevant indicative criteria presented, then a detailed impact assessment is consequently not required. Effects are therefore believed to be 'insignificant'.

The indicative screening criteria are as follows:

- Outside of an AQMA:
  - A change of Light-Duty Vehicle (LDV) flows of more than 500 24-hour annual average daily traffic (AADT) flow period; and/or
  - A change of Heavy-Duty Vehicle (HDV) flows of more than 100 AADT.
- Within an AQMA:
  - A change of LDV flows of more than 100 AADT; and/or
  - A change of HDV flows of more than 25 AADT.

3.2 Site-Suitability Assessment – Potential Exposure

The Proposed Development has the potential to introduce future residents to an area of poor air quality as evidenced through the presence of an AQMA (see Section 4.2 for further details). A site-suitability assessment has been undertaken through a review of available SMDC monitoring data and application of Defra's *NO_2 Fall Off With Distance Calculator* tool[18] in order to predict annual mean NO_2 concentrations at the Site.

Furthermore, in consideration of concentrations of PM_{10} and $PM_{2.5}$ as part of the site-suitability assessment, a review has been undertaken following the recommendations of the EPUK & IAQM guidance as follows:

- A review of any existing monitoring or modelling data in the vicinity of the Site;
- The background and future baseline air quality and whether this will likely approach or exceed an AQAL;
- The presence and location of an AQMA as an indicator of local hotspots where the AQALs may be exceeded;
- The presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants, that could cause unacceptably high exposure for users of the new development; and
- The presence of a source of odour that may affect amenity for future occupants of the development.

[18] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/no2-falloff/.

3.2.1 Assessing Significance

To determine the significance of predicted air quality impacts based upon a site-suitability assessment, the EPUK & IAQM guidance states:

> *"Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means."*

In line with this, likely pollutant concentrations at the Site are compared to the AQALs to determine whether further consideration is required or whether effects can be considered 'not significant'.

3.3 Construction Phase Plant Emissions

Emissions from non-road mobile machinery (NRMM) / plant associated with the construction phase of the Proposed Development have been screened with reference to LAQM.TG(22) guidance[13].

4.0 Baseline Environment

4.1 Baseline Air Quality

Monitoring data collected prior to / subsequent of the COVID-19 pandemic (i.e. pre-2020 and post-2021) has been used to characterise the baseline environment, as pollutant concentrations monitored during 2020 and 2021 are expected to be atypical, and not representative of the local environment and have therefore not been considered as per guidance produced by Defra[14] and the IAQM Position Statement[17].

4.2 LAQM Review and Assessment

SMDC, in fulfilment of statutory requirements, has conducted an on-going exercise to review and assess air quality within their administrative area. The latest publicly available LAQM report for SMDC at the time of writing is the 2023 Annual Status Report[19] (ASR).

SMDC currently have two declared AQMAs within their administrative area. The closest of which, the Cellarhead AQMA, is located adjacent to the Site and is described as:

> *"The area encompasses the area known locally as the Cellarhead crossroads, which is a busy junction between the A52 and the A520. The AQMA extends 250m (A520) North, 230m South (A520), 480m East (A52) and 210m West (A52) of the junction."*

The Cellarhead AQMA was declared in 2019 for exceedences of the annual mean NO_2 AQAL at locations of relevant exposure. Reference should be made to Figure 1 for an illustration of the extents of the Cellarhead AQMA relative to the Site. Consideration has been given to the Cellarhead AQMA throughout this assessment.

4.3 Review of Air Quality Monitoring

4.3.1 Automatic Air Quality Monitoring

SMDC do not presently undertake any automatic monitoring within their administrative area.

The nearest Automatic Urban and Rural Network (AURN) automatic monitor is situated approximately 6km to the south-west of the Site (the 'Stoke-on-Trent A50 Roadside' AURN). Given the separation distance between this monitor and the Site and the differences in local characteristics, similar pollutant concentrations are not anticipated. Therefore, this source of data has not been considered.

4.3.2 Passive Diffusion Tube Monitoring

Passive NO_2 diffusion tube monitoring is currently undertaken by SMDC within the Site locale. Monitored concentrations / statistics for passive NO_2 diffusion tube locations in proximity to the Site were obtained from the SMDC 2023 Air Quality ASR[19] and the SMDC 2022 Air Quality ASR[20].

The details and results of the monitoring locations of relevance to the Site are presented in Table C and Table D respectively. All monitoring data presented has been ratified by SMDC. As discussed in Section 4.1, annual mean monitored concentrations during 2020 and 2021 have been discounted due to the COVID-19 pandemic and associated reductions in road traffic / road traffic emissions and monitored concentrations during that period.

[19] Staffordshire Moorlands District Council, Air Quality Annual Status Report 2023, July 2023.

[20] Staffordshire Moorlands District Council, Air Quality Annual Status Report 2022, September 2022.

Table C: Local NO_2 Diffusion Tube Monitoring Sites: Details

Site ID	Site Type	NGR (m)		Within AQMA?	Approx. Distance to Site (m)
		X	Y		
49	Roadside (A)	395811	347530	Yes	11
55	Roadside (A)	395754	347560	Yes	16
54	Roadside (A)	395732	347575	Yes	37
53	Roadside (A)	395727	347570	Yes	41
42A, 42B	Roadside (A)	395704	347562	Yes	64
39A, 39B	Roadside (A)	395702	347553	Yes	68
38A, 38B	Roadside (A)	395702	347548	Yes	69
56	Roadside (A)	395699	347577	Yes	70

Note:

(A) Roadside site defined by LAQM.TG(22) as: "*a site sampling typically within one to five metres of the kerb of a busy road*".

Table D: Local NO_2 Diffusion Tube Monitoring Sites: Results

Site ID	2022 Data Capture %	Annual Mean NO_2 Concentration (µg/m^3)				
		2016	2017	2018	2019	2022
49	99.7	- (B)	27.8	30	25.1	20.0
55	99.7	- (B)	- (B)	- (B)	32.1	27.1
54	73.1 (A)	- (B)	- (B)	- (B)	30.5	20.0
53	99.7	- (B)	- (B)	- (B)	41.9	32.0
42A, 42B	99.7	- (B)	41.2	40.7	42	34.6
39A, 39B	99.7	- (B)	48.2	42.1	42.7	35.0
38A, 38B	99.7	- (B)	47.9	42.3	42.5	35.3
49	99.7	- (B)	- (B)	- (B)	38.1	20.0

Notes:

(A) Data capture is below the 75% threshold required by LAQM.TG(22) guidance indicating a requirement for the data to be annualised. However, the SMDC 2023 Air Quality ASR indicates the DT54 dataset hasn't been annualised.

(B) Monitoring not completed during calendar year.

As shown in Table D, monitoring locations 53 / 42A, 42B / 39A, 39B / 38A, 38B exceeded the annual mean NO_2 AQAL (i.e. 40µg/m^3) in 2019. These locations are all situated within the extent of the Cellarhead AQMA and, therefore, elevated concentrations would be anticipated. The monitoring locations which recorded exceedences in 2019 are all placed adjacent to an area of queuing traffic associated with the Cellarhead crossroad junction. Diffusion tube locations 42A, 42B, 39A, 39B & 38A, 38B are also all located in a narrow section of street whereby there is anticipated to be a canyon affect, likely resulting in elevated pollutant concentrations from idling / queuing road traffic and associated emissions.

This is identified within SMDC's LAQM – Detailed Modelling Study report[21] as the cause of elevated emissions leading to the monitored exceedences, which states:

> *"Overall it suggests volume of traffic and congestion on the main junction of A52 Cellarhead Road, A52 Kingsley Road and A520 Leek Road are considered to be the key contributor to elevated levels of NO_2 annual mean concentrations within the AQMA."*

The monitoring locations closest to the Site, diffusion tubes 49 and 54, recorded a 2019 annual mean NO_2 concentration of 25.1µg/m^3 and 30.5µg/m^3, respectively, representing 62.8% and 76.3% of the AQAL, respectively.

It is noted that no monitoring locations within the Cellarhead AQMA exceeded the annual mean NO_2 AQAL (i.e. 40µg/m^3) in 2022. The monitoring locations closest to the Site, diffusion tubes 49 and 54, both recorded a 2022 annual mean NO_2 concentration of 20.0µg/m^3, representing 50% of the AQAL.

The empirical relationship given in LAQM.TG(22) states that exceedences of the 1-hour mean NO_2 AQAL is unlikely to occur where annual mean concentrations are <60µg/m^3. This indicates that an exceedence of the 1-hour mean AQAL was unlikely to have occurred at the above locations in between 2017-2019 and 2022.

4.4 Defra Mapped Background Concentrations

Defra maintains a nationwide model of existing and future background air quality concentrations[22] at a 1km grid square resolution which is routinely used to support LAQM requirements and air quality assessments. The data sets include annual average concentration estimates for NO_2, PM_{10} and $PM_{2.5}$ using a base year of 2018 (the year in which comparisons between modelled and monitoring are made).

The Defra mapped background concentrations for the base year (2019) and the earliest predicted opening year of the Proposed Development (2025) are presented in Table E.

All of the mapped background concentrations presented are "well-below" the respective annual mean AQALs.

Table E: Defra Mapped Background Pollutant Concentrations

Grid Square (X, Y) (m)	Year	Annual Mean Concentration (µg/m^3)		
		NO_2	PM_{10}	$PM_{2.5}$
395500, 347500	2019	9.4	10.3	6.9
	2025	7.5	9.6	6.3
AQAL		***40***	***40***	***20***

[21] Staffordshire Moorlands District Council, Detailed Modelling Study, December 2022.

[22] https://uk-air.defra.gov.uk/data/laqm-background-home.

Figure 1: Site Setting, LAQM Monitoring and Designation AQMA

5.0 Construction Phase Assessment

This section presents the potential air quality impacts and effects associated with the construction phase of the Proposed Development.

5.1 Road Traffic Screening Assessment

5.1.1 Construction Phase

Consideration of trip generation associated with the construction phase of the Proposed Development was not included as part of the Transport Statement[23].

Notwithstanding, given the short-term nature of the construction phase and the comparatively low volume of vehicle movements that will likely arise, it is unlikely that significant air quality effects from development related road traffic emissions during the construction phase will arise. Such potential effects have therefore been scoped out from requiring detailed assessment based on their assumed 'insignificant' effect in reference to the stated EPUK & IAQM guidance.

5.2 Emissions from Construction Phase Plant / NRMM

LAQM.TG(22) guidance[13] states that with the application of suitable control measures and site management, exhaust emissions from on-site NRMM are "*unlikely to make a significant impact on local air quality. In the vast majority of cases they will not need to be quantitatively assessed*".

As such, suitable control measures are provided in Section 7.0 and no further assessment is considered to be required.

6.0 Operational Phase Assessment

This section presents the potential air quality impacts and effects associated with the operational phase of the Proposed Development.

6.1 Road Traffic Screening Assessment

Traffic data used for screening purposes was sourced from the Transport Statement[23] submitted in support of the planning application, with further guidance and confirmation of trips provided by the appointed transport consultant to the applicant – Focus Transport Planning.

It is noted that a review of the Transport Statement and discussion with Focus Transport Planning indicates the Proposed Development is not anticipated to result in changes to existing vehicle speeds, or impact on / result in changes to overall timings of / absolute queue lengths on the surrounding local highway network. As referenced within the Transport Statement:

> *"The redevelopment proposals would upgrade the existing site access junction to adoptable standards with a proposed carriageway width of 5.5m and corner radii of 6m at its bellmouth connection onto Leek Road and new 'Keep Clear' carriageway markings. These markings are proposed in order to ensure that in the event of any queuing back of southbound traffic from the traffic signals, right turn manoeuvres into and out of the site are not blocked – this would ensure that vehicles turning right into the site do not block northbound movements along the A520 Leek Road."*

A review of the total vehicle TRICs output, as shown in Page 5 of Appendix TS4 of the Transport Statement, has been undertaken. The TRICs output indicates a total trip generation of 3.193 per dwelling. By multiplying this value by the number of proposed dwellings (9), a trip generation of 29 vehicles per day (rounded up from 28.7) is derived.

To calculate the total HDV trip generation, Page 7 of Appendix TS4 of the Transport Statement has been reviewed. The TRICS output for OVGs (Ordinary Goods Vehicles – defined as >3.5 tonnes in weight) indicates a total trip generation of 0.04 per dwelling. By multiplying this value by the number of proposed dwellings, a trip generation of 0.36 vehicles per day (i.e. <1 per day) is derived.

Confirmation of this approach was sought from Focus Transport Planning[24], whom confirmed:

> *"The TRICS data […] doesn't include any site outside the period 7am-7pm, so arguably the daily trip rate could be higher. However, given we're talking about a very specific use here, […] the nature of the use is that there will be very few additional movements outside of that period. […] add 10% to account for any potential movements outside those hours."*

Following this approach, the predicted trip generation associated with the Proposed Development is summarised in Table F.

[23] Focus Transport Planning, The Old Bowling Green, Leek Road, Cellarhead, Staffordshire, ST9 0JQ – Transport Statement, October 2023.

[24] Email communication between SLR Consulting Ltd and Focus Transport Planning, dated 14th December 2023.

Table F: Maximum Development Trip Generation

Scenario	AADT		
	All	LDVs	HDVs
Proposed Use	32 (A)	32 (A)	<1 (0.396)
EPUK & IAQM Screening Criteria (B)		**100**	**25**

Notes:
(A) Figures rounds up to the nearest whole number.
(B) Based upon areas *within an AQMA*.

As shown in Table F, the maximum generated trips are not predicted to exceed the relevant criteria, with the AADT values expected to further reduce once distributed onto the local road network. Effects associated with the operation of the Proposed Development can therefore be considered as 'insignificant' in reference to the stated EPUK & IAQM guidance and require no further consideration.

6.2 Site-Suitability Assessment

This section presents the potential air quality effects associated with the site-suitability assessment, for the purpose of identifying requirements for mitigation to be embedded into the scheme design.

6.2.1 NO_2 Fall-Off Assessment

An NO_2 fall-off with distance calculator tool[18] has been produced to assist LAQM practitioners by means of a simple equation which allows NO_2 monitored concentrations made at one distance from a road to be used to predict concentrations at a different distance from the same road. This calculator has been utilised in order to calculate predicted annual mean NO_2 concentrations at the building facade of the Site.

A review of suitable monitoring locations within the development locale indicates that there is one monitoring location in close proximity to the Site which would provide a suitable monitoring dataset; DT54 is located approximately 40m west of the Site (see Table C and Figure 1 for details). LAQM.TG(22) stipulates that the chosen monitoring location should be located on the same road from which you wish to calculate the fall off, and on the same side of the road to which the Proposed Development sits. This applies to DT54 which is located to the north of A52 Kingsley Road, matching that of the Site.

The DMRB[15] considers any receptor within 200m of a road source to be potentially affected by that operation. The nearest building façade associated with the Proposed Development is located a minimum of approximately 5.8m[25] from the kerbside of the A52 Kingsley Road. Therefore, road traffic emissions from vehicles on this link have the potential to result in impacts at the Site. As such, NO_2 annual mean monitored concentrations from DT54 have been considered as an input into the NO_2 fall-off with distance calculator tool.

In accordance with IAQM guidance[26], the measured NO_2 concentration at DT54 for 2019 has been applied for the NO_2 fall-off with distance calculation - as 2019 represents the most recent dataset available prior to the COVID-19 outbreak and associated lockdown effects on traffic volume and patterns. It is noted that the 2019 concentration at DT54 has been applied in lieu of the more recent 2022 concentration as a precautionary approach in respect of

[25] The 'Proposed Block Plan' drawing (reference: 23-124-02, dated 19/09/23) indicates the use of this building as a 'lounge'. As a precautionary approach, it has been assumed this building is representative of exposure to the annual mean AQAL as defined in Table B.

[26] IAQM, Use of 2020 and 2021 Monitoring Datasets, Version 1.0 (August, 2021).

maximum predicted annual mean NO_2 concentrations at the Site based upon the application of the 2019 concentration.

The background concentration entered into the NO_2 fall off assessment was obtained from the Defra background concentrations maps presented in Table E, corresponding to a 2019 base-year. Reference should be made to Table G for a summary of inputs to the NO_2 fall-off with distance calculator tool.

Table G: NO_2 Fall-off With Distance Calculator tool – Inputs

Parameter	Value
How far from the kerb was the monitored concentration?	1.4m (A)
How far from the kerb is the assessment receptor?	5.8m
What is the local annual mean background NO_2 concentration?	9.4µg/m^3
What is the measured annual mean NO_2 concentration?	30.5µg/m^3 (B)
Note: (A) As sourced from SMDC's 2022 Air Quality Annual Status Report, dated September 2022. (B) 2019 annual mean monitored concentration at DT54.	

Reference should be made to Figure 2 for presentation of this calculation and results of the NO_2 fall-off with distance calculator tool.

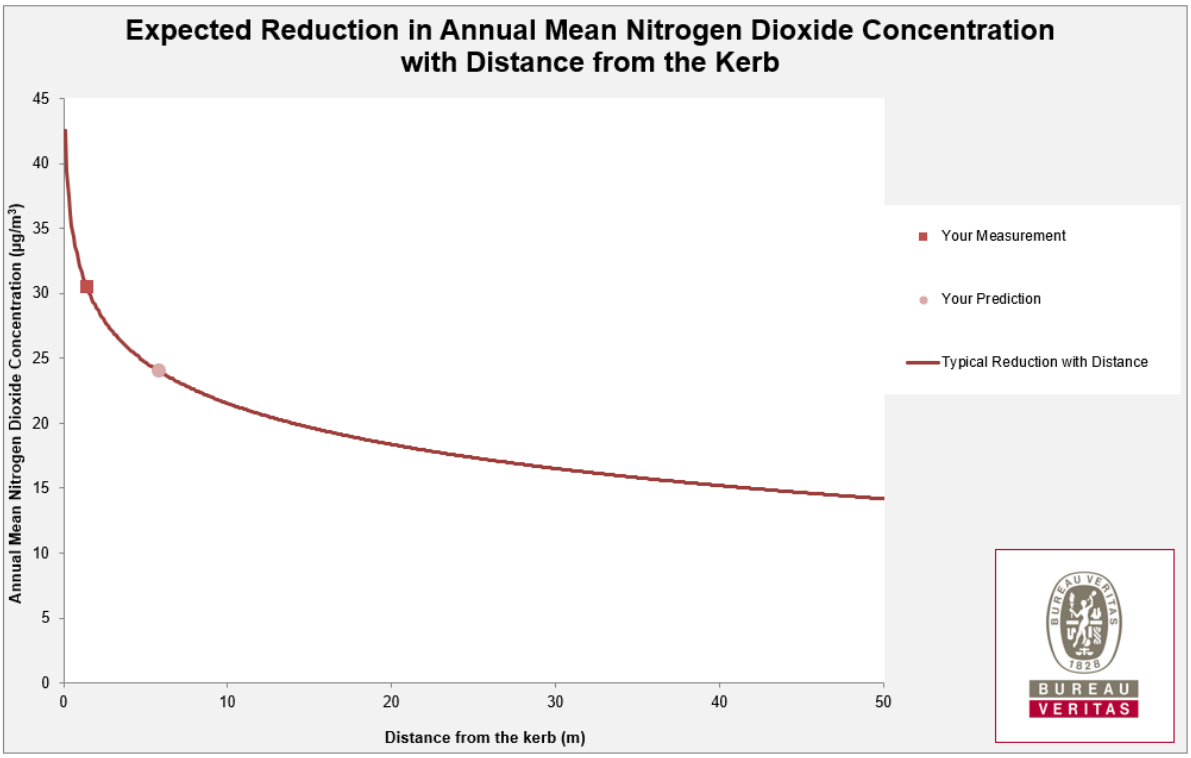


Figure 2: NO_2 Fall-off Assessment: Annual Mean NO_2 Concentration at Proposed Development Building Façade – Based on DT54, 2019 Annual Mean Concentration

The NO_2 fall-off with distance assessment presented within Figure 2 illustrates that the corresponding annual mean NO_2 concentration predicted at the location of the Proposed Development boundary is compliant with the annual mean NO_2 AQAL (predicted concentration is 24.0µg/m^3). All other on-Site locations of increasing stand-off distance are

anticipated to experience decreasing lower annual mean concentrations in accordance with the DMRB[15].

6.2.1.1 1-Hour Mean NO_2

A methodology is presented within LAQM.TG(22) to determine compliance with the 1-hour mean NO_2 AQAL. This guidance states that:

> *"[…] exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60µg/m^3."*

The NO_2 fall-off with distance assessment presented within Section 6.2.1 predicts a maximum annual mean NO_2 concentration of 24.0µg/m^3. Therefore, predicted concentrations are below the 60µg/m^3 indicative criterion at the Site and, in accordance with LAQM.TG(22) guidance, exceedences of the 1-hour mean NO_2 AQAL are considered unlikely.

6.2.2 Review of PM_{10} / $PM_{2.5}$ Monitoring / Modelling

A review of aerial imagery of the Site setting indicates there are considered to be no sources of dust that may affect amenity for future occupants of the Proposed Development. It is noted that there are existing uses of relevant exposure to the annual mean and 24-hour mean AQALs (as defined in Table B) in all directions to the Site. At these existing receptors, there are no PM_{10} / $PM_{2.5}$ AQMAs indicating no existing hotspot locations whereby annual mean or 24-hour AQALs may be exceeded.

The Site is not considered to be located near to a 'heavily trafficked road'. The closest A road (52 Kingsley Roda) is located approximately 5.8m south of the Site and has a 2022 AADT of 7,830 with a 4.84% proportion of HDVs[27]. Given the distance and relatively low traffic flow, it is not considered that road traffic emission contributions of PM_{10} and $PM_{2.5}$ from this A road will significantly impact upon concentrations at the Site (i.e. located within 200m).

Notwithstanding, a review of SMDC's LAQM – Detailed Modelling Study report[21] indicates that annual mean PM_{10} and $PM_{2.5}$ concentrations were predicted through a dispersion modelling study at locations within the Cellarhead AQMA for a 2019 baseline year. It is noted that receptors 12 and 13 within that report represent a worst-case approximation of the Site relative to the surrounding road network (i.e. receptors 12 and 13 are located north of Kingsley Road / east of A520 Leek Road). The conclusions of SMDC's LAQM – Detailed Modelling Study report in respect of 2019 PM_{10} and $PM_{2.5}$ concentrations state:

> *"All of the 23 discrete receptors are predicted to be well below the PM_{10} and $PM_{2.5}$ annual mean AQS objective limit of 40µg/m^3 and 25µg/m^3. The highest annual mean PM_{10} and $PM_{2.5}$ concentration was recorded at Receptor 13 with a PM_{10} concentration of 14.0µg/m^3 and a $PM_{2.5}$ concentration of 9.3µg/m^3, this is much lower than the annual mean AQS objective limit."*

Therefore, as referenced above, there are no predicted exceedences of the annual mean PM_{10} or $PM_{2.5}$ AQALs at any location within the SMDC's LAQM – Detailed Modelling Study report domain. Maximum absolute PM_{10} or $PM_{2.5}$ concentrations represented 35% and 46.5% of the AQALs, respectively.

It is noted that background concentrations[22] and road traffic emissions[28] are forecast to reduce year-on-year due to improvements in the vehicle fleet-mix, for example. Therefore, as the SMDC's LAQM – Detailed Modelling Study report predictions are based upon a 2019 base-year, and the Proposed Development is not anticipated to the completed and

[27] https://roadtraffic.dft.gov.uk/manualcountpoints/36561.

[28] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/.

operational until 2025, it is reasonable to conclude that absolute annual mean PM_{10} and $PM_{2.5}$ concentrations would be lower in 2025 in comparison to those predicted in 2019.

6.2.2.1 24-Hour Mean PM_{10}

For the prediction of short-term PM_{10}, LAQM.TG(22) provides an empirical relationship between the annual mean and the number of exceedences of the 24-hour mean AQAL for PM_{10} that can be calculated as follows:

> *No. 24-hour mean exceedances = -18.5 + 0.00145 × annual mean^3 + (206/annual mean)*

Based upon the maximum annual mean PM_{10} concentration predicted through the SMDC's LAQM – Detailed Modelling Study report (i.e. 14µg/m^3), this equates to zero days where 24-hour mean PM_{10} concentrations are >50µg/m^3. This is below the 35 permitted exceedences prescribed within the 24-hour mean AQAL.

6.2.3 Summary

Overall, the findings of the exposure assessment show the Site is suitable for the proposed residential use, and no further assessment is required. Effects associated with the likely exposure of future occupants in relation to NO_2, PM_{10} and $PM_{2.5}$ concentrations are considered to be 'not significant' in reference to the stated EPUK & IAQM guidance and no further mitigation measures are required.

7.0 Mitigation Measures

This section presents any proportionate mitigation measures required during the construction and operational phases of the Proposed Development.

7.1 Construction Phase Plant / NRMM Emissions

The following controls outlined within LAQM.TG(22) and IAQM guidance should apply to NRMM:

- Ensure all NRMM complies with the appropriate EU Directive Staged Emission Standard;
- Where feasible, ensure further abatement plant is installed on NRMM equipment, e.g. Diesel Particulate Filters (DPFs);
- Ensure all vehicles switch off their engines when stationary – no idling vehicles;
- Where possible, avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment; and
- Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided).

Successful implementation of the above mitigation measures, which should be secured by planning condition, would ensure that emissions from the construction phase and NRMM used during construction are ‘not significant’.

7.2 Operational Phase

In accordance with the EPUK & IAQM guidance, road traffic impacts associated with the operation of the Proposed Development can be considered as having an ‘insignificant’ effect on local air quality. As such, long-term scheme-specific mitigation measures in relation to operational effects arising from road traffic emissions are therefore not considered to be necessary.

Furthermore, the site-suitability assessment has indicated no exceedences of any considered AQAL at the façade of Proposed Development / across the Site. Therefore, site-suitability effects are predicted to be ‘not significant’ and the Site is found to be suitable for residential purposes. On this basis, there is no requirement for any embedded mitigation measures.

8.0 Conclusions

SLR Consulting Ltd has been commissioned by Bagnall Heights Ltd to undertake an Air Quality Assessment to support the planning application for a Proposed Development comprising 9 additional care units (C2 use-class) and a communal lounge/office, on land known as The Old Bowling Green, Leek Road, Cellarhead.

8.1 Construction Phase

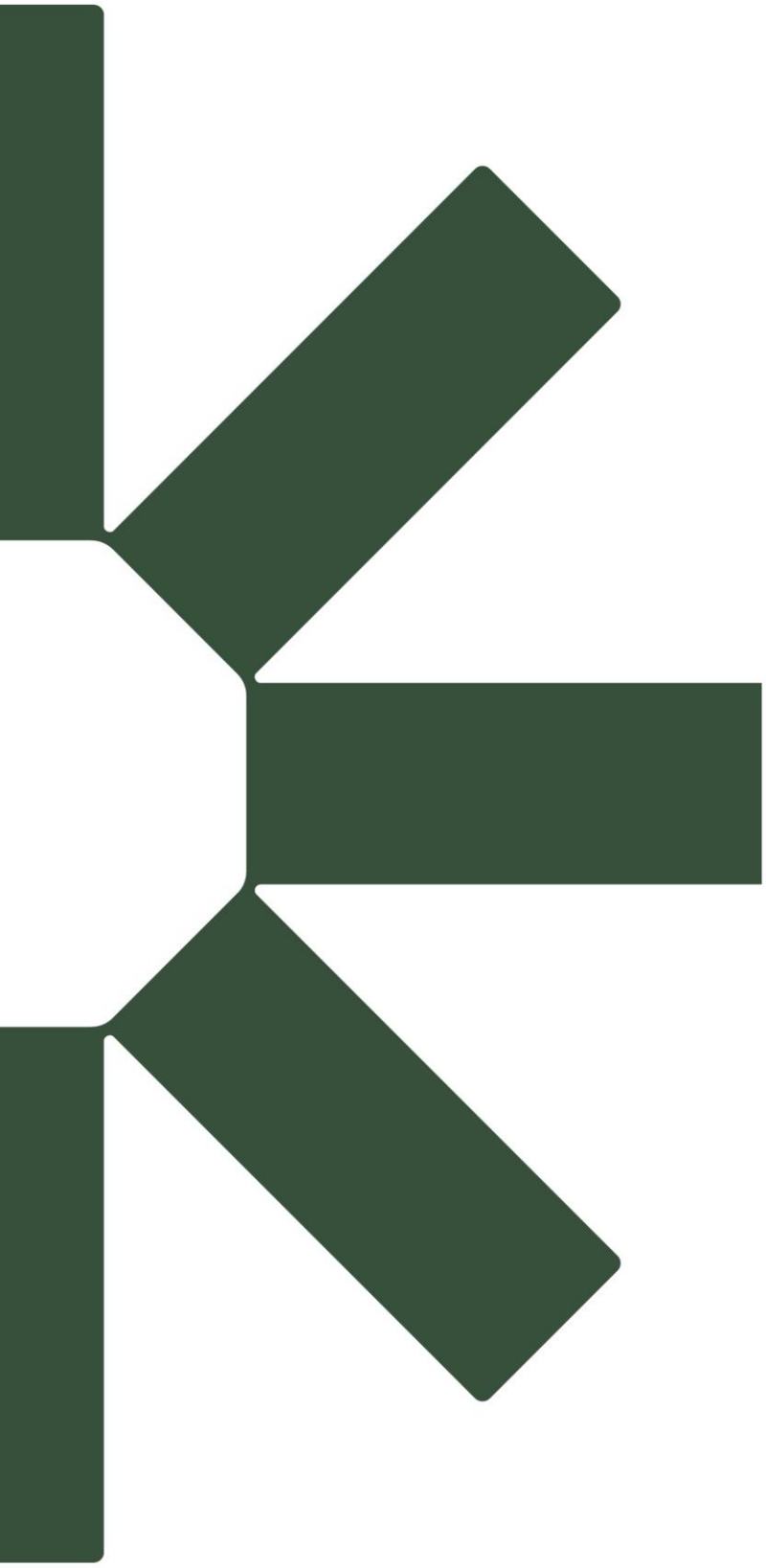
With the application of identified mitigation measures, emissions from plant / NRMM on-site are predicted to result in a 'not significant' impact on air quality.

Given the short-term nature of the construction phase and the comparatively low volume of vehicle movements that will likely arise, there is predicted to be an 'insignificant' effect on air quality from construction-generated road traffic emissions.

8.2 Operational Phase

A screening assessment for impacts on air quality from additional traffic movements associated with the operational phase of the Proposed Development has been undertaken using the IAQM & EPUK screening criteria. The maximum typical number of predicted development movements is below the relevant indicative criteria for assessment within an AQMA. Therefore, road traffic impacts associated with the operation of the Proposed Development can be considered as having a 'not significant' effect on local air quality and have, therefore, been screened out.

An assessment has been undertaken to assess the suitability of the Site for the proposed residential end use. Annual mean NO_2 concentration was quantified at the location of the Proposed Development, using the NO_2 fall-off with distance calculator approach. This calculation indicated no exceedences of annual mean NO_2 concentrations at the Site. There is also no predicted risk of exceedence of the 1-hour mean NO_2 AQAL at the Site. Furthermore, a review of modelling and monitoring data in the Site locale indicates no likely exceedences of the PM_{10} or $PM_{2.5}$ annual mean AQALs. There is also no predicted risk of exceedence of the 24-hour mean PM_{10} AQAL at the Site. Therefore, baseline NO_2, PM_{10} and $PM_{2.5}$ concentrations do not represent a development constraint or require embedded mitigation into the scheme design. The overall effect of onsite air quality, on future residents of the Proposed Development, is considered 'not significant' in accordance with current guidance.



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