



AIR POLLUTION SERVICES

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Air Quality Assessment: Land adjacent to A483, Llandrindod Wells

Date: 13 September 2023



Quality Assurance

Client: Morgan
Construction

Reference: APS_P1195A_A1-1

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Experts in Air Quality, Odour and Climate Change



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Location

- 2.3. The Proposed Development is located within the administrative area of PCC. The location of the Proposed Development is shown in Figure 2 and Figure 3.

Figure 2: Location of Proposed Development in relation to Local Authority Administrative Areas

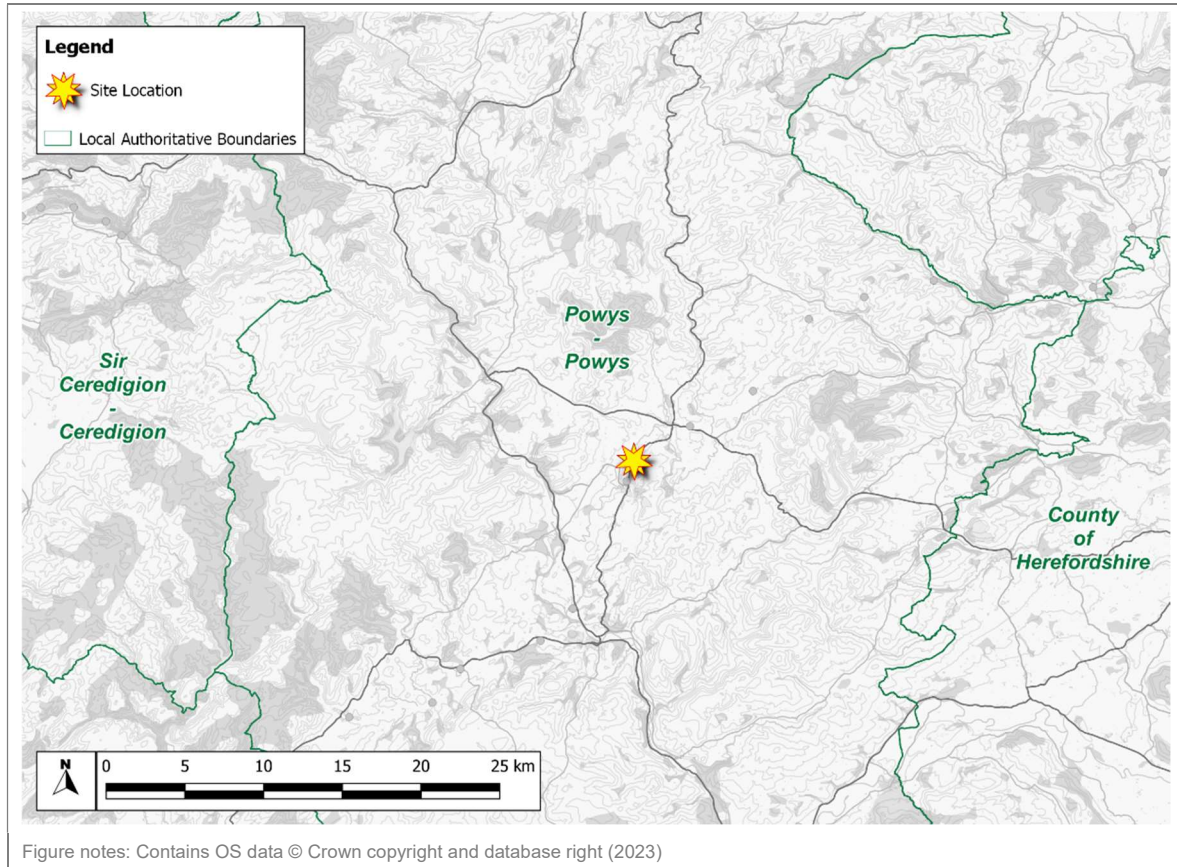


Figure 3: Site Location



Traffic Generation

- 2.4. Given the small scale of the Proposed Development, the traffic generation is considered to be minimal.

On-site Combustion Plant

- 2.5. No centralised on-site combustion plant is expected to be included in the Proposed Development.

Design for Air Quality

- 2.6. Professional guidance produced by Environmental Protection UK ([EPUK](#)) and the Institute of Air Quality Management ([IAQM](#)) (2017) is clear that it is important that proposed developments incorporate good design and best practice measures to ensure any impacts are minimised as far as practicable, even where pollutant concentrations are predicted to be below the relevant assessment thresholds. The Proposed Development includes the following good design and best practice measures by design:
- the Proposed Development is located within a highly urbanised area where there are many amenities, helping to minimise vehicle use; and
 - the Proposed Development is located close to bus stops and the London Underground, providing a number of different routes. These enable good access to sustainable modes of transport which help to minimise emissions.

3. Scope of assessment

In Scope of Assessment

- 3.1. The scope of assessment includes several elements, and this report is part of a series of documents addressing air quality and should be read in conjunction with the latest version of each document.
- 3.2. The scope and documents covered are set out below.
- Air Quality Policy/Legislation Context: Land adjacent to A483, Llandrindod Wells, APS_P1195A_C1-1 (Appended)
 - Air Quality Baseline Review: Land adjacent to A483, Llandrindod Wells, APS_P1195A_D1-1 (Appended)
 - Air Quality Site Suitability: Land adjacent to A483, Llandrindod Wells, APS_P1195A_I1-1 (Appended)
- 3.3. The pollutants of concern for human exposure are nitrogen dioxide (NO₂) and fine particulate matter (both PM₁₀ and PM_{2.5}).
- 3.4. Where considered, this report is an assessment of air quality at locations of human health exposure (i.e the quality of the air) which can be linked to health effects, however, it is not an assessment of the effect on human health from poor air quality or deposition to ground.

Screened out of Assessment

Road Traffic Impacts on Local Area

- 3.5. The screening criteria set out in the EPUK/IAQM guidance relating to road traffic are:
- A change of Light Duty Vehicle (LDV) flows of:
 - more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA)
 - more than 500 AADT elsewhere.
 - A change of Heavy-Duty Vehicle (HDV) flows of:
 - more than 25 AADT within or adjacent to an AQMA
 - more than 100 AADT elsewhere.
 - Where roads are realigned near to sensitive receptors and the change in alignment is 5 m or more and the road is within an AQMA. Applies to junctions that cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights, or roundabouts.
 - Where bus flows will change by:
 - more than 25 AADT within or adjacent to an AQMA
 - more than 100 AADT elsewhere.
- 3.6. The trip generation and road alignment associated with the proposed development is likely to be well below the threshold and therefore impacts are negligible and the need for a detailed assessment is screened out.

Not in Scope of Assessment

- 3.7. This report does not consider the following:
- Impacts on human exposure and sensitive ecological exposure in the local area due to effects during the construction phase, including dust soiling and dust emissions from construction works, pollutant emissions from Non-Road Mobile Machinery (NRMM), and pollutant emissions from construction related traffic.
 - Impacts on sensitive ecological exposure in the local area due to changes in road traffic associated with the Proposed Development during its operational phase, since there are not considered to be any national network site or nationally designated ecological sites in close proximity to the Proposed Development; and
 - Impacts on human exposure and sensitive ecological exposure in the local area due to pollutant emissions from on-site combustion plant associated with the Proposed Development during the operational phase. The Proposed Development is not anticipated to include any on-site combustion plant.
- 3.8. This report does not consider the impacts of air quality on the health implications associated with COVID-19, as there remains too much uncertainty at this stage to consider this explicitly.

4. Review of Baseline Air Quality

- 4.1. The baseline concentrations of pollutants are considered in relation to three separate types of criteria, covered by different legislation, policy, and guidance. These include Air Quality Objectives (AQOs), Limit Values (LVs) and World Health Organization (WHO) Guidelines (AQG) and Interim Targets (ITs).
- 4.2. The Proposed Development is not located within, or adjacent to, an AQMA; the closest is the Bargates AQMA located over 40 km east of the Proposed Development site.
- 4.3. A review of baseline conditions is set out in the appended document APS_P1195A_D1-1. A summary of the findings is out below.

Air Quality Objectives

- 4.4. There is little baseline information on air quality of direct relevance to the Development Site. There is no monitoring of NO₂, PM₁₀ or PM_{2.5} in the area.
- 4.5. Measured concentrations at the closest monitoring locations to the Proposed Development did not demonstrate any exceedances of the annual mean NO₂ AQO in 2019.
- 4.6. Predicted background concentrations of NO₂ and PM₁₀ in 2025 were below the AQGs of 10 µg/m³ and 15 µg/m³, respectively. Predicted background concentrations of PM_{2.5} adhered to WHO IT 4 (10 µg/m³) in 2025.
- 4.7. The annual mean concentration of PM₁₀ and PM_{2.5} at the Development Site are likely to be well below the AQOs.



Limit Value Compliance

- 4.8. There is no information provided by Defra regarding compliance with the limit in the locality of the Proposed Development. However, based on the information available, it can be inferred that concentrations will be below the LVs.

World Health Organization Guidelines

- 4.9. Table 1 and Table 2 provide an indication of the baseline air quality at the Development Site in 2019 and the assessment year with respect to the WHO annual mean ITs and AQG.

Table 1: Indicative Achievement of Annual Mean WHO Guidelines / Interim Targets ($\mu\text{g}/\text{m}^3$) on the Development Site in 2019

Pollutant	IT1	IT2	IT3	IT4	AQG
NO ₂	✓	✓	✓	n/a	✓
PM ₁₀	✓	✓	✓	✓	✓
PM _{2.5}	✓	✓	✓	✓	x
Table notes: ? may achieve IT/AQG; x IT/AQG not achieved; ✓ IT/AQG achieved; n/a not applicable.					

Table 2: Indicative Achievement of Annual Mean WHO Guidelines / Interim Targets ($\mu\text{g}/\text{m}^3$) on the Development Site in 2025

Pollutant	IT1	IT2	IT3	IT4	AQG
NO ₂	✓	✓	✓	n/a	✓
PM ₁₀	✓	✓	✓	✓	✓
PM _{2.5}	✓	✓	✓	✓	x
Table notes: ? may achieve IT/AQG; x IT/AQG not achieved; ✓ IT/AQG achieved; n/a not applicable.					

5. Air Quality Site Suitability

- 5.1. The air quality at the Proposed Development has been considered for the year of 2025. Air quality at the Proposed Development has been assessed qualitatively utilising information from monitoring sites, taking account of traffic flows and background levels. Details of the assessment are set out in the appended document APS_P1195A_I1-1.
- 5.2. Predicted concentrations at the Proposed Development are expected to be well below the annual mean and short-term AQOs and LVs. No further mitigation measures are proposed for the Proposed Development for it to be compliant with the statutory thresholds.
- 5.3. Annual mean concentrations of NO₂ at the Proposed Development are expected to adhere to the AQL 2 (20 $\mu\text{g}/\text{m}^3$) in 2025. Annual mean concentrations of PM₁₀ at the Proposed Development are expected to adhere to the AQL 1 (15 $\mu\text{g}/\text{m}^3$) in 2025. Annual mean concentrations of PM_{2.5} are expected to adhere to the AQL 2 of (10 $\mu\text{g}/\text{m}^3$) in 2025.
- 5.4. Overall, the air quality impacts of local emissions sources on the Proposed Development will be 'not significant' in terms of compliance with AQOs and LVs. Nevertheless, it may be prudent to explore

any easy and practical opportunities to improve air quality for the future users of the Proposed Development, such as electric vehicle recharging provision.

6. Conclusion

- 6.1. The air quality impacts of the Proposed Development have been assessed. The air quality impacts have been found to be negligible and the effects 'not significant'.
- 6.2. Air quality for future users of the Proposed Development, at all relevant locations of sensitive air quality exposure, has been demonstrated to be suitable, with short-term mean concentrations below the regulatory standard throughout the Proposed Development.
- 6.3. Overall, the air quality effects are compliant with all regulatory standards and are judged to be 'not significant'.

7. Glossary

AADT	Annual Average Daily Traffic
APS	Air Pollution Services
AQG	Air Quality Guideline
AQMA	Air Quality Management Area
EPUK	Environmental Protection UK
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
IT	Interim Target
LDV	Light Duty Vehicle
NO₂	Nitrogen dioxide
NRMM	Non-Road Mobile Machinery
PCC	Powys County Council
PM₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM_{2.5}	Small airborne particles, more specifically particulate matter less than 2.5 micrometres in aerodynamic diameter
µg/m³	Microgrammes per cubic metre

8. References

EPUK/IAQM. (2017). *Land-Use Planning & Development Control: Planning For Air Quality*.

9. Professional Experience

Dr Austin Cogan, MPhys (Hons) PhD CEnv MEnvSc MIAQM

Austin is a Director and cofounder of Air Pollution Services, is a Chartered Environmentalist and has over 15 years' experience in environmental sciences. He has extensive experience of air quality, dust, and odour assessments, having been involved in hundreds of projects including residential and commercial developments, road schemes, airports, waste management processes, industrial processes, power generating facilities and agricultural facilities. This has included provision of expert witness services at several public inquiries and hearings. Austin has also supported many local authorities with Clean Air Zone studies (such as Bath, Bristol, Newcastle, Gateshead, North Tyneside and South Gloucestershire), Borough Plan modelling, microsimulation modelling and developing AQMAs and AQAPs. He has also contributed to multiple guidance documents, including DMRB and GLA evidence bases, and most recently IAQM's guidance on indoor air quality. Furthermore, Austin led the development of AirChecker, a bespoke air quality conveyancing search report, providing useful information on air quality to home and commercial property buyers and renters. Austin is also an international expert in the field of climate change, having monitored greenhouse gases globally. Austin gained two years' experience in scientific instrument design and spent four years' pioneering research in satellite observations of greenhouse gases and aerosols at the Space Research Centre, Leicester. Austin has worked with many international bodies, including NASA, JAXA, CNES and ESA, and published numerous scientific papers and presented at conferences both nationally and internationally. Additionally, he led the development of officially licensed quality assured observational meteorological data at APS, which is used regularly by most of the air quality and odour industry in the UK.

Elen Jones, BSc (Hons) AMEnvSc AMIAQM

Miss Jones is an Assistant Consultant at APS, having recently completed a BSc Geography degree at the University of the West of England (UWE). She is currently gaining experience in undertaking air quality assessments for planning and permit applications, local authority work, and indoor air quality.



AIR POLLUTION SERVICES

Experts in Air Quality, Odour and Climate Change



- Air Quality Assessments for Planning Applications
- Air Quality Neutral
- Pre-application Feasibility



- LAQM Support
- Feasibility Studies
- Local Plan Modelling



- Construction Dust
- Mineral Dust
- Dust Management



- Odour Risks
- Odour Modelling
- Odour Management



- Transport Schemes
- Industrial and Energy
- Agriculture and Waste



- EIA Air Quality Chapters
- Greenhouse Gas Assessments
- Climate Vulnerability



- Air Risk Assessments
- MCPD Permits
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- Litigation Services
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Air Quality Policy/Legislation Context: Land Adjacent to A483, Llandrindod Wells

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C1. Introduction

- C1.1. Air Pollution Services ([APS](#)), part of KALACO Group Ltd, has been commissioned by [Click or tap here to enter text.](#) the Client to assess the air quality impacts associated with the proposed development at Land adjacent to A483, Llandrindod Wells (herein the 'Proposed Development').
- C1.2. This document sets out the relevant air quality legislation (Section C2), national planning context (Section C3), and local planning context (Section 0), which are material considerations in determining planning applications.

C2. Air Quality Legislation

- C2.1. Relevant Air Quality Legislation is set out in Table 1.

Table 1: Relevant Air Quality Legislation

Legislation	Text
The Environment Act 1995	Part IV of The Environment Act requires the Government to produce an Air Quality Strategy. This must include standards and objectives for the protection of human health and ecosystems. It also sets out the requirements of the Local Air Quality Management (LAQM) regime.
Air Quality Regulations 2000 (SI 2000/98)	LAQM requires every authority to carry out regular reviews and assessments of air quality in its area to identify whether the air quality objectives (AQOs) have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA) and prepare an action plan which identifies appropriate measures to be introduced in pursuit of the objectives.
Air Quality (Wales) (Amendment) Regulations 2002 (SI 2002/3043)	The latest Air Quality Strategy was published in 2023 (Wales Assembly Government, 2023). It includes a list of pollutant limits (also known as AQOs) for use by local authorities when considering human health. These AQOs were incorporated into English legislation by the 2000 and 2002 Regulations. The Strategy also sets out the PM _{2.5} targets and interim targets set under the Environment Act 2021 (see below) and critical levels for the protection of ecosystems. The 2023 Strategy is a framework for local authorities which sets out a series of local and national actions that the government intend to facilitate.

Table 1: Relevant Air Quality Legislation

Legislation	Text
	The AQOs are policy targets often expressed as a maximum ambient concentration, for a specific averaging period, not to be exceeded, either without exception or with a permitted number of exceedances, within a specified timescale. To protect ecosystems critical levels and critical loads have been derived for different habitats. Exceedance of these values are used as an indication of the risk to the ecosystem. Critical loads are values of pollutants deposited onto a habitat below which significant effects do not occur. Critical levels are the concentrations of pollutants above which direct adverse effects on vegetation or ecosystems may occur.
Air Quality Standards Regulations 2010 (SI 210/1001) The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (SI 2020/1313)	In addition to the AQOs, the European Union (EU) has set limit and target values for the protection of human health and critical levels for the protection of ecosystems. These were transposed into UK legislation by the 2010 Regulations. The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 reduced the EU annual mean limit value for particulate matter (PM_{2.5}) from 25 to 20 µg/m³. Like the AQOs, the limit values, target values and critical levels are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedances allowed per year (if any) and a date by which it must be achieved. Some pollutants have more than one value covering different dates or averaging times.
Well-being of Future Generations (Wales) Act 2015	The Well-being of Future Generations (WFG) (Future Generations Commissioner for Wales, 2015) Act 2015 places seven well-being goals into law and requires public bodies to apply the sustainable development principle in a number of ways. This has led to the establishment of average population exposure to nitrogen dioxide being one of the Welsh Government's national indicators used to measure progress towards well-being goals. Consequently, regulations made under the WFG Act require public services boards to consider air quality when carrying out their statutory assessments of local well-being under the Act.
Environment (Wales) Act 2016	The Environment (Wales) Act 2016 sets out the sustainable management of natural resources in Wales, including a management framework that is based on evidence published in The State of Natural Resources Report (Natural Resources Wales, 2016) and delivered through the Natural Resource Policy (Welsh Government, 2017a). The Natural Resources Policy sets out the challenges and opportunities for managing Wales's natural resources sustainably, including reducing air pollution levels. This states that a mix of actions will be needed to address pollution from traffic and other sources and will require taking practical steps to improve air quality across Wales, not just in the most polluted hotspots.
Environment Act 2021 Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023/96)	This Act requires the Secretary of State to set a long-term target (defined as no less than 15 years after the date on which the target was set) to reduce people's exposure to PM_{2.5}. It also enables the Secretary of State to set other air quality targets, including for other air pollutants. The targets are an annual mean of 10 µg/m³ by 2040 together with a 35% exposure reduction target by 2040 compared to 2018. The 2023 Regulations set these targets in legislation. The Secretary of State must prepare an Environmental Improvement Programme (EIP) and produce an annual report on the implementation of the EIP, including progress towards meeting the targets. Every five years the EIP must be reviewed. The current EIP was published in 2023 (HM Government, 2023). This includes two interim targets to be achieved by the end of January 2028. These are an annual mean of 12 µg/m³ and an exposure reduction target of 22% compared to 2018.
Table notes: All legislation cited is available at legislation.gov.uk The Statutory Instrument (SI) number for Regulations is given in brackets.	

Useful Information

- C2.2. In addition, the 2020 coroners court case investigating a young girl's death in 2013 concluded that air pollution was a significant contributing factor to both the induction of the girl's asthma and the exacerbation of her symptoms, due to exposure in exceedance of World Health Organization (WHO)

guidelines for pollutants. This set a precedence to consider WHO guidelines when determining the potential for health impacts of air quality and has thus been considered when undertaking this assessment.

- C2.3. For the protection of semi-natural habitats, the United Nations Economic Commission for Europe (UNECE), under the auspices of the Convention on Long-range Transboundary Air Pollution (CLTAP), has adopted a series of critical levels above which adverse effect on ecosystems may occur, and critical loads below which harmful effects on sensitive ecosystems does not occur based on current knowledge. The critical loads are typically expressed as a range in recognition of their uncertainty.
- C2.4. The UK Government is a signatory of CLTAP and its protocols.

C3. National Planning Policy, Strategies and Action Plans

National Planning Policy

- C3.1. Relevant information on national planning policy is set out in Table 5 for context.

Table 2: National Planning Policy

Document	Content
Planning Policy Wales	Planning Policy Wales (PPW) sets out the Government's planning policies for Wales and how these are expected to be applied. To prevent unacceptable risks from air pollution, the PPW (Welsh Government, 2018) states that: <i>"When considering a scheme of enabling development, planning permission should be granted only where...the enabling development does not give rise to significant risks, for example residential development in the floodplain or significantly impact on air quality or soundscape",</i> <i>"In proposing new development, planning authorities and developers must, therefore: address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;</i> <i>not create areas of poor air quality or inappropriate soundscape; and</i> <i>seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes",</i> <i>"Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission", and</i> <i>"Development should prevent problems from occurring or getting worse such as the generation of carbon emissions, poor air quality and waste and the depletion of our natural resources which will need to be managed for many years to come".</i>
Future Wales	In September 2020 the Minister for Housing and Local Government laid the draft National Development Framework (NDF) in the Senedd for a 60-day scrutiny period. The documents laid in the Senedd included a 'Schedule of Changes' report, which identifies the changes the Minister intends to make to the draft NDF that was consulted on in 2019. The Schedule of Changes is the formal submission to the Senedd of the Minister's intended changes. The document is a Working Version of the NDF and was prepared in September 2020 to assist the Senedd's scrutiny of the NDF. It has not been laid in the Senedd. The Working Version has been prepared prior to Senedd scrutiny. It is not a new or final version of the NDF. It contains drafting notes, was prepared at a specific point in the NDF process to assist scrutiny and is a working document. The document will change following Senedd scrutiny, and it must not be used as a source of policy.

Table 2: National Planning Policy

Document	Content
	The national plan 2040 is the national development framework, setting the direction for development in Wales to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of our communities. It includes one policy that refers to air quality (Welsh Government, 2020): Policy 12 – Regional Connectivity Developing infrastructure responsibly <i>“Planning Policy Wales contains the planning policy framework for addressing air quality, soundscape and noise. When proposing new transport infrastructure or new development, average population exposure to air and noise pollution should be reduced and soundscapes improved where it is practical and feasible to do so. At the very least, exposure to pollution should be minimised. This will include taking into account the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment arising as a result of proposals for transport infrastructure or development”.</i>
Table notes: -	

Relevant Government Strategies

- C3.2. The Government has also published a number of strategies and plans which relate to air quality. The most relevant strategies and plans are set out in Table 3.

Table 3: Government Strategies

Strategy	Relevant Information
Prosperity for All: the national strategy (Welsh Government, 2017b)	In 2017 the Welsh Government published ‘Prosperity for All: the national strategy’ (Welsh Government, 2017b) which sets out a cross-government commitment to reducing emissions and delivering vital improvements in air quality through planning, infrastructure, regulation, and health communication measures.
Clean Air Strategy (Defra, 2019a)	The strategy focuses on reducing emissions of nitrogen oxides (NO_x), ammonia (NH₃), particulate matter (PM), non-methane volatile organic compounds (NMVOCs) and sulphur dioxide (SO₂). For particulate matter the emission reduction targets are 30% by 2020, and by 46% by 2030 and for NO_x 55% by 2020 and 735 by 2030 all from a 2005 baseline. This strategy sets out the aim for new enforcement powers at a national and local level, across all sectors of society and sets out the comprehensive action that is required from government and society to meet these targets. The strategy includes actions to reduce emissions from transport (including road, maritime, rail, aviation and NRMM, homes, farming and industry). <i>“New legislation will create a stronger and more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem”.</i>
A green future: our 25-year plan to improve the environment (HM Government, 2019)	This 25-year environmental plan sets out the government’s long-term plans to improve the environment within a generation. This includes the first goal ‘Clean air’ where the government states, “we will achieve clean air by: • Meeting legally binding targets to reduce emissions of five damaging air pollutants. This should halve the effects of air pollution on health by 2030. • Ending the sale of new conventional petrol and diesel cars and vans by 2040. • Maintaining the continuous improvement in industrial emissions by building on existing good practice and the successful regulatory framework”.

National Air Quality Plan. (Defra and Department for Transport, 2017) and (Defra and Department for Transport, 2018)	Defra and the Department for Transport's plan describes how the UK will comply with the annual mean Nitrogen Dioxide (NO ₂) limit values. Alongside a package of national measures, the Plan requires those English Local Authorities (or the GLA in the case of London Authorities) that are predicted to have exceedances of the limit values beyond 2020 to produce local plans by December 2018. These plans must have measures to achieve the statutory limit values within the shortest possible time and may include the implementation of a charging Clean Air Zone (CAZ).
Clean Growth Strategy (HM Government, 2018)	This strategy focuses on reducing the UK's carbon footprint, but also contains several policies and proposals that will also improve relate to air quality, including: • End the sale of new conventional petrol and diesel cars and vans by 2040 (subsequently brought forward to 2030) • Spend £1 billion supporting the take-up of ultra-low emission vehicles (ULEV), • Develop the electric vehicle charging network • Accelerate the uptake of low emission taxis and buses by: • Work with industry to accelerate the transition to zero emission vehicles • Announce plans for the public sector to lead the way in transitioning to zero emissions vehicles • Invest £1.2 billion to make cycling and walking the natural choice for shorter journeys • Work to enable cost-effective options for shifting more freight from road to rail, including using low emission rail freight for deliveries into urban areas, with zero emission last mile deliveries • Delivering trials of Heavy Goods Vehicle (HGV) platoons, which could deliver significant fuel and emissions savings.
Road to Zero (DfT, 2018)	This paper outlines how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper confirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040 (subsequently brought forward to 2030), and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by 2040, and that by 2050 almost every car and van should have zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030. It sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. If these ambitions are realised then road traffic-related NO_x emissions can be expected to reduce significantly over the coming decades.
Transport Decarbonisation Plan (2021)	More recently, the Department for Transport (DfT) published a Transport Decarbonisation Plan (2021), which states: <i>"new diesel and petrol cars and vans would no longer be sold from 2030, and that all new cars and vans must be fully zero emission at the tailpipe from 2035"</i> This brings the dates significantly forward from the DfT Policy Paper.
The Ten Point Plan for a Green Industrial Revolution (HM Government, 2020)	This sets out how the UK intends to achieve its vision for a cleaner, healthier, net zero carbon future. The focus is on the following ten points: • Point 1 Advancing Offshore Wind • Point 2 Driving the Growth of Low Carbon Hydrogen • Point 3 Delivering New and Advanced Nuclear Power • Point 4 Accelerating the Shift to Zero Emission Vehicles • Point 5 Green Public Transport, Cycling and Walking • Point 6 Jet Zero and Green Ships • Point 7 Greener Buildings • Point 8 Investing in Carbon Capture, Usage and Storage



	• Point 9 Protecting Our Natural Environment • Point 10 Green Finance and Innovation
Table notes: -	

Relevant Government Guidance

C3.3. Relevant information on government guidance is set out in Table 5 for context.

Table 4: Local Planning Policy and Strategy

Document	Content
TAN 11 (Draft): AIR QUALITY, NOISE AND SOUNDSCAPE	The draft Technical Advice Note (TAN) 11 (Welsh Government, 2022) sets out general expectations and requirements for developers, designers, consultants and planning authorities regarding airborne pollution. It provides advice on how the planning system can be used to minimise impact of noise without placing unreasonable restrictions on development. It outlines some of the main considerations which local planning authorities should take into account in drawing up development plan policies and when determining planning applications for development which will either generate air pollution or be exposed to existing air pollution sources.
Table notes: -	

C4. Local Planning Policy, Strategies and Action Plans

Local Planning Context

C4.1. Relevant information on local planning policy, strategy and guidance is set out in Table 5 for context.

Table 5: Local Planning Policy and Strategy

Document	Content
Powys County Council (PCC) Local Plan 2011-2026 (PCC, 2017)	The Local Plan (2017) sets out the Council's framework to work towards sustainable development. The Document includes strategic issues surrounding the move to a net zero carbon economy, and detailed environmental issues which stem from development. Policy DM2 – The Natural Environment states that: <i>"In order to assess the acceptability of a development proposal against the criteria of Policy DM2, proposals which would be likely to result in increased nutrient loading to the environment, such as intensive livestock units, will be required to assess the potential impacts in respect of water and air quality, to ensure that they do not adversely affect these natural and semi natural environments".</i> Policy DM13 – Design and Resources: <i>"Development must respect the existence and amenities of neighbouring uses including approved development. These amenities include... air quality".</i> Policy DM14 – Air Quality Management states that development proposals may only be allowed where any resultant air pollution does not cause or lead to an acceptable risk of harm to human health or the natural environment: <i>"Proposals will need to demonstrate that measures can be taken to overcome any significant adverse risk, with particular attention being paid to:</i> <i>1. National Air Quality Strategy objectives and any Air Quality Management Areas.</i> <i>2. The critical levels for the protection of habitats and species within a European site or Site of Special Scientific Interest in accordance with Policy DM2".</i>
Table notes: -	

Local Air Quality Action Plan

- C4.2. PCC declared an AQMA along New Road, Newtown, for exceedances of annual mean NO₂ AQOs in 2008. The AQMA was revoked in 2017, consequently, PCC has not published an Air Quality Action Plan (AQAP).

C5. Glossary

APS	Air Pollution Services
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
CAZ	Clean Air Zone
CLTAP	Convention on Long-range Transboundary Air Pollution
DfT	Department for Transport
EIP	Environmental Improvement Programme
EPR	Environmental Permitting (England and Wales) Regulations
EU	European Union
LAQM	Local Air Quality Management
NDF	National Development Framework

NH₃	Ammonia
NMVOC	Non-Methane Volatile Organic Compound
NO₂	Nitrogen dioxide
NO_x	Nitrogen oxides
PCC	Powys County Council
PM₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM_{2.5}	Small airborne particles, more specifically particulate matter less than 2.5 micrometres in aerodynamic diameter
PPW	Planning Policy Wales
SO₂	Sulphur Dioxide
TAN	Technical Advice Note
ULEV	Ultra Low Emission Vehicles
UNECE	United Nations Economic Commission for Europe
WFG	Well-being of Future Generations
WHO	World Health Organization

C6. References

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Air Quality Baseline: Land adjacent to A483, Llandrindod Wells

Client: Morgan Construction **Reference:** APS_P1195A_D1-1 **Date Published:** 24 August 2023

Rev.	Date	Description	Prepared	Reviewed	Authorised
01	24/08/2023	Issued	EJ	AC	AC

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D1. Introduction

- D1.1. Air Pollution Services (APS), part of KALACO Group Ltd, has been commissioned by the Client to assess the air quality impacts associated with the proposed development at Land adjacent to A483, Llandrindod Wells, Wales (herein the 'Proposed Development').
- D1.2. This document sets out the air quality baseline conditions including the methodology (Section D2), air quality zones (Section D3), concentrations of nitrogen dioxide (NO₂) (Section D4), concentrations of particulate matter less than 10 micrometres in diameter (PM₁₀) (Section D5), concentrations of particulate matter less than 2.5 micrometres in diameter (PM_{2.5}) (Section D6), other sources of air pollution (Section D7), the overall baseline conditions (Section D8), and a glossary of useful terms used within the assessment (Section D9).

D2. Methodology

- D2.1. A baseline air quality review was undertaken to determine the existing air quality in the vicinity of the site. This desk-top study was undertaken using the following sources:
- Aerial photography from Google Satellite.
 - Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority and where available other monitoring networks. This covers both the application site (if there is any) and the surrounding area, the latter being used to provide context to the assessment.
 - Industrial and waste management sources that may affect the area have been identified using the UK Pollutant Release and Transfer Register (PRTR) (Defra, 2022). Local sources have also been identified through examination of maps and the Council's Air Quality Review and Assessment reports (PCC, 2020).
 - Background concentrations of NO₂, PM₁₀ and PM_{2.5} have been defined using the national pollution maps published by Defra (2023a). These cover the whole of the country on a 1x1 km grid of average concentrations.

- Predicted roadside concentrations of NO₂ in the study area have been identified using the maps of roadside concentrations published by Defra (2022b) as part of its 2017 Air Quality Plan for the baseline year 2015 and for the future years 2017 to 2030. These maps are used by the UK Government, to report exceedances of the Limit Value (LV). The national maps of roadside PM₁₀ and PM_{2.5} concentrations (Defra, 2023c), which are available for the years 2009 to 2015, show no exceedances of the LVs anywhere in the UK in 2015.

D2.2. Baseline information is only provided for pollutants that may be affected by or affect the Proposed Development.

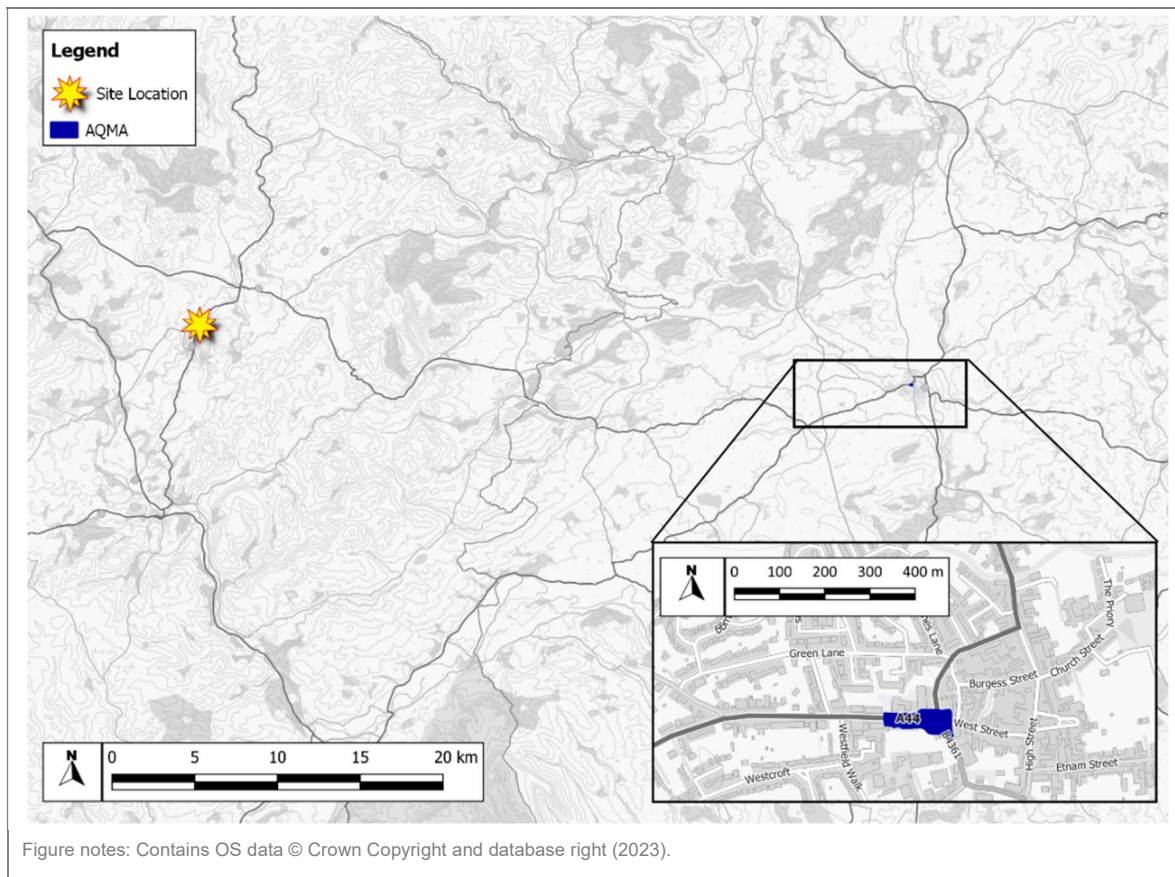
D3. Air Quality Zones

D3.1. There are no declared Clean Air Zones (CAZ), Air Quality Focus Areas (AQFAs), Low Emission Zones (LEZs), Ultra Low Emission Zones (ULEZs), or Non-Road Mobile Machinery (NRMM) Zones within the study area.

AQMA

D3.2. Powys County Council (PCC) does not have a declared Air Quality Management Area (AQMA) within the county. The closest AQMA to the Proposed Development is the Bargates (Leominster) AQMA, located approximately over 40 km east of the Proposed Development, as shown in Figure 1.

Figure 1: Location of the Proposed Development in relation to the Bargates AQMA



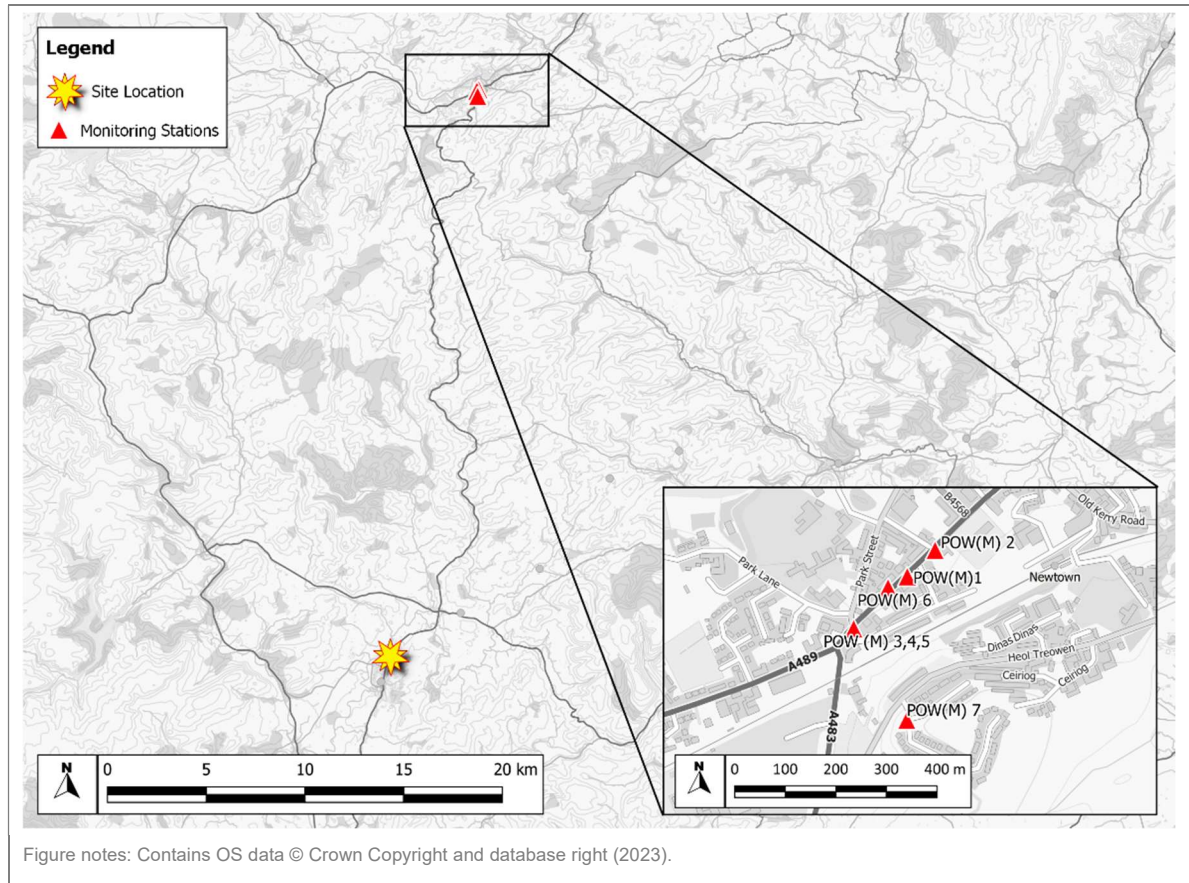
D4. Nitrogen Dioxide

Measurements

Monitoring Surveys

- D4.1. PCC measures NO₂ concentrations at two locations using passive monitors (diffusion tubes). The two monitors that are currently in use were implemented in 2020, data from 2020 is not considered to be representative of typical conditions due to restrictions associated with the COVID-19 pandemic.
- D4.2. The closest monitoring stations to the Proposed Development that were active in 2019 are located over 20 km north of the Proposed Development as shown in Figure 2. Data from 2015 to 2019 have been taken from the annual progress report for 2020 (PCC, 2020).
- D4.3. National Government measures concentrations of NO₂ at monitoring sites across the UK, as part of the Automatic Urban and Rural Network ([AURN](#)) regime. There are no National Government monitoring sites that measures NO₂ concentrations within the vicinity of the site.

Figure 2: Site Location and Monitoring Stations



Annual Mean

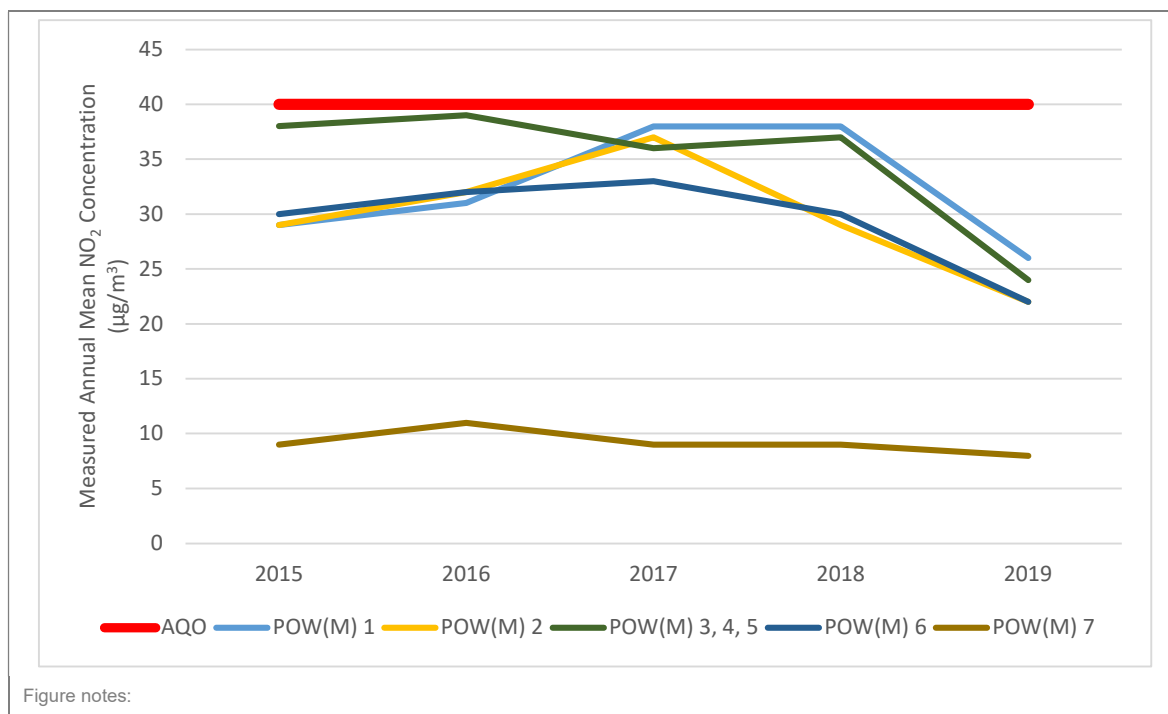
- D4.4. Measured annual mean NO₂ concentrations for the monitoring sites shown in Figure 2 are presented in Table 1. Measured NO₂ concentrations were below the Government's regulated air quality objective (AQO) of 40 µg/m³ at all monitoring sites in all years presented. Annual mean NO₂ concentrations met the World Health Organization (WHO) Interim Target (IT) 3 (30 µg/m³) at all sites in 2019 and met WHO IT 4 (20 µg/m³) at POW(M) 7 in 2019.

Table 1: Measured NO₂ Annual Mean Concentrations (µg/m³) ^a

Monitoring Site – Site Name (Type)	Distance from Road (m)	Network ^b	2015	2016	2017	2018	2019	2020 ^e
Diffusion Tube Monitoring - Annual Mean Concentrations (µg/m³)								
POW(M) 1	2	A	29	31	38	38	26	-
POW(M) 2	2	A	29	32	37	29	22	-
POW(M) 3, 4, 5	2	A	38	39	36	37	24	-
POW(M) 6	0	A	30	32	33	30	22	-
POW(M) 7	0	A	9	11	9	9	8	-
AQO			40					
LV ^c			40					
WHO AQG Level (IT 2, IT 3, IT 4) ^d			10 (40, 30, 20)					
Table notes:								
a. Concentrations above the AQO are presented in bold. These do not necessary represent relevant exposure nor exceedances of the AQO.								
b. A - Local Authority network, B – AURN.								
c. Reporting of LV exceedances is only carried out based on approved reference monitoring and at relevant reporting locations. Therefore, while the value is included, the monitoring presented is unlikely to comply with the requirements for LV reporting and assessment.								
d. Not required to be achieved within UK legislation.								
e. No data available.								

D4.5. There are no clear trends in the monitoring data. Although concentrations decreased between 2018 and 2019, as shown in Figure 3, a change over a short period cannot be determined to be a trend.

Figure 3: Measured NO₂ Concentrations between 2015 and 2019



Predicted Concentrations

Defra Predicted Background Mapped Concentrations

- D4.6. Ambient background concentrations of NO₂ have been defined using the national pollution maps published by Defra (Defra, 2023a). These cover the whole of the country on a 1x1 km grid for each year from 2018 until 2030.
- D4.7. Concentrations for 2019 and 2025 have been extracted for the grid cell that covers the Proposed Development. All predicted background concentrations are well below the AQOs and LV in 2019 and 2025, as shown in Table 2. With respect to the WHO Interim Targets in 2025, the pollutant concentrations are below the Air Quality Guidelines (AQG) (10 µg/m³) for NO₂.

Table 2: Defra Predicted Background Mapped NO₂ Concentrations (µg/m³)

Year	Application Site
2019	4.4
2025	3.5
AQO	40
LV	40
WHO AQG Level (IT 2, IT 3, IT 4) ^a	10 (40, 30, 20)

Table notes:

a. Not in Regulations and there is no legal requirement for local authorities to meet it.



Defra Predicted Roadside Concentrations

- D4.8. Defra has predicted roadside concentrations of NO₂ for the main roads in the UK (Defra, 2022b) for the years 2017 to 2030 as part of Defra's commitment to report exceedances of the LV. There are no predictions for roads within 200 m of the application site.

D5. Particulate Matter <10 micrometres (PM₁₀)

Measurements

Monitoring Surveys

- D5.1. PCC does not monitor for PM₁₀.

Predicted Concentrations

Defra Predicted Background Mapped Concentrations

- D5.2. Ambient background concentrations of PM₁₀ have been defined using the national pollution maps published by Defra (Defra, 2023a). These cover the whole of the country on a 1x1 km grid for each year from 2018 until 2030.
- D5.3. Concentrations for 2019 and 2025 have been extracted for the grid cell that covers the Proposed Development and are shown in Table 3. All predicted background concentrations are well below the AQOs and LV in 2019 and 2025. With respect to the WHO Interim Targets in 2025, the pollutant concentrations are below the AQG (15 µg/m³) for PM₁₀.

Table 3: Defra Predicted Background Mapped PM₁₀ Concentrations (µg/m³)

Year	Application Site
2019	9.5
2025	8.8
AQO	40
LV	40
WHO AQG Level (IT 1, IT 2, IT 3, IT 4) ^d	15 (70, 50, 30, 20)
Table notes: a. Not in Regulations and there is no legal requirement for local authorities to meet it.	

Defra Predicted Roadside Concentrations

- D5.4. Defra has predicted roadside concentrations of PM₁₀ for the main roads in the UK (Defra, 2022b) for the years 2017 to 2030 as part of Defra's commitment to report exceedances of the LV. There are no predictions for roads within 200 m of the application site. Note, Defra has not predicted any exceedances of the LV throughout the UK.

D6. Particulate Matter <2.5 micrometres (PM_{2.5})

Measurements

Monitoring Surveys

- D6.1. PCC does not monitor for PM_{2.5}.

Predicted Concentrations

Defra Predicted Background Mapped Concentrations

- D6.2. Ambient background concentrations of PM_{2.5} have been defined using the national pollution maps published by Defra (Defra, 2023a). These cover the whole of the country on a 1x1 km grid for each year from 2018 until 2030.
- D6.3. Concentrations for 2019 and 2025 have been extracted for the grid cell that covers the Proposed Development and are shown in Table 3. All predicted background concentrations are well below the AQOs and LV in 2019 and 2025. With respect to the WHO Interim Targets in 2025, the pollutant concentrations are below WHO IT 4 (10 µg/m³) for PM_{2.5}.

Table 4: Defra Predicted Background Mapped PM_{2.5} Concentrations (µg/m³)

Year	Application Site
2019	6.1
2025	5.6
AQO	40
LV	40
WHO AQG Level (IT 1, IT 2, IT 3, IT 4) ^d	5 (35, 25, 15, 10)
Table notes:	
a. Not in Regulations and there is no legal requirement for local authorities to meet it.	

Defra Predicted Roadside Concentrations

- D6.4. Defra has predicted roadside concentrations of PM_{2.5} for the main roads in the UK (Defra, 2022b) for the years 2017 to 2030 as part of Defra's commitment to report exceedances of the LV. There are no predictions for roads within 200 m of the application site. Note, Defra has not predicted any exceedances of the LV throughout the UK.

D7. Other Sources of Air Pollution

Permitted Facilities

- D7.1. Defra and the Devolved Administrations maintain a database of sites which are at risk of contributing significantly to pollutant concentrations, called the UK Pollutant Release and Transfer Register (Defra, 2022). A search of the 2020 database has not identified any regulated facilities within 1 km of the Proposed Development.

D8. Overall Baseline Conditions

Air Quality Objectives

- D8.1. There is little baseline information on air quality of direct relevance to the Proposed Development. There is no monitoring of NO₂, PM₁₀ or PM_{2.5} in the area.
- D8.2. Measured concentrations at the closest monitoring locations to the Proposed Development did not demonstrate any exceedances of the annual mean NO₂ AQO in 2019.
- D8.3. Predicted background concentrations of NO₂ and PM₁₀ in 2025 were below the AQGs of 10 µg/m³ and 15 µg/m³, respectively. Predicted background concentrations of PM_{2.5} adhered to WHO IT 4 (10 µg/m³) in 2025.
- D8.4. The annual mean concentration of PM₁₀ and PM_{2.5} at the Proposed Development are likely to be well below the AQOs.

Limit Value Compliance

- D8.5. There is no information provided by Defra regarding compliance with the limit in the locality of the Proposed Development. However, based on the information available, it can be inferred that concentrations will be below the LVs.

World Health Organization Guidelines

- D8.6. Table 5 and Table 6 provide an indication of the baseline air quality at the application site in 2019 and the assessment year with respect to the WHO annual mean ITs and AQG.

Table 5: Indicative Achievement of Annual Mean WHO Guidelines / Interim Targets (µg/m³) on the Application Site in 2019

Pollutant	IT1	IT2	IT3	IT4	AQG
NO ₂	✓	✓	✓	n/a	✓
PM ₁₀	✓	✓	✓	✓	✓
PM _{2.5}	✓	✓	✓	✓	x
Table notes: ? may achieve IT/AQG; x IT/AQG not achieved; ✓ IT/AQG achieved; n/a not applicable.					

Table 6: Indicative Achievement of Annual Mean WHO Guidelines / Interim Targets ($\mu\text{g}/\text{m}^3$) on the Application Site in 2025

Pollutant	IT1	IT2	IT3	IT4	AQG
NO ₂	✓	✓	✓	n/a	✓
PM ₁₀	✓	✓	✓	✓	✓
PM _{2.5}	✓	✓	✓	✓	x
Table notes: ? may achieve IT/AQG; x IT/AQG not achieved; ✓ IT/AQG achieved; n/a not applicable.					

D9. Glossary

AGQ	Air Quality Guideline
APS	Air Pollution Services
AQFA	Air Quality Focus Area
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
IT	Interim Target
LAQM	Local Air Quality Management
LEZ	Low Emission Zone
Limit Values (LVs)	Legally binding parameters that must not be exceeded. Limit values are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedances allowed per year, if any, and a date by which it must be achieved. Some pollutants have more than one limit value covering different endpoints or averaging times.
NO₂	Nitrogen dioxide
NRMM	Non-Road Mobile Machinery
PCC	Powys County Council
PM₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM_{2.5}	Small airborne particles, more specifically particulate matter less than 2.5 micrometres in aerodynamic diameter

PRTR	Pollutant Release and Transfer Register
ULEZ	Ultra Low Emission Zone
WHO	World Health Organization
µg/m³	Microgrammes per cubic metre

D10. References

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Air Quality Site Suitability: Land adjacent to A483, Llandrindod Wells

Client: Morgan Construction **Reference:** APS_P1195A_I1-1 **Date Published:** 13 September 2023

Rev.	Date	Description	Prepared	Reviewed	Authorised
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11. Introduction

11.1. Air Pollution Services ([APS](#)), part of KALACO Group Ltd, has been commissioned by Morgan Construction (the 'Client') to assess the air quality impacts associated with the proposed development at Land adjacent to A483, Llandrindod Wells, Wales (herein the 'Proposed Development'). The Proposed Development is located within the administrative area of Powys County Council ([PCC](#)).

11.2. This document sets out the site suitability of the Proposed Development with regards to air quality.

Location Context

11.3. The Proposed Development will introduce human health exposure to the application site. Future occupiers may be affected by both short-term and long-term exposure to air pollutants.

11.4. The main air quality concern regarding the suitability of the application site for future occupants is the combined effects of background pollutant concentrations and pollutant contributions from local roads.

12. Methodology

Guidance

12.1. The assessment has been carried out incorporating approaches set out in the following guidance.

Guidance on Land-Use Planning & Development Control: Planning For Air Quality

12.2. Environmental Protection UK ([EPUK](#)) in partnership with the Institute of Air Quality Management ([IAQM](#)) have produced guidance (2017) on Land-Use Planning & Development Control: Planning For Air Quality. EPUK and IAQM have produced this guidance to ensure that air quality is adequately considered in the land-use planning and development control processes. It provides a means of reaching sound decisions, having regard to the air quality implications of development proposals and provides guidance on how air quality considerations of individual schemes may be considered within the development control process, by suggesting a framework for the assessment.

LAQM Technical Guidance

- 12.3. Defra and the devolved administrations have published a guidance document on Local Air Quality Management (LAQM) – Local Air Quality Management Technical Guidance (LAQM.TG22) (Defra, 2022). This document is designed to support local authorities in carrying out their duties under the Environment Act 1995 and subsequent regulations. LAQM is the statutory process by which local authorities monitor, assess, and take action to improve local air quality. The Technical Guidance provides tools, approaches and technical information related to the assessment of air quality.

Approach Overview

- 12.4. The approach to determining site suitability considers two elements:
- Compliance with regulatory thresholds in the context of the planning regime; and
 - A review of the potential air quality health indicators.

Compliance with regulatory thresholds

- 12.5. The human-health related Air Quality Objectives (AQOs) and Limit Values (LVs) for the pollutants relevant to this project are detailed in Table 1.

Table 1: Air Quality Objectives and Limit Values

Pollutant	Time Period	Criteria Type	Concentration, and the number of exceedances allowed per year (if any)	Date AQO / LV to be Achieved From and Maintained After
Nitrogen Dioxide (NO ₂)	1-hour Mean	AQO / LV	200 µg/m ³ not to be exceeded more than 18 times a year	31 st December 2005 / 1 st January 2010
	Annual Mean	AQO / LV	40 µg/m ³	31 st December 2005 / 1 st January 2010
Fine Particles (PM ₁₀)	24-hour Mean	AQO / LV	50 µg/m ³ not to be exceeded more than 35 times a year	31 st December 2004
	Annual Mean	AQO / LV	40 µg/m ³	31 st December 2004
Fine Particles (PM _{2.5}) ^a	Annual Mean	AQO / LV	20 µg/m ³ / 25 µg/m ³	2020 / 2015
Table notes: a. Air Quality Objectives (AQOs) from the Air Quality Strategy; limit values from the Air Quality Standards Regulations.				

Air Quality Health Indicators

- 12.6. The World Health Organization (WHO) has recently revised its air quality guidelines (AQGs) and Interim Targets (ITs) (2021) for six pollutants, including PM₁₀, PM_{2.5} and NO₂. The air quality guidelines for these pollutants have become more stringent. Table 2 presents the WHO AQGs and ITs for the pollutants of concern.
- 12.7. In recognition of the difficulty of meeting the AQGs, a series of ITs are proposed by the WHO which should be considered steps towards ultimately achieving the AQGs, rather than as end targets. The WHO document aims to provide quantitative health-based recommendations for air quality management.
- 12.8. The guidelines are not legally binding standards; however, they should be used to inform legislation and policy. Ultimately, the goal of the guidelines is to help reduce the health burden resulting from

exposure to air pollution. Air pollution increases morbidity and mortality from cardiovascular and respiratory disease and from lung cancer and there is increasing evidence of effects on all other organ systems.

- 12.9. The WHO AQGs are based solely on the latest epidemiological evidence, whereas the AQOs and LVs were based on health evidence from the 1990s. They also take account of other factors such as the technical and economic feasibility of meeting the standard by a defined date.
- 12.10. It is more than 15 years since WHO published its last AQGs (2006). Over that period there has been a large increase in the evidence of health effects of air pollution. New epidemiological studies have shown adverse effects at much lower levels than had previously observed.
- 12.11. The WHO guidelines are not currently in Regulations and there is no legal requirement for local authorities to meet them. The Environment Act 2021 puts a duty on the Secretary of State to lay before Parliament an annual mean target for PM_{2.5} in ambient air before November 2022, although this has recently been postponed by Defra in a statement made to parliament (Defra, 2022).

Table 2: WHO Guidelines

Pollutant	Time Period	IT Levels				AQG Level
		1	2	3	4	
Nitrogen Dioxide (NO ₂)	1-hour Mean	-	-	-	-	200 µg/m ³
	24-hour Mean	120	50	-	-	25 µg/m ³
	Annual Mean	40	30	20	-	10 µg/m ³
Fine Particles (PM ₁₀)	24-hour Mean	150	100	75	50	45 µg/m ³
	Annual Mean	70	50	30	20	15 µg/m ³
Fine Particles (PM _{2.5})	24-hour Mean	75	50	37.5	25	15 µg/m ³
	Annual Mean	35	25	15	10	5 µg/m ³

Table notes: -

- 12.12. To review the potential for health effect due to air quality, consideration has therefore also been given to the 2021 WHO AQGs and ITs. As stated earlier, these thresholds are based solely on the latest evidence of health effects of air pollution.
- 12.13. WHO acknowledges that in many countries, including the UK, achieving the AQGs is difficult, and has set ITs to encourage the reduction in air pollution towards the AQGs. A pragmatic approach has been adopted for identifying an appropriate local level (IT or AQG) for this assessment based on the background concentrations in the local area in the assessment year. This is the level members of the public can reasonably expect to enjoy if away from local emission sources such as road traffic. The aim is to provide information of the level of exposure future users of the application site may experience.
- 12.14. The assessment carried out for the assessment is not suitable for assessing against the WHO short term ITs and there is currently no proxy method for assessment and therefore the focus is on the annual mean levels.
- 12.15. The risk to human health is assessed using the air quality in the first year of occupation of the proposed development based on the WHO AQG and ITs (World Health Organization, 2021).



Step 1 – Define AQLs

- 12.16. Table 3 provides descriptions and Air Quality Levels (AQLs) based on the WHO AQGs and ITs. The descriptors are in the context of current air quality in the UK and over time, as air quality improves, will need to be updated to drive reductions in air pollution.
- 12.17. For site suitability assessments accompanying outline planning applications it is recommended that the development AQL be based on the worst-case concentration at the site boundary. This will provide a conservative assessment. Further to this, understanding the spatial variation in concentrations across a site could then help inform the design for a detail full planning application. Where the development site includes areas which are clearly not potential locations for relevant exposure (i.e. buildings could not be erected in specific parts of the site) it may be appropriate to not use the concentration at the site boundary but rather the area where buildings could be located.
- 12.18. For site suitability assessments accompanying reserved matters planning applications it would be more appropriate to base the development AQLs on the concentrations at the worst-case building facades as indicated on the development site plan.
- 12.19. Two AQLs are identified for the first year of occupation of the development:
- **Background AQL** derived from the background concentrations in the 1km x 1km grid where the development is located (Defra, 2023)¹ or suitable local background monitoring data (with relevant forward projection). Where a development covers several grids or is close to the boundary of one with much lower concentrations, it would be prudent to use the highest background concentrations as a worst-case scenario or interpolating to be relevant to the site.
 - **Development AQL** derived from the predicted concentrations at the site, i.e. taking into account local sources of air pollution, such as the emissions from a nearby road. This would be at the site boundary (outline applications) or at the worst-case facade of the buildings on the site plan (detailed/full or reserved matters applications). This would include cumulative impacts, either through assumed traffic growth or the explicitly modelled traffic impact of other developments in the areas.

¹ Or equivalent background maps for the other nations.



Table 3: Future Air Quality Levels*

Pollutant	Concentrations (µg/m³)*	AQL	Description
NO ₂ **	≤10 µg/m³	1	Achieves WHO AQG.
	11-20 µg/m³	2	Achieves WHO IT3.
	21-30 µg/m³	3	Achieves WHO IT2.
	31-40 µg/m³	4	Achieves WHO IT1.
	>40 µg/m³	5	Exceeds regulatory thresholds. ***
PM _{2.5}	≤5 µg/m³	1	Achieves WHO AQG.
	6-10 µg/m³	2	Achieves WHO IT4.
	11-15 µg/m³	3	Achieves WHO IT3.
	16-20 µg/m³	4	Achieves WHO IT2.
	>20 µg/m³	5	Exceeds regulatory thresholds. ***
PM ₁₀	≤15 µg/m³	1	Achieves WHO AQG.
	16-20 µg/m³	2	Achieves WHO IT4.
	21-30 µg/m³	3	Achieves WHO IT3.
	31-40 µg/m³	4	Achieves WHO IT2.
	>40 µg/m³	5	Exceeds regulatory thresholds. ***
Note: * Concentrations should be rounded to the nearest whole number. ** For NO ₂ there is no WHO IT4. *** Regulatory thresholds refer to the limit values and air quality objectives.			

Step 2 – Define Risk

- 12.20. The difference between the development AQL and the background AQL along with the future AQL at the proposed development are used to assess the risk to the health of future occupiers of the site compared to exposure in the general wider area, as illustrated in Table 4.

Table 4: Health Risk for Future Occupiers of the Proposed Development

Future AQL at Proposed Development	Number of AQL changes in future year at site (i.e. Background AQL – Maximum AQL at Proposed Development) *				
	0	-1	-2	-3	-4
AQL 1	Negligible	**	**	**	**
AQL 2	Low	Medium	**	**	**
AQL 3	Medium	High	High	**	**
AQL 4	High	High	Extremely high	Extremely high	**
AQL 5	Extremely high	Extremely high	Extremely high	Extremely high	Extremely high
Notes: * The difference in Background Air Quality Level – Proposed Development Air Quality Level (see Table 3) ** The grey cells are non-feasible options					

Step 3 - Evaluation

- 12.21. Any proposed development where the future background is AQL 5, i.e. one or more of the regulatory thresholds will be exceeded, should be assessed as described in the section on compliance with regulatory thresholds. This is likely to only apply to a few areas of London where background NO₂ concentrations continue to exceed the thresholds.
- 12.22. Where sensitive development is located where the air quality is poor in the local context additional exposure reduction measures should be adopted to reduce the exposure. In this way future users of the development will be exposed to better air quality than without the additional exposure reduction measures. This is consistent with the WHO advice to use the ITs to drive improvement.
- 12.23. The additional measures may include designing the layout of the development to give a buffer between local sources of pollution and sensitive development, re-orientating buildings to put living rooms and bedrooms away from pollution sources, and the use of mechanical ventilation (which needs to be well maintained).
- 12.24. Air quality is forecast to improve in the future and therefore time is an important factor when considering the recommended exposure reduction measures to reduce the risk. Thus, if future occupiers will suffer exposure for one year the risk is different to exposure over, say, 10 years. If high levels of air pollution are forecast for many years, it may be that the site is not suitable for the proposed use or additional exposure reduction measures are required to reduce the health risk. Information on the rate of change in annual mean concentrations in the locality (e.g. from the local authority's annual status report), together with professional judgement, should be used to assess how long it will be before the development AQL will drop to the same level as the background AQL. For example, where the development predicted concentration is near the top of the AQL band then it is likely that it would take longer for an improvement in air quality to reach the next band down. Where the prediction is just above the lower threshold of the band there is potential for the next AQL to be achieved in a relatively short period.
- 12.25. Greater consideration as to whether a site is suitable, or not, should be given to those sites with increased risk of health effects for future users. Proposals which result in an unacceptable risk to health could be considered for refusal.



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- 12.26. Where the risk is assessed to be medium or above, all opportunities to improve air quality should be explored by the development and/or consultant, taking into account the risk of disbenefits of other environmental factors, such as the need to meet net zero emissions.
- 12.27. High and extremely high sites may not be suitable for the proposed land-use unless suitable exposure reduction measures are introduced to ensure appropriate exposure. This is particularly the case where a large number of people will be exposed and/or the people exposed are likely to be from deprived communities who tend to have a greater risk of poor health.
- 12.28. A proportionate health impact assessment is recommended for extremely high-risk sites, while it may also be beneficial for high risk sites in supporting a determination of significant effects on health. We recommend that this is reviewed by the local air quality and/or public health professionals.
- 12.29. The greatest level of risk from any pollutant should be used. However, exposure reduction measures are likely to be pollutant focused.
- 12.30. Any air pollution focused HIA should be reviewed by both air quality and public health officers of the local authority.

Relevant exposure

- 12.31. The locations of relevant exposure for each type of AQAL are set out in Table 5.

Table 5: Locations of relevant exposure

Receptor Locations	Relevant exposure
AQO	The annual mean AQO applies at locations where members of the public might be regularly exposed, such as building façades of residential properties, schools, hospitals, and care homes. The 24-hour mean AQO applies at the annual mean locations of exposure as well as at hotels and residential gardens. The 1-hour mean AQO applies at the annual mean locations of exposure and at hotels, residential gardens and any outdoor location where members of the public might reasonably be expected to spend one hour or longer, such as busy pavements, outdoor bus stations and locations with outdoor seating. Places of work like factories or offices are not considered places where members of the public might be regularly exposed and therefore the AQO's do not apply at these locations.
LV	In accordance with Article 2(1), Annex III, Part A, paragraph 2 of Directive 2008/50/EC detailed locations where compliance with the LVs does not need to be assessed: "Compliance with the limit values directed at the protection of human health shall not be assessed at the following locations: a) Any locations situated within areas where members of the public do not have access and there is no fixed habitation; b) In accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and c) On the carriageway of roads; and on the central reservation of roads except where there is normally pedestrian access to the central reservation". The government models compliance with the Directive at locations 4 m from the kerbside, 2 m high, more than 25 m from major road junctions and adjacent to at least 100 m of road length where the LVs apply.
WHO	The WHO criteria apply wherever there is relevant exposure in relation to each time period for each pollutant.
Table notes: n/a	

Impacts of Emissions Sources on the Development

12.32. The EPUK and IAQM guidance (2017) explains consideration should be given to:

- the background and future baseline air quality and whether this will be likely to approach or exceed the thresholds set by air quality objectives;
- the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular NO₂), that would cause unacceptably high exposure for users of the new development; and
- the presence and location of Air Quality Management Areas (AQMAS) as an indicator of local hotspots where the air quality objectives may be exceeded.

Annual Mean vs Short Term Impacts

12.33. The assessment focuses on annual mean concentrations, however, consideration in relation to compliance with the short-term regulatory thresholds is also provided.

12.34. Previous research carried out on behalf of Defra and the devolved administrations identified that, where road traffic is the dominate pollutant source, exceedances of the 1-hour mean NO₂ AQO are unlikely to occur where the annual mean is below 60 µg/m³ (Defra, 2022). Similarly, exceedances of the 24-hour mean PM₁₀ AQO are unlikely to occur where the annual mean is below 32 µg/m³. Where annual mean concentrations are below these levels the short-term impacts are considered negligible.



Planning Significance

- 12.35. The approach developed by EPUK and IAQM has been used. The guidance is that the assessment of significance should be based on professional judgement, with the overall air quality impact described as either 'significant' or 'not significant' (i.e. the site is suitable or not suitable for the proposed use).
- 12.36. In drawing the determination of significance, the following factors should be taken account of:
- the extent of future population exposure to any impacts;
 - the influence and validity of any assumptions adopted when undertaking the prediction of impacts; and
 - the judgement on significance relates to the consequences of the impacts; i.e. will they have an effect on human health that could be considered as significant?
- 12.37. The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the users of any new development where an AQO is not met will be judged as significant.

13. Site Suitability Assessment

- 13.1. The suitability of the site for future users has been considered. The existing conditions are based on various sources of information available as outlined in the air quality baseline document (APS_P1195A_D1-1). Air quality has been improving over the past decade, largely due to improvements in vehicle emissions, and is expected to continue to improve into the future, as old vehicles are replaced by new lower emission alternatives.
- 13.2. The Proposed Development is located in a rural area, adjacent to the A483, an arterial road through Llandrindod Wells. Contributions have been assessed qualitatively, using predicted and measured concentrations to inform the assessment. Background concentrations of pollutants and road traffic contributions have been considered.

Simple or Detailed Assessments

- 13.3. Completion of an air quality assessment can be conducted either by a simple or detailed assessment. Detailed assessments make use of atmospheric models to predict pollutant concentrations on local air quality. It should be noted that an exceedance of the criterion listed in Table 6.2 of the EPUK guidance does not constitute the requirement for a detailed assessment; the use of professional judgement in conjunction with sufficient evidence can be considered appropriate at times (Simple Assessment).
- 13.4. The guidance also outlines the content that should be included in an air quality assessment; this has been adhered to in this report.

Predicted Concentrations

NO₂

- 13.5. The Proposed Development is located in a rural area with the A483 running along the easternmost edge of the site boundary, and Ddole Road along the southern edge. Although there is no monitoring data for the local area, concentrations have been obtained for the closest monitoring



locations to the Proposed Development which have 2019 data available. In the absence of any more local information, the inclusion of these data in this report provides valuable information in terms of air quality context. Defra predicted background mapped concentrations of NO₂ (2023) were taken for the grid cell which covers the monitoring sites. The background concentrations were subtracted from the measured concentrations to provide a road contribution.

Table 6: Road Contribution of NO₂ in 2019

Monitor	Measured Concentration (µg/m ³)	Background Concentration (µg/m ³)	Difference (Road Contribution) (µg/m ³)
POW(M) 1	26	6.6	19.4
POW(M) 2	22	6.6	15.4
POW(M) 3, 4, 5	24	6.6	17.4
POW(M) 6	22	6.6	15.4
Table Notes: -			

- 13.6. When determining the road contribution at the Proposed Development, it is useful to consider the road contribution at the monitoring sites, with consideration given to the traffic flows along the roads.
- 13.7. Traffic data for 2019 was obtained from the Department for Transport's (DfT's) Road Traffic Statistics Database (2019) for the relevant roads in relation to the monitoring sites (Figure 1). Using the traffic flows, the contribution per singular vehicle (C) was calculated by dividing the concentration (A) by the AADT (B).

Figure 1: DfT Count Points and Monitoring Locations



Table 7: Per Vehicle NO₂ Contribution

Monitor	Road Contribution ($\mu\text{g}/\text{m}^3$)	AADT	Road Contribution per vehicle movement ($\mu\text{g}/\text{m}^3$) <i>C (A/B)</i>
POW(M) 1	19.4	16,811	0.001154006
POW(M) 2	15.4	16,811	0.000916067
POW(M) 3, 4, 5	17.4	16,811	0.001035037
POW(M) 6	15.4	16,811	0.000916067
Table Notes: -			

- 13.8. Traffic data for the closest available road to the Proposed Development was obtained from the DfT (2019) for 2019 (Figure 2). Using the highest per vehicle road contribution value (to provide a conservative approach), the predicted road contribution at the Proposed Development was calculated (D). This includes the assumption that vehicles driving past the monitoring sites have a similar fleet to those driving past the Proposed Development, which is considered appropriate.

Figure 2: DfT Count point and the Proposed Development Location



Figure notes: Imagery © 2023 Google, Map data © 2023.

- 13.9. Background concentrations at the Proposed Development have been taken from Defra's background maps, which cover the entire UK on a 1x1 km basis. Using the Defra mapped values, the background NO₂ concentration at the Proposed Development was predicted to be 4.4 µg/m³ in 2019. The annual mean AQO for NO₂ is 40 µg/m³, meaning that the contributions from road traffic would need to be a minimum of 35.6 µg/m³ to cause any exceedances.
- 13.10. The predicted road contribution has then been added to the predicted background concentration to derive the estimated total predicted concentration at the Proposed Development.
- 13.11. Table 8 shows the predicted concentration at the Proposed Development. The total predicted concentration of 12.3 µg/m³ is well below the AQO of 40 µg/m³.

Table 8: Predicted Annual Mean NO₂ Concentration at the Proposed Development

Road Name (DfT Count point)	AADT	Calculated Road Contribution (D) (µg/m ³)	Background Concentration (µg/m ³)	Total Predicted Concentration (µg/m ³)
A483 (20555)	6,832	7.9	4.4	12.3
Table Notes: -				

- 13.12. It is also worth noting that the monitors used in this report are located in an urban location, where the streetscape differs to that of the Proposed Development. The streetscape at the Proposed Development would allow for greater dispersion, as it is not as built up (less objects blocking air flow). Consequently, concentrations would likely be lower at the Proposed Development than calculated.



- 13.13. Defra's guidance (2022) states that exceedances of the NO₂ 1-hour mean AQO are unlikely to occur where the annual mean is below 60 µg/m³. The predicted concentrations at the Proposed Development are below this level and therefore it is unlikely that any short-term 1-hour mean exceedances of NO₂ will occur.

PM₁₀ and PM_{2.5}

- 13.14. PCC does not measure concentrations of PM₁₀ or PM_{2.5}, and there are no predicted roadside concentrations available from Defra and the Devolved Administrations. Background concentrations at the Proposed Development has been predicted by Defra and the Devolved Administrations in 2025 are 8.8 µg/m³ for PM₁₀ and 5.6 µg/m³ for PM_{2.5}. While it is likely that there will be a small concentration contribution from local road traffic, the contributions are highly unlikely to make concentrations reach the AQO levels of 40 µg/m³ and 20 µg/m³, for PM₁₀ and PM_{2.5} respectively.
- 13.15. Defra's guidance (2022) states that exceedances of the PM₁₀ 24-hour mean AQO are unlikely to occur where the annual mean is below 32 µg/m³. The predicted concentrations at the Proposed Development are highly likely to be below this level and therefore it is unlikely that any short-term 24-hour mean exceedances of PM₁₀ will occur.

Compliance with regulatory thresholds and statutory standards

Air Quality Objectives

- 13.16. Concentrations are predicted to be well below the annual mean NO₂ AQO at the Proposed Development and there are unlikely to be any exceedances of the short-term 1-hour mean AQO.
- 13.17. Concentrations are predicted to be well below the annual mean PM₁₀ AQO at the Proposed Development and there are unlikely to be any exceedances of the short-term 24-hour mean AQO.
- 13.18. Concentrations are predicted to be well below the annual mean PM_{2.5} AQO at the Proposed Development.

Limit Values

- 13.19. The application site boundary is over 4 m from the kerb of the local major roads (i.e. the location used for LV compliance reporting) and therefore reporting of LVs at the application site is not required. Furthermore, Defra and the Devolved Administrations have not predicted any exceedances of the LVs along roads close to the Proposed Development.
- 13.20. However, in recognition that LV apply anywhere members of the public can access, concentrations at the Proposed Development have been considered. The predicted concentrations at the Proposed Development is predicted to be well below the LVs. There is thus unlikely to be a breach of the LVs within the Proposed Development.

Mitigation Measures

- 13.21. No further mitigation measures are proposed.

Air Quality Health Indicators

- 13.22. Table 9 sets out the predicted background concentrations at the application site, the WHO level (IT or AQG) which the background concentration achieves, the maximum predicted concentration at

the application site, and the WHO level (IT or AQG) that is predicted to be achieved at the Proposed Development in 2025.

Table 9: 2025 Annual Mean Concentrations and Relevant WHO Levels

Pollutant	Background Concentrations * ($\mu\text{g}/\text{m}^3$)	Background AQL	Development Concentrations * ($\mu\text{g}/\text{m}^3$)	Development AQL	Change in AQL
NO ₂	4.4	1	12.3	2	-1 levels
PM ₁₀	8.8	1	8.8	1	0 levels
PM _{2.5}	5.6	2	5.6	2	0 level
Table note: Roadside contributions of PM could not be accounted for. However, due to the background level, it is unlikely that the contribution would be sufficient to change the AQAL.					

- 13.23. The Proposed Development is currently unoccupied and, thus, there is no existing exposure.
- 13.24. Table 9 shows that the Proposed Development will introduce exposure at AQL 2 for NO₂ and PM_{2.5} and at AQL 1 for PM₁₀, based on the estimation made.
- 13.25. Based on Table 9 the risk to the future occupiers of the Proposed Development, based on the considered sources of emission, is:
- Medium for NO₂;
 - Negligible for PM₁₀; and
 - Low for PM_{2.5}.
- 13.26. For NO₂, the site is anticipated to be one level behind the background AQL due to road emission sources. This may result in a slight risk to the future users' health compared to users of a site located away from local sources of pollution. It should, however, be recognised that the background achieves the WHO AQG. As air quality improves into the future due to national policy, the conditions at the application site will also improve and it is likely that much of the application site would achieve the WHO AQG within a short period.
- 13.27. There was limited air quality information regarding PM₁₀ and PM_{2.5} concentrations at the Proposed Development. The development concentrations are therefore considered similar to the background levels. Although roadside contributions were not predicted for PM due to a lack of data, it is unlikely that the contributions would cause a change in the AQL.
- 13.28. While the WHO guidelines are not statutory thresholds, as there are acknowledged non-threshold effects of the pollutants at any level, there is a small potential risk of adverse health effects due to exposure of future users of the Proposed Development, and it may be prudent to explore any easy and practical opportunities to improve air quality for the future users of the Proposed Development, although this Proposed Development is a low-risk site. On this basis the application site is considered to be reasonable in relation to the risk to health impacts and better than much of Wales.



14. Significance of the impacts of sources in the local area on sensitive human health exposure at the Proposed Development

- 14.1. The assessment has demonstrated that the future users of the Proposed Development will not be exposed to any exceedances of the AQOs or LVs.
- 14.2. The air quality for the future users of the Proposed Development, in relation to compliance with the regulatory thresholds and in the context of the planning regime, is judged to be 'not significant'. This professional judgment is made in accordance with the methodology and assessment criteria set out earlier in this document.
- 14.3. This judgment, without mitigation, takes account of the assessment that:
- the predicted concentration of NO₂ at Proposed Development is below the AQOs and LVs in 2019 and 2025; and
 - the Proposed Development is not located within or adjacent to an AQMA.

15. Summary

- 15.1. The air quality at the Proposed Development has been considered for the year of 2025.
- 15.2. Predicted concentrations at the Proposed Development are expected to be well below the annual mean and short-term AQOs and LVs. No further mitigation measures are proposed for the Proposed Development for it to be compliant with the statutory thresholds.
- 15.3. Annual mean concentrations of NO₂ at the Proposed Development are expected to adhere to the AQL 2 (20 µg/m³) in 2025. Annual mean concentrations of PM₁₀ at the Proposed Development are expected to adhere to the AQL 1 (15 µg/m³) in 2025. Annual mean concentrations of PM_{2.5} are expected to adhere to the AQL 2 of (10 µg/m³) in 2025.
- 15.4. Overall, the air quality impacts of local emissions sources on the Proposed Development will be 'not significant' in terms of compliance with AQOs and LVs. Nevertheless, it may be prudent to explore any easy and practical opportunities to improve air quality for the future users of the Proposed Development, such as electric vehicle recharging provision.

16. Glossary

APS	Air Pollution Services
AQG	Air Quality Guideline
AQL	Air Quality Level
AQMA	Air Quality Management Area
AQO	Air Quality Objective
DfT	Department for Transport
EPUK	Environmental Protection UK
IAQM	Institute of Air Quality Management

IT	Interim Target
LAQM	Local Air Quality Management
LAQM.TG22	Local Air Quality Management Technical Guidance
LV	Limit Value
NO₂	Nitrogen dioxide
PCC	Powys County Council
PM₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM_{2.5}	Small airborne particles, more specifically particulate matter less than 2.5 micrometres in aerodynamic diameter
PPW	Planning Policy Wales
TAN	Technical Advice Note
WHO	World Health Organization
µg/m³	Microgrammes per cubic metre

17. References

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