WIMBLEBURY ROAD, CANNOCK

AIR QUALITY TECHNICAL NOTE

Project	**Wimblebury Road, Cannock**		
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Introduction

BWB Consulting Ltd was appointed by Taylor Wimpey Strategic Land to undertake an air quality constraints assessment for a proposed residential development at land off Wimblebury Road, Cannock ("the Site"). Cannock Chase District Council (CCDC) has now confirmed it is progressing with its Local Plan to Regulation 19 Stage and are updating the Local Development Scheme.

The Site comprises two parcels of land east of Wimblebury Road, Cannock. **Figure 1** details the location of the proposed development. The north western parcel is proposed as an allocation under site reference SH2, and the south eastern parcel has been safeguarded for future development. This technical note has been prepared to consider both parcels of land.

A desktop review of the Site and the surrounding land was undertaken to identify any sources that may influence air quality and a review of local air quality monitoring and management data was undertaken. In addition, a preliminary detailed operational phase road traffic emissions exposure assessment was undertaken to predict pollutant concentrations across the Site to consider the exposure of future users to poor air quality.

This technical note is necessarily technical in nature, so to assist the reader, a glossary of air quality terminology can be found in **Appendix A**.

Site Setting

Allocated Land

To the north and east of the parcel of allocated land is currently agricultural land, with residential dwellings beyond. To the west of the Site is Wimblebury Road, with a school, residential dwellings and Old Brickworks Nature Reserve beyond. To the south of this parcel are allotments, with the A5190 Cannock Road beyond.

Safeguarded Land

To the north and east of the parcel of safeguarded land is an area of woodland, with agricultural land and residential dwellings beyond. To the west of the safeguarded land parcel lies a park and allotments. The A5190 Cannock Road borders this parcel to the south, with agricultural land beyond.

Figure 1: Site Location

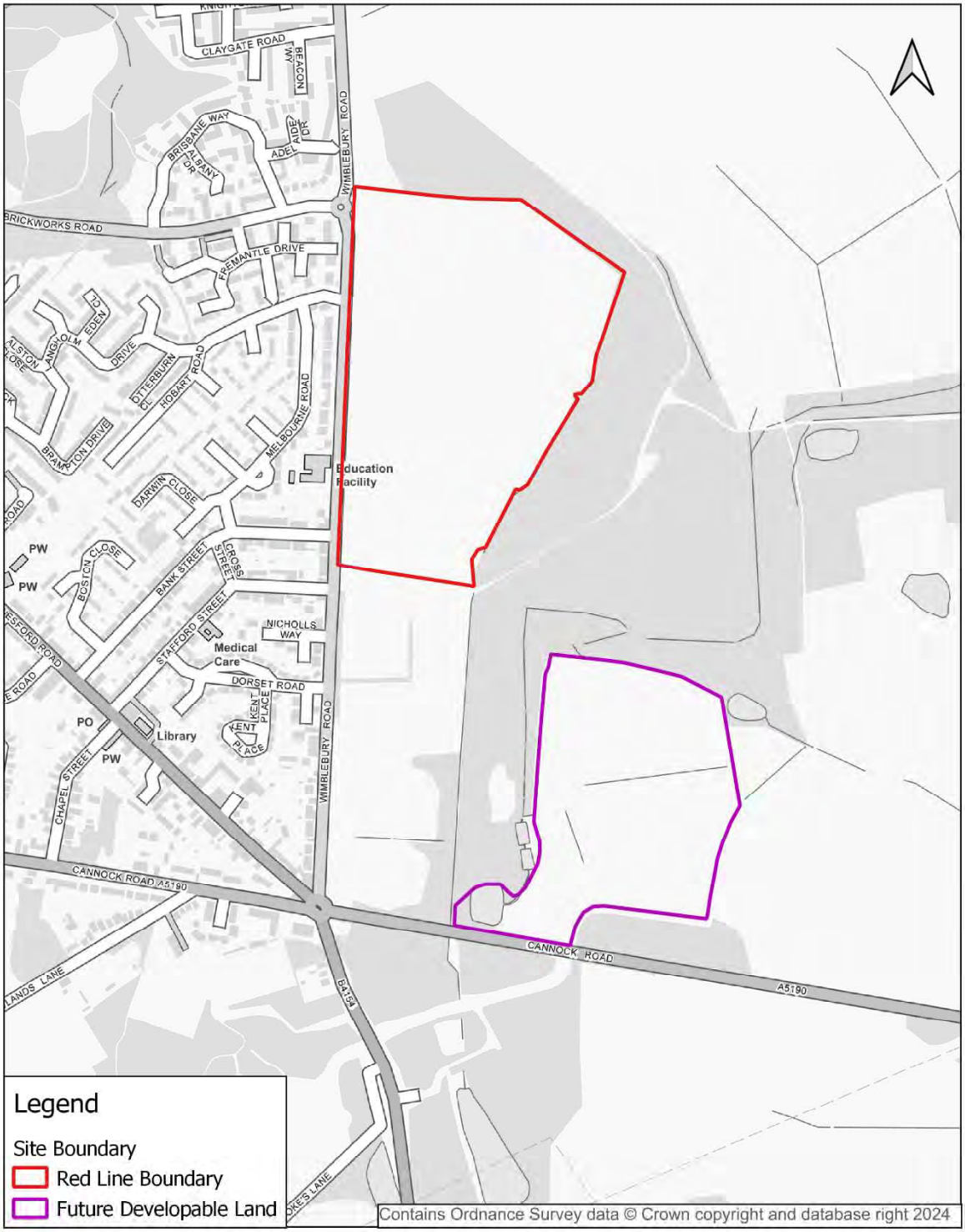

Figure 1.1: Site Location

Drawn by: MS
Date: 20/02/2024

Legislation, Planning Policy & Guidance

National Legislation and Planning Policy

The following national legislation and planning policy documents were considered in this preliminary assessment. A summary of the relevant national legislation and planning policy is provided in **Appendix B**:

- European Parliament, EU 2008 ambient Air Quality Directive (2008)[1];
- HMSO, Air Quality (England) Regulations (2000)[2];
- HMSO, Environment Act (1995)[3];
- HMSO, Environment Act (2021)[4];
- HMSO, Air Quality (England) Regulations (2002)[5];
- HMSO, Air Quality Standards Regulations (2010)[6];
- Department for Environment, Air Quality Strategy (1997)[7];
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2007)[8];
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2023)[9];
- Department for the Environment, Food and Rural Affairs, The Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020)[10];
- HMSO, The Environmental Targets (Fine Particulate Matter) (England) Regulations (2023)[11];
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework (NPPF) (2023)[12]; and
- Ministry for Housing, Communities and Local Government, Planning Practice Guidance (PPG) for air quality (2019)[13].

Local Planning Policy

The following local planning policy documents were considered in this air quality assessment and a summary is provided in **Appendix B**:

- Cannock Chase District Council, Cannock Chase Local Plan (Part 1) 2014[14].

Air Quality Assessment Guidance

The following guidance was utilised in the air quality assessment:

- Defra, Local Air Quality Management Technical Guidance (LAQM.TG(22)) (2022)[15];
- Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction (2024)[16]; and
- Institute of Air Quality Management and Environmental Protection UK, Land-Use Planning and Development Control: Planning for Air Quality (2017)[17].

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[1] European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe
[2] HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO
[3] HMSO (1995) The Environment Act 1995, London: TSO
[4] HMSO (2021) The Environment Act 2021, London: TSO
[5] HMSO (2002) Statutory Instruments 2002 No. 3043, The Air Quality (England) (Amendment) Regulations 2002, London: HMSO
[6] HMSO (2010) Statutory Instruments 2010 No. 1001 Air Quality Standards Regulations 2010. London: HMSO
[7] Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO
[8] Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO
[9] Department for the Environment, Food and Rural Affairs (Defra) (2023) Air Quality Strategy: Framework for Local Authority
[10] Department of the Environment, Food and Rural Affairs (Defra) (2020) The Environment (Miscellaneous Amendments) (EU Exit) Regulations, London: HMSO
[11] HMSO (2023) Statutory Instruments 2023 No. 96 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023
[12] Ministry of Housing, Communities & Local Government (2023) National Planning Policy Framework, HMSO London
[13] Ministry for Housing, Communities and Local Government (2019) Planning Practice Guidance Air Quality
[14] Cannock Chase District Council (2014) Cannock Chase Local Plan (Part 1)
[15] Defra (2022) Local Air Quality Management Technical Guidance LAQM.TG(22)
[16] Institute of Air Quality Management (2024) Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, London
[17] Institute of Air Quality Management and Environmental Protection UK (2017) Land-Use Planning and Development Control: Planning for Air Quality
Greater London Authorities (2023) Air Quality Neutral

Review of Site Setting

Existing Pollutant Sources

Road Traffic

The principal source of air pollution in the vicinity of the Site is considered to be road traffic emissions. The parcel of safeguarded land is partially located within Air Quality Management Area (AQMA) Number 3 (Five Ways Island) which was designated by the CCDC for the potential exceedance of the annual mean nitrogen dioxide (NO_2) air quality objective. The allocated land is not located within an AQMA.

Rail

There are no railway lines in the vicinity of the Site and there are no stations or sidings located within 30m of the Site boundary. Therefore, it is considered unlikely that emissions from railway sources will significantly impact air quality within the Site.

Industrial

No existing industrial sources were identified in the vicinity of the Site and therefore, it is unlikely that emissions from industrial sources will significantly impact air quality within the Site.

Odour

No existing odour sources were identified in the vicinity of the Site and therefore, it is considered unlikely that the residential amenity for future users of the Site will be significantly affected by odour.

Dust

No existing dust generating sources were identified in the vicinity of the Site and therefore, it is considered unlikely that dust from nearby businesses and operations will significantly impact air quality within the Site.

Existing Baseline Conditions

Local Air Quality Management

The parcel of safeguarded land is partially located within the AQMA Number 3 (Five Ways Island) which was designated by CCDC for the potential exceedance of the annual mean NO_2 air quality objective. The allocated land is not located in an AQMA.

Local Air Quality Monitoring

Nitrogen Dioxide (NO_2)

CCDC undertakes monitoring within its administrative boundary using a network of automatic monitoring locations and diffusion tubes. The closest monitoring location to the Site is diffusion tube HH01 located on Wimblebury Road, approximately 14m west of the Site.

Bias adjusted NO_2 monitoring results, for the locations in the vicinity of the proposed development Site, are detailed in **Table 1**. Exceedances of the annual mean NO_2 air quality objective are shown in **bold**.

Table 1: CCDC NO_2 Monitoring Data in 2015 – 2022

Monitoring Location	Grid Reference (X,Y)		Site Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration ($\mu g.m^{-3}$)							
					2015	2016	2017	2018	2019	2020	2021	2022
HH01	401629	310590	Roadside	14m west	-	-	-	-	19.4	14.1	17.6	14.9
HH02	401576	310577	Urban Background	65m west	-	-	-	-	13.0	-	-	-
HFRDRd	401536	310001	Roadside	450m south	29.7	33.7	30.8	32.5	26.2	-	-	-
HHFW	401563	309940	Roadside	500m south	**45.9**	**61.4**	**49.5**	**44.5**	**43.9**	31.4	32.5	36.6
CNKRd	401421	309965	Roadside	520m south west	**49.2**	**44.4**	31.4	25.2	34.2	25.0	25.7	26.7
HHMS auto	401392	309954	Roadside	550m south west	-	24.2	22.7	17.5	21.5	14.4	15.7	13.8
HHMS	401392	309954	Roadside	550m south west	-	29.2	16.8	17.2	23.0	16.2	-	-

- data not available

Monitored annual mean NO_2 concentrations between 2015 and 2022 were below the annual mean air quality objective for NO_2 of 40µg.m^{-3} at the majority of the monitoring locations in the vicinity of the Site.

Monitoring location HHFW monitored exceedances of the annual mean NO_2 objective between 2015 and 2019. This monitoring location is located within the AQMA and lies close to the Five Ways Island roundabout which experiences significant congestion. Therefore, elevated pollutant concentrations are anticipated at this monitoring location.

Monitoring location CNKRd also monitored exceedances of the annual mean NO_2 objective in 2015 and 2016. This monitoring location is also located close to Five Ways Island roundabout and within the AQMA. Since 2017, monitored annual mean NO_2 concentrations at CNKRd were below the objective; a review of CCDC Air Quality Annual Status Reports identified no explanation for this decrease.

Allocated Land

Monitoring location HH01 is considered to be most representative of conditions at the parcel of allocated land as both the parcel and monitoring location are situated adjacent to Wimblebury Road.

Safeguarded Land

Monitoring location HHMS auto and HHMS are considered to be most representative of conditions at the parcel of safeguarded land as both the parcel and monitoring location are situated adjacent to the A1590 Cannock Road and are located at a similar distance to the significantly congested Five Ways Islands roundabout.

Overall monitored annual mean NO_2 concentrations show a decreasing trend between 2015 and 2022, with some year on year fluctuations. A significant decrease in monitored annual mean NO_2 concentrations was recorded between 2019 and 2020 however this was considered to be a result of lockdown restrictions influencing traffic levels during the COVID-19 pandemic in 2020.

Particulate Matter (PM_{10})

Concentrations of PM_{10} were monitored at the HHMS automatic monitoring location upto and including 2019, which is located approximately 550m south west of the Site on the A5190 Cannock Road. Monitored concentrations of PM_{10} at the HHMS automatic analyser are detailed in **Table 2**.

Table 2: CCDC PM_{10} Monitoring Data in 2015 – 2020 for the HHMS Automatic Analyser

Site ID	Grid Reference		Site Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration ($\mu g.m^{-3}$)					
					2015	2016	2017	2018	2019	2020
HHMS auto	401392	309954	Roadside	550m south west	-	21.1	14	18	16	-

- Data not available. Pollutant concentrations displayed to the level of accuracy included in the CCDC Air Quality Annual Status Report

Allocated Land

Monitored annual mean PM_{10} concentrations recorded between 2016 and 2019 were below the annual mean PM_{10} objective of 40$\mu g.m^{-3}$ at monitoring location HHMS. Monitoring location HHMS is located in close proximity to the Five Ways Island roundabout which experiences significant congestion, whereas the parcel of allocated land is located adjacent to a minor road. It is therefore considered that PM_{10} concentrations at the parcel of allocated land will be lower than those monitored at the HHMS monitoring location.

Safeguarded Land

Monitoring location HHMS auto is considered representative of conditions at the parcel of safeguarded land due to its location adjacent to the A1590 Cannock Road and distance to the Five Ways Island roundabout. It is therefore considered that PM10 concentrations at the parcel of safeguarded land will be similar to those monitored at the HHMS monitoring location.

Particulate Matter ($PM_{2.5}$)

CCDC does not undertake monitoring of $PM_{2.5}$ within its administrative area.

Summary of Site Setting Review

Following a review of local pollution sources that may influence the Site, it was considered unlikely that industrial sources, rail sources or odour sources will significantly influence the Site with regard to air quality. The proximity of the Site to the AQMA Number 3 (Five Ways Island) was considered to represent the greatest potential to influence the suitability of the Site for the proposed use with regard to the relevant air quality objectives.

Preliminary Site Suitability Assessment

BWB undertook a detailed preliminary air dispersion modelling assessment in October 2023 was therefore undertaken to consider the suitability of the Site for the proposed uses with regard to the relevant air quality objectives at the time of assessment. Consideration was also given to any potential mitigation requirements.

A summary of the methodology used, model inputs, tools and guidance utilised is provided in **Appendix C**. Details of the traffic data and modelled road network utilised in the assessment are provided in **Appendix D**. The wind rose for 2019 for the Coleshill meteorological recording station is provided in **Appendix E**. The model verification process is detailed in **Appendix F**.

Assessment Criteria

Predicted pollutant concentrations were compared to the relevant air quality objectives. The current relevant air quality standards and objectives are detailed in **Table 3.**

Table 3: Air Quality Standards and Objectives (England)

Pollutant	Averaging Period	Air Quality Objective (µg.m^{-3})	Date to Achieve by
NO_2	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM_{10}	Annual Mean	40	31 December 2004
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
$PM_{2.5}$	Annual Mean	20	1 January 2020
	Annual mean interim target as detailed within the Environmental Improvement Plan[18]	*12*	*31 January 2028*
	Annual mean	*10*	*31 December 2040*

[18] Defra (2023) Environmental Improvement Plan 2023, First revision of the 25 Year Environment Plan

Site Suitability Assessment

A Cartesian grid was modelled covering the area between the following grid references: minimum 401095, 309491 to maximum 402494, 311180. The Cartesian grid was modelled over the Site and the surrounding area to capture the AQMA Number 3 (Five Ways Island) and the surrounding roads connected the Five Ways Island roundabout, as the primary emission sources in the vicinity of the Site. The grid was run at a height of 1.5m to represent the average breathing height at ground floor level for an anticipated opening year of 2025.

Figures 2 - 4 illustrate the predicted annual mean pollutant concentration contours for NO_2, PM_{10} and $PM_{2.5}$ respectively across the Site in 2025.

Annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations across the Site were predicted to be below the relevant air quality objectives across the Site in 2025. Annual mean $PM_{2.5}$ concentrations were also below the 2028 interim target of 12µg.m^{-3}, however a small section of the safeguarded land approximately 10m from the A5190 exceeds 2040 future objective of 10µg.m^{-3}. Given the location of this land, it is unlikely that sensitive uses will be located here.

With regard to short term air quality objectives for NO_2 and PM_{10} at the proposed development, the predicted annual mean NO_2 concentrations within the Site are less than 60µg.m^{-3} and therefore in accordance with Defra guidance it may be assumed that exceedance of the 1-hour mean NO_2 objective are unlikely. The calculation detailed in **Appendix C** was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Figure 2: Predicted Annual Mean NO_2 Concentrations across the Site

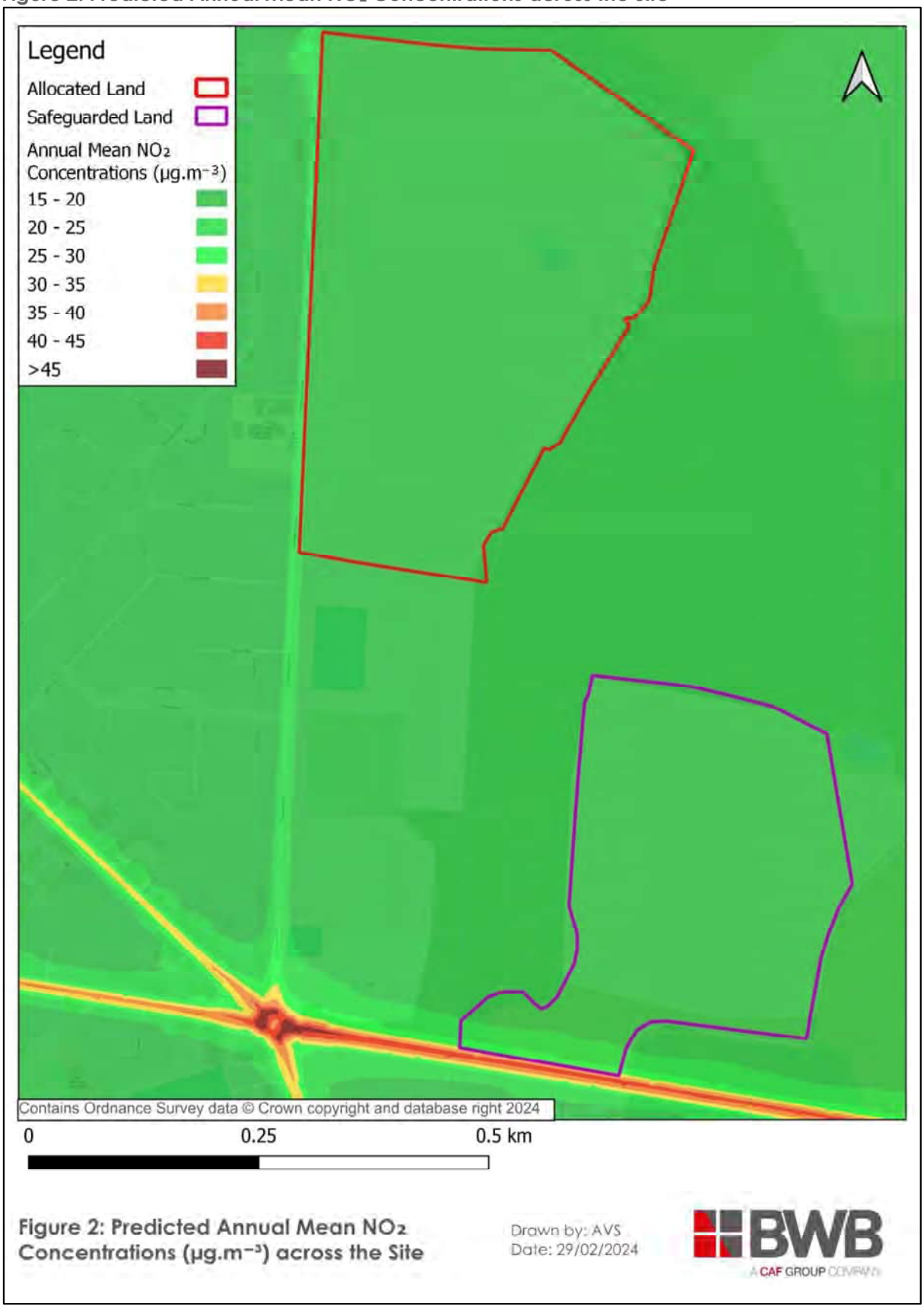


Figure 2: Predicted Annual Mean NO_2 Concentrations (µg.m⁻³) across the Site

Drawn by: AVS
Date: 29/02/2024

Figure 3: Predicted Annual Mean PM_{10} Concentrations across the Site

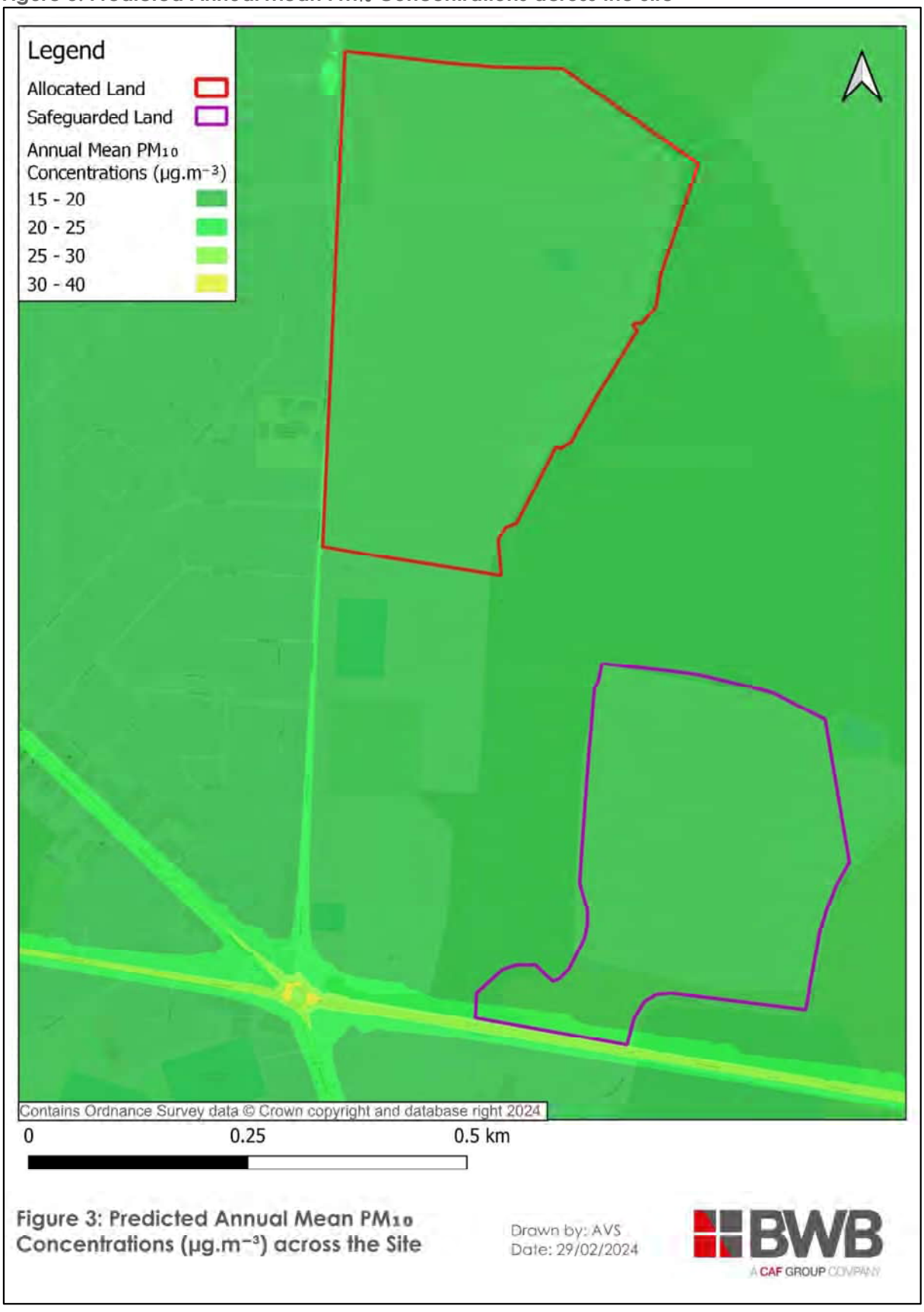


Figure 3: Predicted Annual Mean PM_{10} Concentrations ($\mu g.m^{-3}$) across the Site

Drawn by: AVS
Date: 29/02/2024

Figure 4: Predicted Annual Mean $PM_{2.5}$ Concentrations across the Site

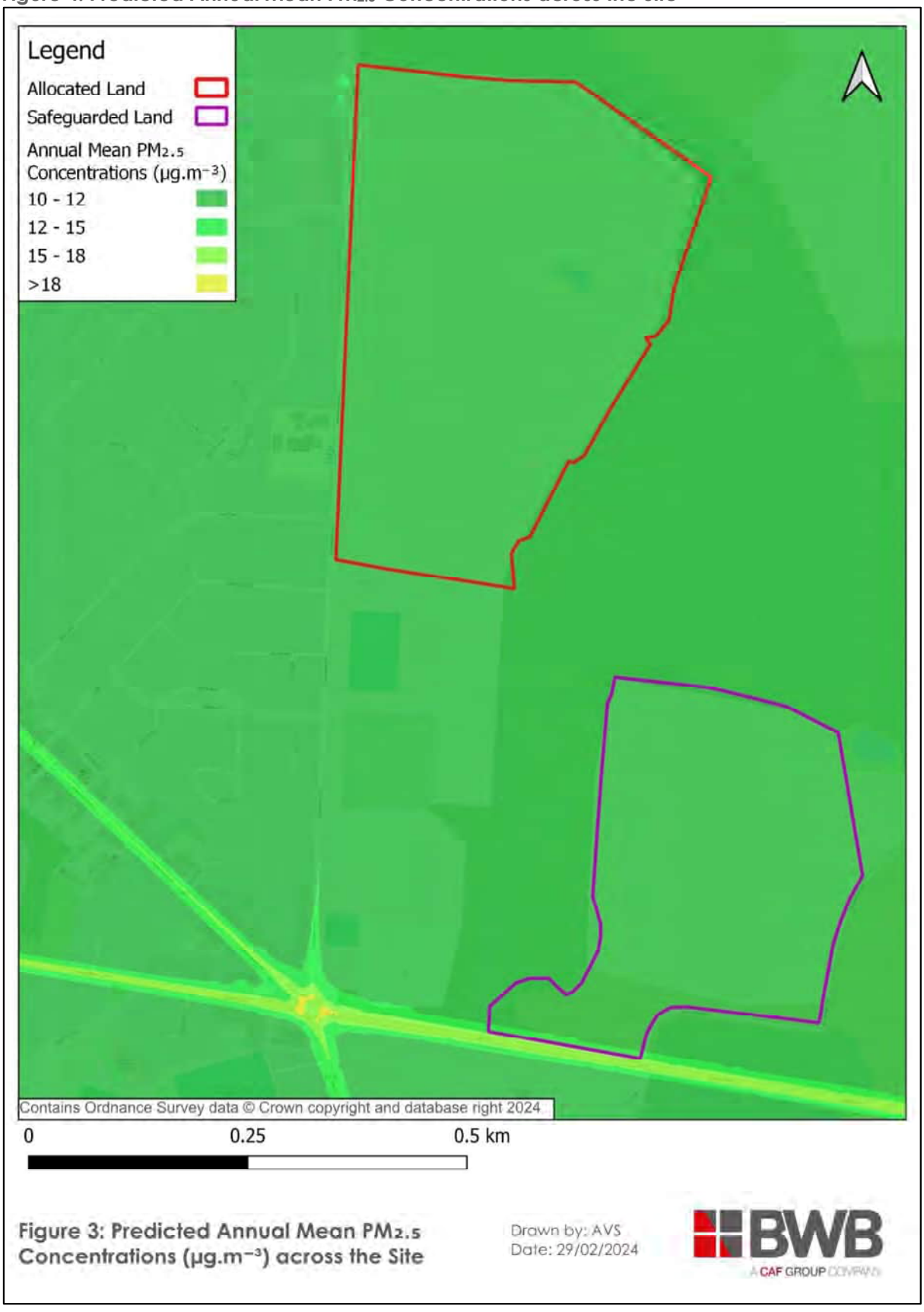


Figure 3: Predicted Annual Mean $PM_{2.5}$ Concentrations ($\mu g.m^{-3}$) across the Site

Drawn by: AVS
Date: 29/02/2024

Recommendations

Predicted pollutant concentrations across the Site are well below the current air quality objectives.

Whilst pollutant concentrations are predicted to be below the current air quality objectives, to minimise the potential exposure of future residents of the Site to elevated pollutant concentrations, it is recommended that less sensitive uses are located on the southern boundary of the Site, closest to the A1590 Cannock Road. Such uses could include public open space, access routes, car parking and SUDS where appropriate. In addition, it is likely the elevated NO_2 concentrations on the southern boundary are a result of the significant congestion associated with the Five Ways Island roundabout. It is understood that there are plans currently underway to improve this junction. Should a solution be identified that reduces congestion along the section of the A1590 Cannock Road that is adjacent to the Site, pollutant concentrations across the southern boundary of the Site are also likely to decrease.

It is recommended that a detailed assessment of Site suitability is undertaken to support any planning application proposed for the Site to confirm that pollutant concentrations remain below the relevant air quality objectives for residential use. If a solution has also been identified to reduce congestion at the Five Ways Island roundabout, the assessment will consider the impact this will have on pollutant concentrations across the Site. In addition, a detailed impact assessment will be required to consider the impact of development generated traffic on local air quality.

APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Term	Definition
AADT	Annual Average Daily Traffic flow.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between two years, which is useful for pollutants that have higher concentrations during the winter months.
AQAP	Air Quality Action Plan.
AQMA	Air Quality Management Area.
AQS	Air Quality Strategy.
Defra	Department for Environment, Food and Rural Affairs.
EPUK	Environmental Protection UK.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV	Heavy Duty Vehicles (HGVs + buses and coaches)
HGV	Heavy Goods Vehicles.
IAQM	Institute of Air Quality Management.
LAQM	Local Air Quality Management.
LDV	Light Duty Vehicles (motorbikes, cars, vans and small trucks)
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
Percentile	The percentage of results below a given value.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
micrograms per cubic metre ($\mu g.m^{-3}$)	A measure of concentration in terms of mass per unit volume. A concentration of $1 \mu g.m^{-3}$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

APPENDIX B: PLANNING POLICY AND LEGISLATION

National Legislation and Planning Policy

The UK Air Quality Strategy

European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive[1] sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000[2], as amended, for the purpose of the Local Air Quality Management Framework. The Air Quality (England) Regulations were amended in 2002[5] and again in 2010[6], with miscellaneous amendments added in 2020[10] following the UK exit from the EU. Additionally, an updated $PM_{2.5}$ objective was published in 2023[9] with an interim target to be achieved by 2028[23].

The UK Government are required under the Environment Act 1995[3] to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997[7] and was most recently reviewed and updated in 2007[8] and most recently reviewed and updated in 2023[9]. The AQS provides an overview of the Government's ambient air quality policy and sets out the air quality standards and objectives to be achieved and measures to improve air quality.

The Environment Act 2021[4] was granted Royal Assent in November 2021 and contains amendments to Part IV of the Environment Act 1995[3] with regard to the Local Air Quality Management regime. Under the Environment Act 2021[4], the Secretary of State must lay a statement before Parliament setting out progress made in meeting air quality objectives and standard in England and steps taken towards achieving the standards. The Environment Act 2021[4] also places responsibility on local authorities to co-operate with air quality partners in the preparation of Air Quality Action Plans and identification of measures which should be monitored within the Plan and dates by which they should be implemented.

Part IV of the Environment Act[3] requires local authorities in the UK to review local air quality within their administrative area and, if relevant air quality standards and objectives are likely to be exceeded, designate Air Quality Management Areas (AQMAs). Following the designation of an AQMA, local authorities are required to publish an Air Quality Action Plan (AQAP) detailing measures to be taken to improve local air quality and work towards meeting the relevant air quality standards and objectives.

National Planning Policy Framework

The National Planning Policy Framework (NPPF)[12] was amended in December 2023 and sets out the Government's planning policies for England and how these are expected to be applied. The NPPF[12] recognises air quality within Section 15: Conserving and enhancing the natural environment, and states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *[…]*

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

[…]

Ground conditions and pollution

[…]

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

With regard to assessing cumulative effects the NPPF states:

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

[...]"

Planning Practice Guidance

The Planning Practice Guidance (PPG) for air quality[13] was updated in November 2019 and provides guiding principles on how the planning process can take account of the impacts of new development on air quality.

The PPG[13] sets out the following with regard to air quality and planning:

- "What air quality considerations does planning need to address;
- What is the role of plan-making with regard to air quality;

- Air quality concerns relevant to neighbourhood planning;
- What information is available about air quality;
- When could air quality considerations be relevant to the development management process;
- What specific issues may need to be considered when assessing air quality impacts;
- How detailed does an air quality assessment need to be; and
- How can an impact on air quality be mitigated".

The PPG[13] sets out the pollutants for which there are legally binding limits for concentrations and those which the UK also has national emissions reduction commitments.

The PPG[13] states that development plans may need to consider:

- "what are the observed trends shown by recent air quality monitoring data and what would happen to these trends in light of proposed development and / or allocations;
- the impact of point sources of air pollution (pollution that originates from one place);
- the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments, including their implications for vehicle emissions;
- ways in which new development could be made appropriate in locations where air quality is or is likely to be a concern, and not give rise to unacceptable risks from pollution. This could, for example, entail identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable; and
- opportunities to improve air quality or mitigate impacts, such as through traffic and travel management and green infrastructure provision and enhancement".

The PPG[13] also states what may be considered relevant to determining a planning application and these include whether a development would:

- "Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;
- Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems

(including chimneys) which require approval or permits under pollution control legislation;

- Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;
- Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;
- Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value".

The PPG[13] provides guidance regarding what should be included within an air quality assessment. Examples of potential air quality mitigation measures are also provided.

Local Planning Policy

Cannock Chase District Council, Cannock Chase Local Plan (Part 1) 2014.

The Cannock Chase Local Plan[14] was adopted in June 2014 and sets out the policies for development in Cannock up until 2028. The following policy relates to air quality:

> *"Policy CP10 – Sustainable Transport*
>
> *[…]*
>
> *Cannock Chase Council will work with bus and rail operators, Staffordshire County Council, the West Midlands Integrated Transport Authority (Centro), Local Enterprise Partnerships (LEPs), local transport bodies and developers to help develop and promote sustainable transport modes that provide realistic alternatives to the car, and which help contribute to achieving national climate change targets and reduce air pollution.*
>
> *[…]"*

The above policy was taken into consideration throughout the undertaking of the assessment.

APPENDIX C: PRELIMARY SITE SUITABILITY ASSESSMENT - METHODOLOGY

Air Dispersion Modelling

The air dispersion model ADMS-Roads, version 5.0.0.1 was utilised in the assessment to predict concentrations of NOx, PM_{10} and $PM_{2.5}$ across the Site.

The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance and pollutant concentrations were compared to the current air quality objectives.

Assessment Scenarios and Traffic Data

The following scenarios were considered in the air dispersion modelling:

- Scenario 1: 2019 Verification Year;
- Scenario 2: 2023 Base Year;
- Scenario 3: 2025 Opening Year with development.

Traffic data were obtained from DTA, the Transport Consultants for the project. 24-hour Annual Average Daily Traffic (AADT) flows and Heavy Duty Vehicle (HDV) proportions were provided for the following roads for use in the assessment:

- A4601 Hednesford Road;
- A5190 Lichfield Road;
- Wimblebury Road;
- Cannock Road; and
- Norton Road.

In addition, development-generated traffic data was provided by DTA Transportation and was added onto the above roads in Scenario 2.

Consideration was given to the speeds at which vehicles are likely to travel within the study area. Free flowing traffic conditions were modelled at speed limits, taking into account driving conditions in the study area. Queuing sections were modelled in accordance with Defra guidance.

Traffic data used in the air dispersion modelling and the modelled road network are detailed in **Appendix D**.

ADMS-Roads Model Inputs

The following model inputs were utilised in the assessment:

- Emission Factors – emission factors were utilised from the Defra Emission Factor Toolkit (EFT), version 11.0, for the years of assessment (2019, 2023 and 2025).
- Conversion of oxides of nitrogen – concentrations of NOx were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO_2) using the Defra NOx to NO_2 calculator, version 8.2.
- Meteorological Data – hourly sequential meteorological data for the verification year of assessment (2019) were obtained for the Coleshill

recording station. This is the closest, most representative recording station in the vicinity of the Site. The wind rose for 2019 is provided in **Appendix E**.

- Surface roughness and Monin-Obukhov length (MO) – Site – a surface roughness of 0.75m and a MO length of 30 were utilised in the air dispersion model to represent the mixed urban/industrial conditions of the study area. A surface roughness of 0.75m was used as the Site is in a sub-urban area. A MO length of 30m was used to represent city and large town conditions at the Site.
- Surface roughness and Monin-Obukhov length (MO) – meteorological station – a surface roughness of 0.5m and a MO length of 30 were utilised in the air dispersion model to represent the mixed urban and industrial conditions of the meteorological station. A surface roughness of 0.5m was used to represent the open suburbia of the station. A MO length of 30m was used to represent city and large town conditions at the meteorological station.
- Background pollutant concentrations – background concentrations of NO2, PM_{10} and $PM_{2.5}$ for the study area were obtained from the pollutant concentration maps provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2019, 2023 and 2025).
- Model verification – model verification was undertaken using 2019 monitoring data available for the study area. Full details of the verification procedure are provided in **Appendix F**.
- Calculation of short term PM_{10} concentrations – the following calculation, as detailed in Defra guidance, was utilised to calculate the number of exceedances of the 24-hour mean PM_{10} air quality objective:

Number of 24-Hour Mean Exceedance = -18.5 + 0.00145 * Annual Mean3 + (206 / Annual Mean)

Background Pollutant Concentrations

Background concentrations at the Site are below the relevant air quality objectives for NO_2, PM_{10} and $PM_{2.5}$. $PM_{2.5}$ concentrations are also below the 2028 interim target of 12µg.m^{-3} and 2040 future objective of 10µg.m^{-3}. A review of Defra background concentration maps highlighted a significant contribution of residual and secondary particulate matter towards the total background PM_{10} concentration. It is likely that this contributes towards background PM_{10} concentrations exceeding background NO_2 concentrations in some grid squares considered in the assessment.

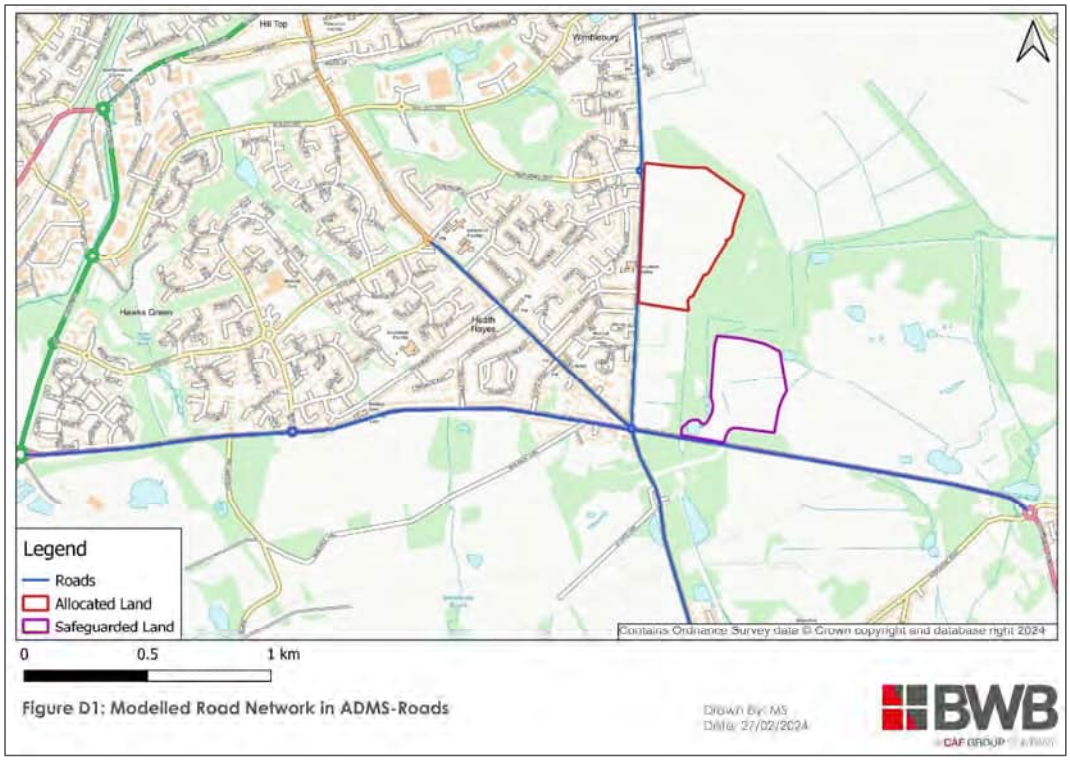
APPENDIX D: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT

Table D1: Traffic Data Utilised in the Air Dispersion Modelling Assessment

Road Link	Speed	Scenario 1: 2019 Verification Year		Scenario 2: 2023 Base Year		Scenario 3: 2025 Opening Year Without Development		Scenario 4: 2025 Opening Year With Development	
	Km.hr^{-1}	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
Wimblebury Road	40/30	4,097	97	4,188	99	4,229	100	4,882	100
Wimblebury Road	40/30	4,097	97	4,188	99	4,229	100	4,383	100
Wimblebury Road	40/30	4,617	162	4,719	166	4,766	167	4,811	167
A5190 Cannock Road	32/22	18,035	557	18,425	569	18,599	574	18,745	574
B4154 Norton Road	32/22	9,989	157	10,211	160	10,312	162	10,348	162
A5190 Cannock Road	48/30	14,389	404	14,700	413	14,839	417	15,165	417
B4154 Hednesford Road	40/20	10,561	123	10,795	126	10,902	127	11,047	127
A5190 Lichfield Road	48/38	18,922	567	19,331	579	19,514	585	19,840	585

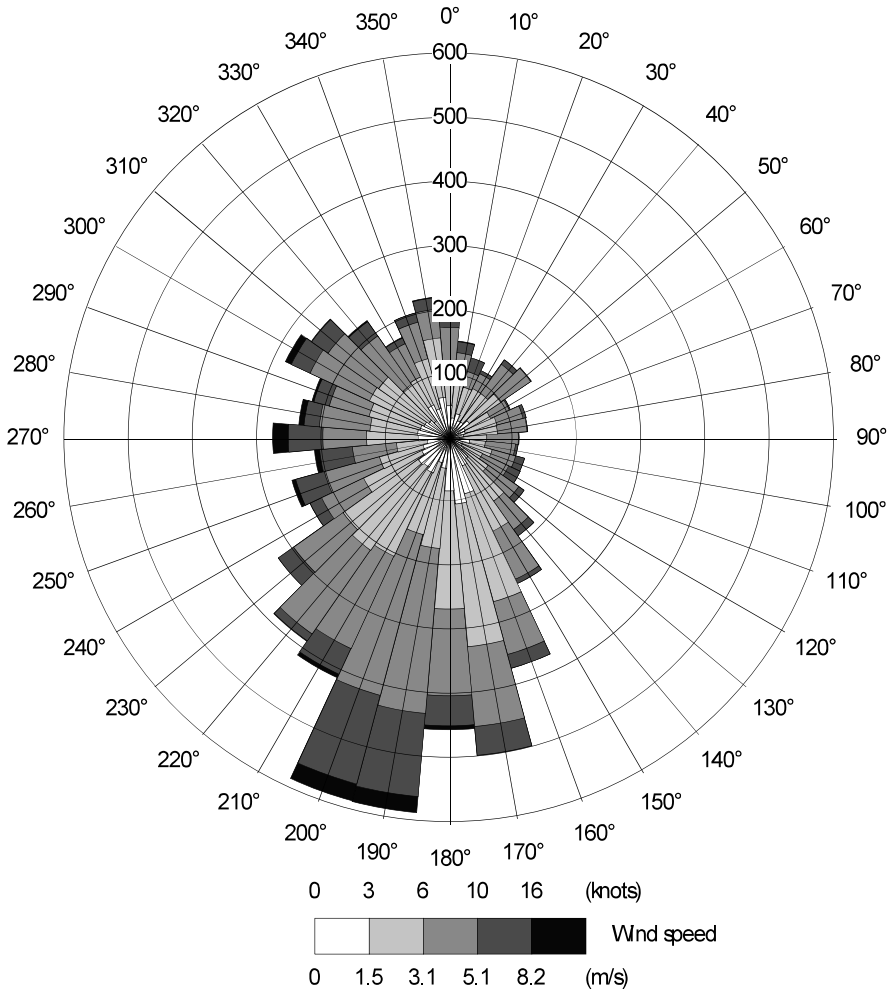
An illustration of the road links included in the ADMS-Roads model is provided in **Figure D1**.

Figure D1: Road Links Included in the ADMS-Roads Model



APPENDIX E: WIND ROSE FOR 2019 FOR COLESHILL METEOROLOGICAL RECORDING STATION

Meteorological data for 2019 Verification Year scenario for the Coleshill recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2019 is detailed below and illustrates a predominant wind direction from the south.



APPENDIX F: MODEL VERIFICATION

Whilst ADMS-Roads is widely validated for use in this type of assessment, model verification for the area around the Site will not have been included. To determine model performance at a local level, a comparison of modelled results with monitored results in the study area was done in accordance with the methodology provided by Defra. This process of verification aims to minimise modelling uncertainty by correcting modelled results by an adjustment factor to give greater confidence to the results.

2020 monitoring data was considered to not be representative of normal conditions, given the likely decrease in traffic levels associated with the national lockdowns in place during the 2020 calendar year and therefore 2019 monitoring data was considered in the model verification.

The model was run for Scenario 1: 2019 Verification Year to predict the 2019 annual mean road contributions of NOx at the monitoring locations in the study area. The model NOx outputs at these locations were compared to the 2019 monitored concentrations to provide adjustment factors. **Table F1** presents the verification process for NOx and **Table F2** presents the verification process for PM_{10}. **Figure F1** details the monitoring locations utilised in the model verification.

No monitoring of $PM_{2.5}$ is undertaken within the study area. Therefore the adjustment factor calculated during the PM_{10} verification process was utilised to adjust predicted concentrations of $PM_{2.5}$.

Table F1: NOx Verification Process

Model Verification Steps	HHMS	HHFW	CNKRd	HFRDRd	HH01	HHMS auto
2019 monitored total NO_2 ($\mu g.m^{-3}$)	31.2	43.9	34.2	26.2	19.4	34.7
2019 background NO_2 concentration ($\mu g.m^{-3}$)	11.7	11.7	11.7	11.2	11.2	15.5
Monitored road contribution NOx ($\mu g.m^{-3}$)	38.2	66.9	44.7	28.8	15.4	23.0
Modelled road contribution NOx ($\mu g.m^{-3}$)	6.7	16.1	11.2	11.6	2.7	6.7
Ratio of monitored road NOx to modelled road NOx	5.7	4.2	4.0	2.5	3.0	3.4
Adjustment factor for modelled road contribution NOx	**3.8397**					
Adjusted modelled road contribution NOx ($\mu g.m^{-3}$)	25.7	61.6	43.0	44.6	10.5	25.7
Modelled total NO_2 concentration ($\mu g.m^{-3}$)	25.2	41.7	33.4	33.7	16.9	37.4
Monitored total NO_2 concentration ($\mu g.m^{-3}$)	31.2	43.9	34.2	26.2	19.4	34.7

Model Verification Steps	HHMS	HHFW	CNKRd	HFRDRd	HH01	HHMS auto
% difference between modelled and monitored total NO_2 concentration	-24.1	-5.4	-2.3	22.2	-15.1	7.0
RMSE % (should be less than 25% and ideally less than 10%)	10.8					

** Road-NOx component, determined from NOx to NO_2 calculator*

A road-NOx factor of **3.8397** was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero. This factor was then applied to the modelled road-NOx concentration across the Site, before conversion to NO_2 concentrations using the NO_x to NO_2 calculator provided by Defra and the NO_2 background concentration. Statistical analysis for the results in **Table F1** demonstrates that the RMSE value is within the ideal range. Given the number of monitoring sites considered in the study area and the extent of the modelled road network, the RMSE value is considered to represent an acceptable level of average uncertainty within the air quality model.

Table F2: PM_{10} Verification Process

Model Verification Steps	HHMS auto
2019 monitored total PM_{10} ($\mu g.m^{-3}$)	16.0
2019 background PM_{10} concentration ($\mu g.m^{-3}$)	12.8
Monitored road contribution PM_{10} ($\mu g.m^{-3}$)	3.2
Modelled road contribution PM_{10} ($\mu g.m^{-3}$)	0.67
Ratio of monitored road PM_{10} to modelled road PM_{10}	4.7
Adjustment factor for modelled road contribution PM_{10}	4.7208

A PM_{10} adjustment factor of **4.7208** was determined from the PM_{10} verification process and applied to the predicted road-PM_{10} and $PM_{2.5}$ concentrations across the Site.

Figure F1: Monitoring Locations Utilised in the ADMS-Roads Model Verification Process

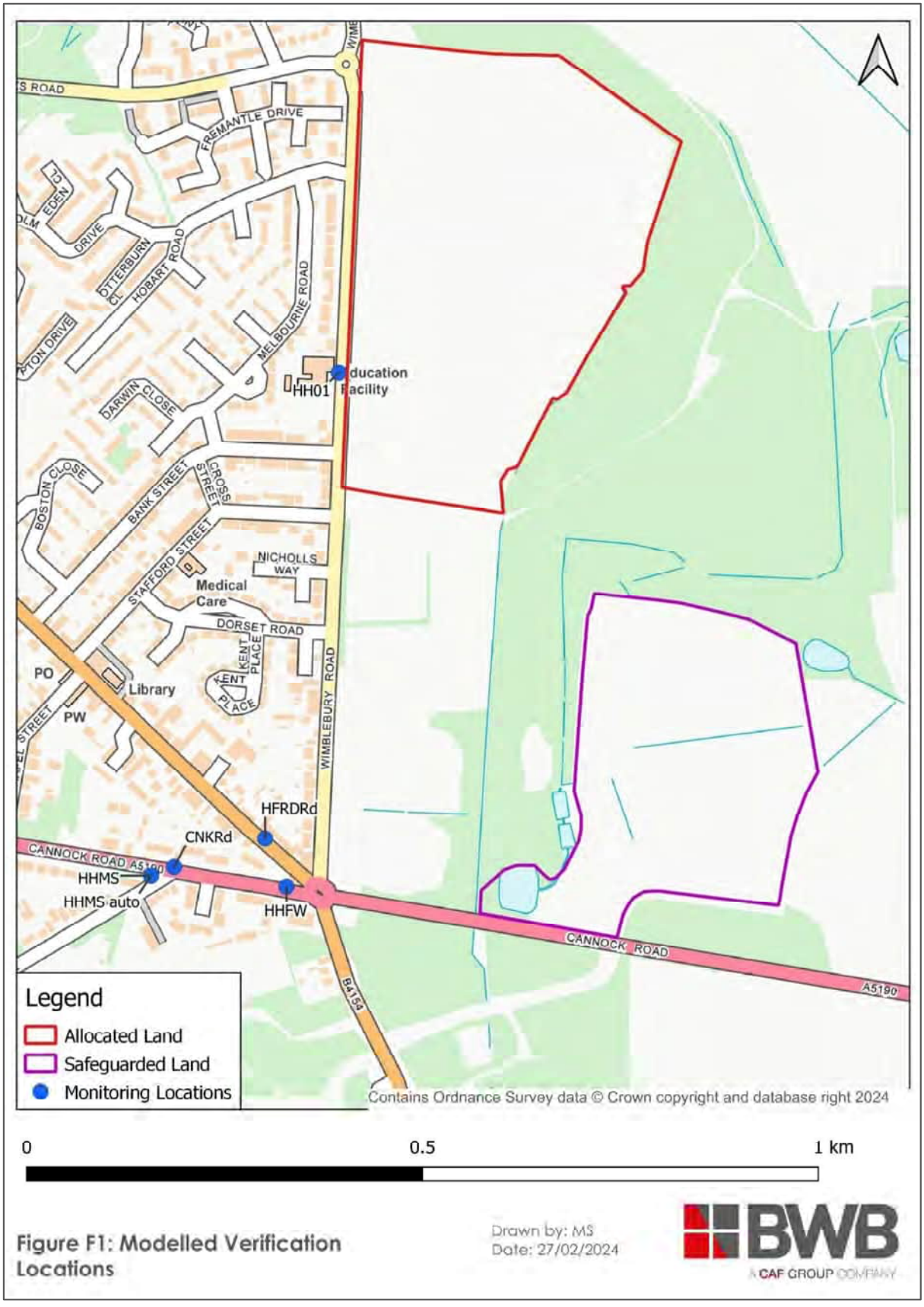


Figure F1: Modelled Verification Locations