2024 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management, as amended by the Environment Act 2021

Date: June 2024

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Executive Summary: Air Quality in Our Area

Air Quality in Central Bedfordshire

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year[1].

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution[2].

Table ES. 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

Table ES. 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO_2)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO_2)	Sulphur dioxide (SO_2) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

Central Bedfordshire Council is a unitary authority in Bedfordshire with an estimated population of 301,500 (Office of National Statistics – 2022 mid-year estimate), in an area of 716 square kilometres. The district is predominantly rural but has several market towns,

[1] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

the most populated of which are Dunstable, Houghton Regis, Leighton-Linslade, Flitwick, Ampthill, Biggleswade and Sandy. The M1, A1 and A5 provide the major north-south routes with the A421, A505 and A507 providing the east-west routes. Luton Airport is close to Central Bedfordshire Council's district boundary.

The major source of pollution in the district is from road transportation both within town centres and the motorway/trunk roads which have significant daily traffic flows. Other sources include pollution/emissions from both inside and outside the district. Those inside the district will include bonfires, agriculture and local industry – there are currently **79** industrial processes permitted by Central Bedfordshire Council.

The air quality is monitored throughout the district using a network of 38 passive diffusion tubes (results of which will be discussed fully later in this document), which monitor nitrogen dioxide (NO_2) and a real-time analyser sited in Sandy (adjacent to the southbound A1), which monitors NO_2 and Particulates – both PM_{10} and $PM_{2.5}$. This site is now owned by the Environment Agency and run by Bureau Veritas; Central Bedfordshire Council remains the Local Support Operator (LSO).

After applying the bias adjustment factor[3] and annualisation factor (only site SB58 Hockliffe required annualisation), **all sites <u>including</u>** N20 (adjacent to the southbound carriageway of the A1 in Sandy) met the UK Governments Annual Air Quality Objective for NO_2 in 2023. Central Bedfordshire Council used the DTDES (Diffusion Tube Data Processing Tool) to process these necessary calculations.

The 2023 monitoring results showed that concentrations in most sites throughout the district continue to fall. However, in the sites where concentrations have shown an increase – these have been relatively small, and the site has remained well below the Air Quality Objective (AQO).

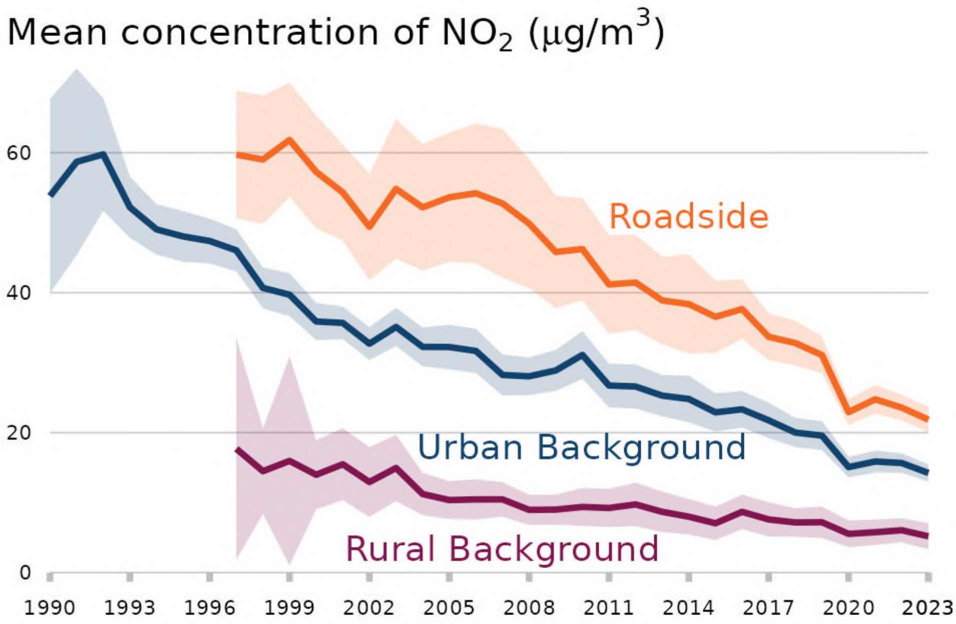
The continuing decline in concentrations of results in Central Bedfordshire are comparable with the national trends[4] as can be seen from the graph taken from the National Statistics (NO_2) Defra update of the 30 April 2024.

[3] National Bias Adjustment Factor taken from Spreadsheet Version Number 03/24 (downloaded 26/03/2024) applied to the 2023 dataset. Available from National Bias Adjustment Factors | LAQM (defra.gov.uk)

[4] National Statistics NO2 – Nitrogen dioxide (NO2) Defra updated 30 April 2024

Figure ES.2: Annual mean concentrations of NO_2 in the UK, 1990 to 2023

Source - National Statistics NO2 – Defra (gov.uk)



There currently are 3 Air Quality Management Areas (AQMAs) in Central Bedfordshire: Ampthill, Dunstable & Sandy.

- The Ampthill and Sandy AQMAs were declared in 2015 and were in relation to the annual NO_2 AQO for Ampthill; however, Sandy was declared for both the hourly & the annual AQOs for NO_2.
- The Dunstable AQMA was declared in 2005 for the annual NO_2 AQO – results from all monitoring sites have shown compliance with the AQO since 2019. However, some sites showed concentrations over 36µg/m^3 but below 40µg/m^3 (the AQO), (and so were within 10% of the AQO). Therefore, an increase in emissions could push a following year's result into an exceedance of the AQO. In order, to revoke an AQMA results should be below 36µg/m^3 for 3-5 years.

Unfortunately, due to the lockdowns due to Covid the data from years 2020 & 2021 cannot be used for decision making purposes (only for information).

Monitoring does not indicate the need for any new AQMAs at this current time.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter ($PM_{2.5}$), the pollutant of most harm to human health. The Air Quality Strategy[6] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero[7] details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel and most of the Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Conclusions and Priorities

There were no exceedances of the hourly or annual Air Quality Objectives (AQOs) for nitrogen dioxide (NO_2) either within (or outside) of an Air Quality Management Area (AQMA). The highest annual mean concentration (measured by passive diffusion tube after bias adjustment and other necessary calculations) was recorded at Site N20 in Sandy (32.1µg/m^3), which is the first time that this site has fallen below the 10% of the AQO (i.e. below 36µg/m^3).

Dunstable AQMA

The Council tendered for a Detailed Assessment and Source Apportionment Report regarding the Dunstable AQMA, to assess and model the monitoring results to show the likely compliance with the annual NO_2 AQO. This was due to some sites showing concentrations over 36µg/m^3 but below 40µg/m^3 (the AQO) and so within 10% of the AQO. Therefore, an increase in emissions could push a following year's result into an exceedance of the AQO. In order, to revoke an AQMA results should be below 36µg/m^3 for 3-5 years. The monitoring results from the years 2020 & 2021 cannot be used for this purpose due to the impacts from Covid. Although all sites in Dunstable have been compliant with the Objective since 2019 (i.e. below 40µg/m^3), not all have been below 36µg/m^3.

The Detailed Assessment and Source Apportionment Report (Air Quality Consultants, December 2023) – See Appendix G, concluded that detailed modelling of the roads within the current AQMA 1 Dunstable and a review of Central Bedfordshire Council's monitoring data has demonstrated that the predicted annual mean nitrogen dioxide concentrations using data from 2019 do not exceed the objective at locations of relevant exposure. Data

[5] Defra. Environmental Improvement Plan 2023, January 2023

[6] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

[7] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

from 2019 was selected to be used as it was at pre-covid levels and at higher concentrations than results from post-covid years, therefore providing a more conservative approach.

The Report showed that all sites do meet the objectives as monitoring Site 50 (outside number 24 Luton Road, Dunstable) was on a lamppost some distance away from the receptors, when the distance correction factor was applied in accordance with Defra's Guidance then the concentration met the AQO.

The other receptors at Church Street, High Street South and West Street, Dunstable (Site 33 – Church Street; Site 34 outside 5 High St South; Site 1 – High St South & Site 55 – West Street) were all in 1st floor flats and therefore not included in the objectives as it is considered that pollutants will be adequately dispersed into the atmosphere by this distance (unfortunately the distance correction model does not calculate vertical distance only horizontal) however it is shown that nitrogen dioxide concentrations do decrease with distance

However, new receptors have been identified in West Street (nearby to monitoring Site 55) a block residential flats including ground floor flat fronting West Street, which is outside of the current AQMA. Modelling indicated that the concentrations of NO_2 may be within 10% of the AQO (i.e. between 36-39.9µgm/^{3}) at this site. Therefore, we have set up a new monitoring site (Site 66) on a lamppost directly outside the flat (in West Street, Dunstable) and await the annual result for 2024 (results will be subject to bias adjustment, etc in accordance with Defra Guidance).

If Site 66 has results similar to Site 55, then the AQO would likely be met in 2025, without any adjustment for distance correction (to calculate the fall-off in the pollution concentration over the distance between the monitoring site to the façade of the property), as measured concentrations have been low enough not to need the application of this factor to be below the AQO in recent years.

- **Site 55** (West Street, Dunstable) result for 2019 of 40.8µg/m^3 (with just bias adjustment), however the monitor/tube was located on a lamppost adjacent to West Street with properties a small distance away. Commercial units occupy the ground floor and residential units are above. Unfortunately, the NO_2 fall-off with distance calculator does not account for height (only horizontal distance). However, the concentrations do decrease with height as well as distance and this means that the flat is sited away from the ground level pollution concentrations and it is likely that the result of 40.8µg/m^3 at the monitoring site, is lower at the 1st floor level flat. This is supported by the findings in The Air Quality Consultant's Detailed Assessment & Source Apportionment Report (December 2023) which showed:

Table 3.4.1 Modelled results from locations including row of units in West Street, where Site 55 is located (modelled locations include both ground and 1st floor levels)

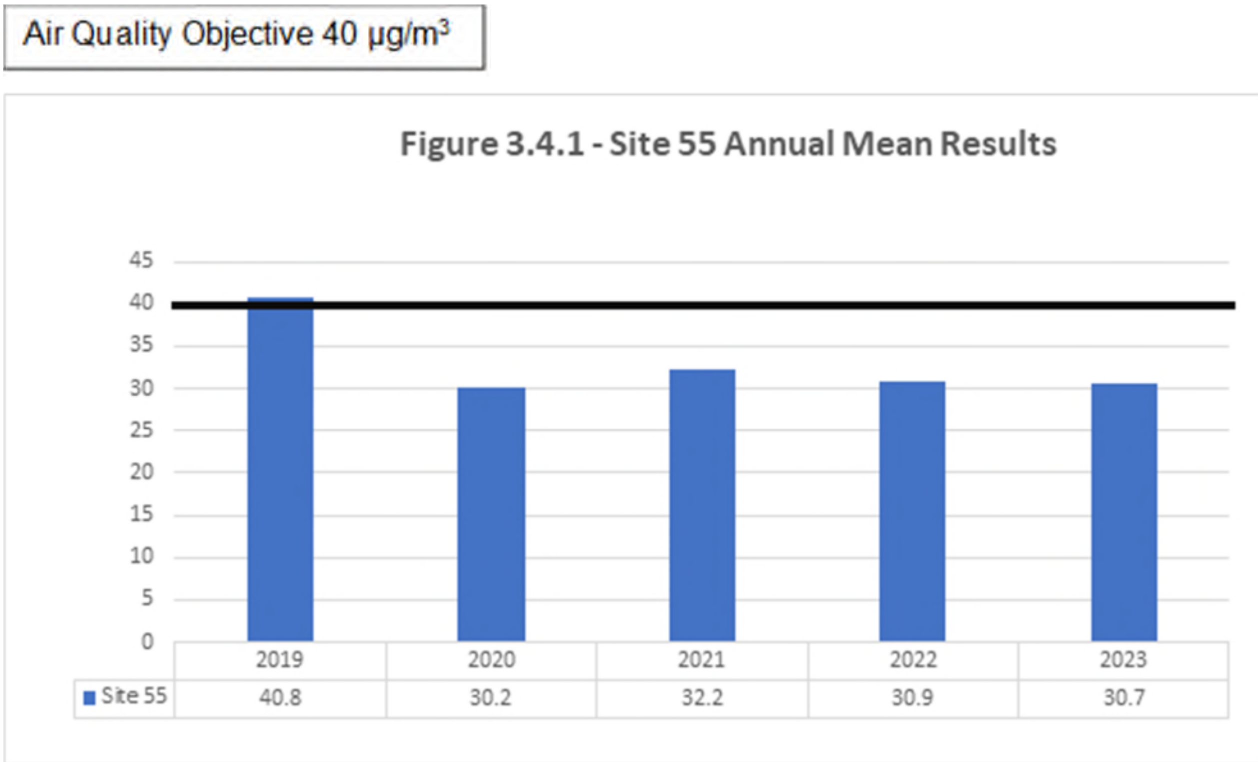
Site	Status	Height	Modelled Result (µg/m^3)
10	commercial	1.5	40
10	residential	4.5	23.6
11	commercial	1.5	39.8
11	residential	4.5	23.6
12	commercial	1.5	39.7
12	commercial	4.5	23.5
13	commercial	1.5	39.6
13	residential	4.5	23.5
14	commercial	1.5	39.5
14	residential	4.5	23.5
15	**residential**	**1.5**	**39.4**
15	residential	4.5	23.4
16	**residential**	**1.5**	**39**
16	residential	4.5	23.3

The ground floor (1.5m) sites 15 & 16 which represent the new residential receptors in West Street both are modelled to be below the AQO of 40µg/m^3 but are very close to the objective level. However residential flats on the first floor all have much lower concentrations – all below 25 µg/m^3.

A monitoring site (Site 66) has been located on a lamppost between the flats and West Street to provide valuable data to inform of the actual NO_2 concentrations at this location.

Meanwhile we can estimate that the required reduction in road NO_x emissions (using Defra's NO_2 to NO_x Calculator) for concentrations to be under 36µg/m^3 (and no longer within 10% of the AQO). Based on Site 15 ground floor residential modelled 2019 concentration of 39.4µg/m^3 and decreasing to 35.4% (which cannot be rounded up to 36 µg/m^3) requires a **16.2% reduction** in road NO_x emissions. However, the actual figures will be substantially lower than that as monitoring results from both 2022 & 2023 at Site 55 show.

Figure 3.4.1 Monitoring results for Site 55



2019 – 40.8µg/m^3 (no distance correction as NO_2 fall-off with distance calculator does not account for height, only horizontal distance). If we apply a distance correction from the monitoring site to the ground floor unit (which is a similar distance from that of the new receptors from the new monitoring site in West Street), it shows that the concentration of NO_2 is 31.2µg/m^3 - as the relevant receptor is the 1st floor flat it is likely that the concentration at this location will be lower as pollutants disperse into the wider atmosphere.

Therefore, it is likely that the concentration of NO_2 in West Street is already compliant with the AQOs as the data in the Detailed Assessment report was based on 2019 data (pre-Covid) and results from this year were higher than they are in 2023. The 2024 monitoring data results may reflect this ongoing trend of declining concentration of NO_2 and will be reported in the 2025 ASR.

Defra had required Central Bedfordshire Council to submit a draft AQAP by the end of March 2024 and so work was in progress to produce this document, then Defra requested 2023 data set, suspending the need for submission of the draft AQAP until they reached a decision regarding the AQMA based on the data submitted. We are still awaiting a decision and have subsequently followed up with an enquiry as to when we may be advised of a decision and were informed that we will be contacted in due course.

The **AQMA at Sandy** was declared in respect of both the annual and 1hour Air Quality Objectives – however the measured concentrations from monitoring sites show that the AQMA has been compliant with the 1hour AQO for 5 years (since 2019). However, the years 2020 & 2021 cannot be used, due to the impact of Covid and so it stands that the site has been compliant in 2019, 2022 & 2023 so only 3 years (without the Covid years).

Results are now significantly below the Air Quality Objective level (it was considered that an annual mean concentration of 60µg/m^3 or above was likely to exceed the 1hour AQO). Results have been below 10% of the AQO (54µg/m^3) since 2020, so as 2020 & 2021 data cannot be used, it is considered that only 2022 & 2023 data should be counted towards evidence to show compliance with the AQO (and below 54µg/m^3).

Compliance with the annual Air Quality Objective at Sandy has only been for the last 2 years (2022 & 2023), with concentrations falling below 10% of the AQO for the first time in 2023.

Therefore, there will need to be a few more years of data showing compliance before revocation of either part of the AQMA is practicable.

The **AQMA at Ampthill** was declared in respect of the annual Air Quality Objective – however the measured concentrations from monitoring sites show that the AQMA has been compliant with the NO_2 annual Air Quality Objective since 2020. However, due to Covid the data from years 2020 & 2021 should not be used for decision making and so these years have been discounted. Thus, compliance has been since 2022 with measured concentrations at all sites recording below 10% of the AQO. Therefore, there will need to be a few more years of data showing compliance before revocation the AQMA is practicable.

The Air Quality Action Plan for Ampthill and Sandy 2019-2024 requires reviewing and updating and this work will commence when the Annual Status Report 2024 has been submitted and when it is known if an updated Action Plan is required for Dunstable (or if we can revoke the Dunstable AQMA – based on the monitoring data submitted to Defra in late March 2024 – Defra have yet to advise of their decision on this matter).

Results at the majority of NO_2 diffusion tube monitoring sites continued to decline again in 2023, many showing results lower than those in 2020 (during Covid & lockdowns), as shown in Figure ES.2: Annual mean concentrations of NO_2 in the UK, 1990 to 2023 on page iii, this is in line with the national trend. The cost of living is still having a detrimental impact on increased rents/mortgages, cost of fuel/petrol/diesel and food, etc., and this may be affecting people’s ability to travel as much. Traffic count data was obtained to show the impact of this.

Traffic flow data was obtained for the A1 (Sandy) from the webtris.highwaysengland.co.uk site on the 9th May 2024 for (TMV sites 6821/1 Northbound between A603 & A421 nr A421 junction); 6820/1 Southbound between A421 & A603 nr Georgetown exit; 6823/1 Northbound between A6001 & A603 and 6822/1 Southbound between A603 & A600.

Only the Site 6820/1 South shows an increase in the traffic flow from 2022 to 2023 and this may be due to the 2022 figure being an average based on January – August 2022 data.

Figure T.1 – Traffic Count (AADT) on A1 Sandy between 2019 and 2023

Year	Site 6821/1 North	Site 6820/1 South	Site 6823/1 North	Site 6822/1 South
2019	14,340	17,247	21,675	22,463
2020	11,430	13,142	16,562	17,163
2021	12,670	14,841	18,492	18,805
2022	13,924	15,533*	20,337	20,405
2023	13,428	16,376	19,548	No data

*Average based on January – August figures

Traffic data was also obtained from https://roadtraffic.dft.gov.uk/manualcountpoints for Dunstable.

Figure T.2 – Traffic Count (AADT) Roads in Dunstable between 2016 & 2022

Year	West St/B489 809855	Luton Rd 38787*	Luton Rd 93016*	Church St 47870**	Church St 93017**	High St North 89005
2016	No data	28,775 mc	No data	17,949 e	No data	No data
2017	No data	28,791 e	No data	17,949 mc	No data	17,694 mc
2018	No data	28,603 e	No data	17,798 e	No data	17,584 e
2019	11,575 mc	28,856 e	No data	17,956 e	No data	17,733 e
2020	12,277 mc	29,585 mc	No data	13,930 e	No data	13,865 e
2021	13,456 e	No data	32,512 e	No data	15,292 e	15,219 e
2022	10,171 mc	No data	26,077 mc	No data	15,136 mc	15,136 e

*both count points have the same grid reference 503032:222093

**both count points have the same grid reference 502010:221920

e = estimated; mc = manual count

The overall downward trend in the traffic data flows from 2021 to 2022 in Dunstable may have some significance to the continuing downward trend in the NO_2 results of the monitoring sites within Dunstable. However, it is interesting to note that there was an increase in traffic flows on the A1 over the same time period and the monitoring data reported a mixture of sites that continued to report a downward trend in concentrations and some sites which showed a slight increase in concentrations in those sites in the vicinity of the A1 in Sandy.

Although this may be tempered by the fact that traffic flows increased in the period 2020/21 and still NO_2 concentration results fell in the majority of sites in Central Bedfordshire, however this occurred during Covid when lockdowns and other restrictions would have had an impact on pollution levels generally.

Unfortunately, the 2023 data is not yet available for the local traffic data and so comparison to the Sandy A1 data (in Figure T.1) is not possible for this period. Although traffic flows on the A1 between 2022 and 2023 decreased at two of the three available data counts and the 2023 monitoring data set continued the downward trend in NO_2 results at all Sandy sites (in the vicinity of the A1).

The 2023 dataset shows that only the annualisation (at one site – Site 58 Hockliffe) and bias adjustment factor was required to be applied (in accordance with Defra Guidance) and **all sites including** N20 met the annual NO_2 AQO, additionally being below 10% of the AQO (36µg/m^3).

It is to be expected that meteoriological factors will play a significant role in the monitoring results and so wind data was obtained from Visual Crossing in May 2024 (data can be viewed in Appendix F) and Windrose and graphs to show the predominant wind direction and speeds.

Figures W.1 and W.1.1 for Sandy (below) clearly shows that the predominant wind direction is from the Southwest (which pushes the emissions from the A1 towards the cottages sited adjacent to the to the road, Site N20). The predominant wind direction at all speeds is south-westerly at the Sandy location.

Similarly Figures W.2 and W.2.1 for Bedfordshire (far below) clearly show that the predominant wind direction is from the Southwest. The predominant wind direction at all speeds is split between South-westerly and Westerly.

The typical wind direction is South-westerly and so the wind direction cannot be held totally accountable for the continuing decrease in concentrations of NO_2 results. Although the wind speeds will play a part in disseminating the emissions into the wider atmosphere.

Figure W.1 - Windrose showing the mean speed (mph) & the wind direction (%) in Sandy during 2023

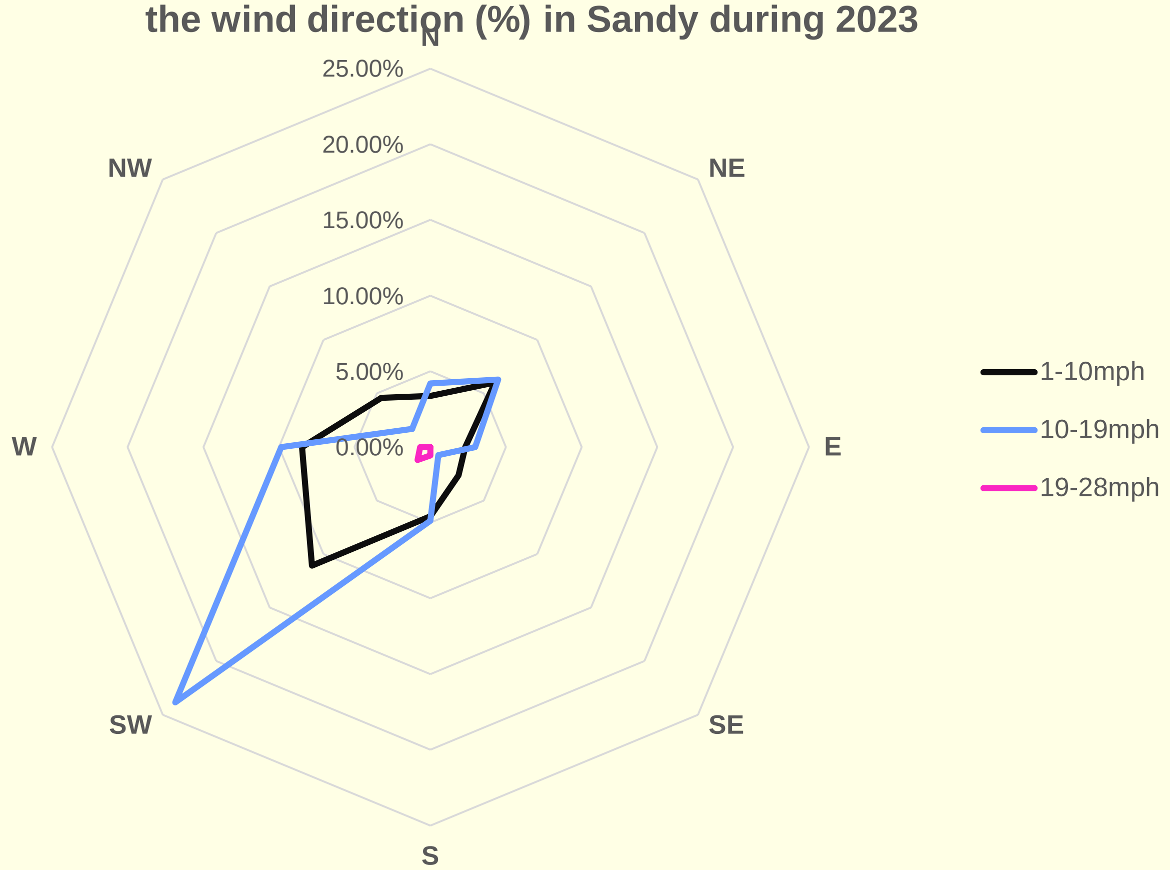
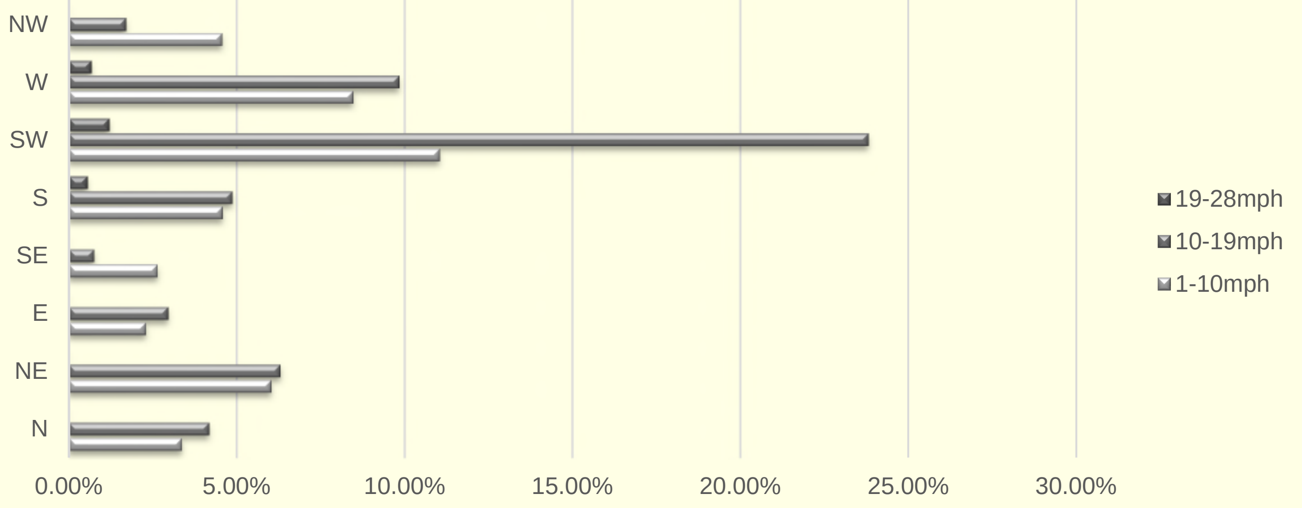


Figure W.1.1 - Graph showing the wind direction (%) in conjunction with mean wind speed (mph) events in 2023 for Sandy



The Luton weather station provides data representative for the rest of Central Bedfordshire, it confirms that the predominant wind direction is southwesterly and the wind is dominant from either the southwest or west at all speeds.

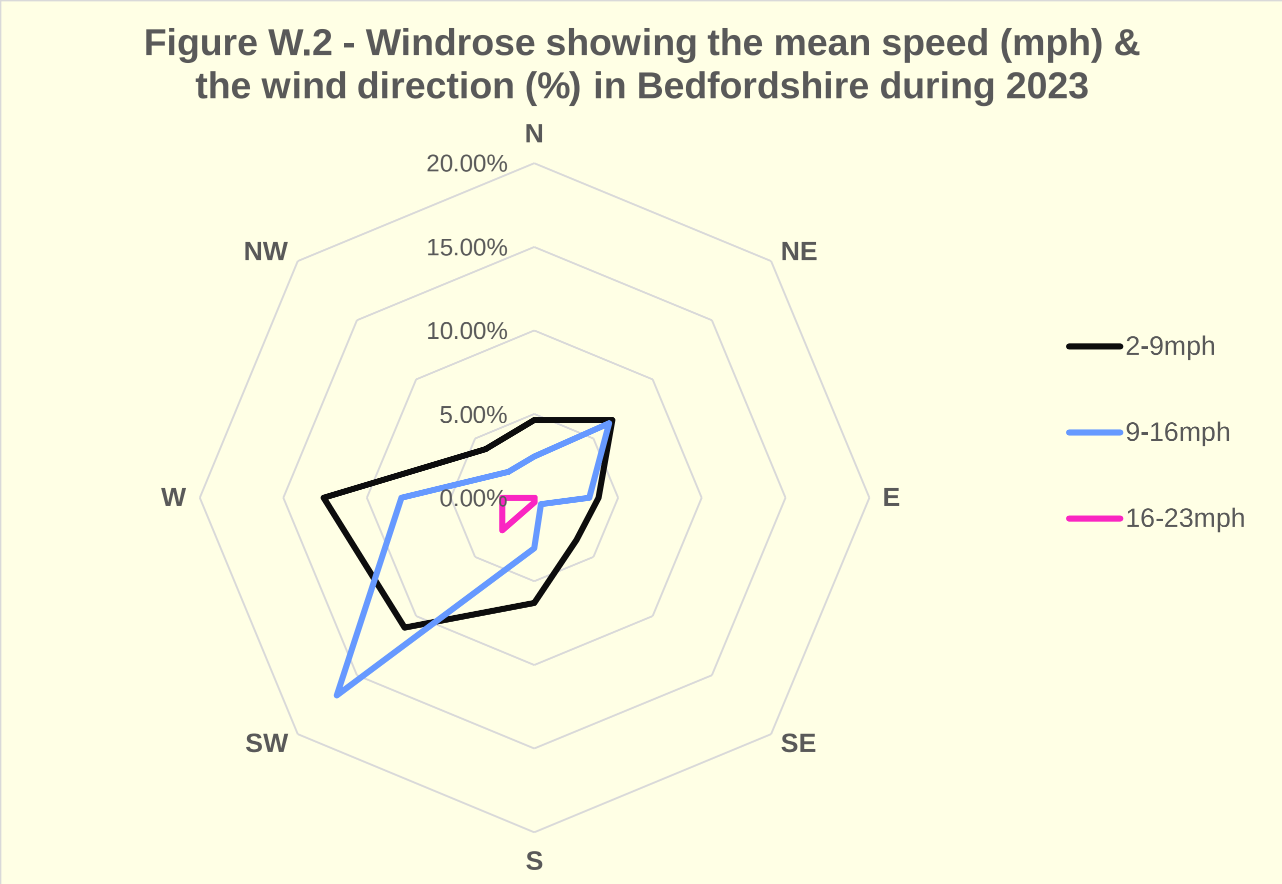


Figure W.2 - Windrose showing the mean speed (mph) & the wind direction (%) in Bedfordshire during 2023
N
NE
E
SE
S
SW
W
NW
20.00%
15.00%
10.00%
5.00%
0.00%
2-9mph
9-16mph
16-23mph

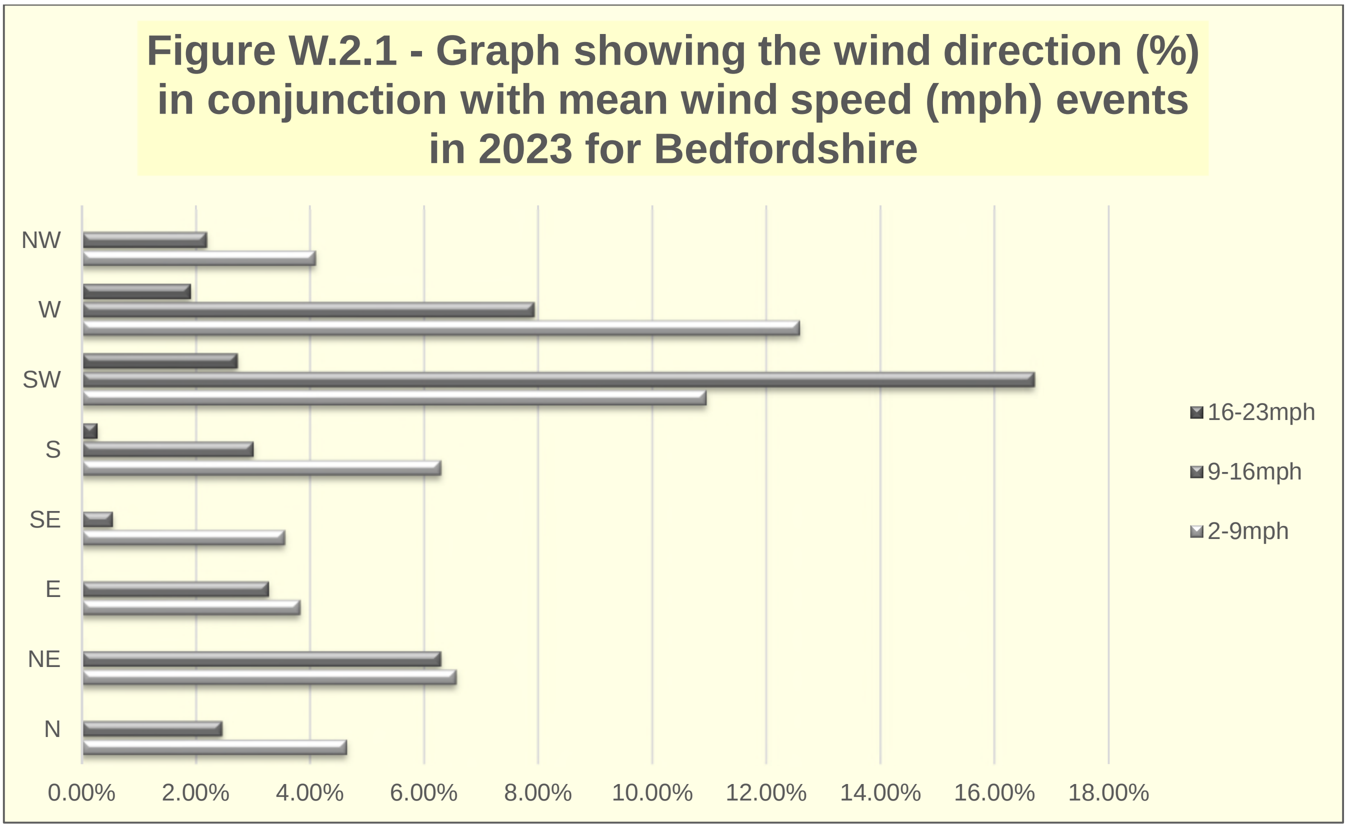


Figure W.2.1 - Graph showing the wind direction (%) in conjunction with mean wind speed (mph) events in 2023 for Bedfordshire
NW
W
SW
S
SE
E
NE
N
0.00%
2.00%
4.00%
6.00%
8.00%
10.00%
12.00%
14.00%
16.00%
18.00%
16-23mph
9-16mph
2-9mph

Local Engagement and How to get Involved.

Emissions from road transportation are the major source of air pollution in the district and therefore the public can help reduce local air pollution concentrations by choosing to walk, cycle and/or use public transport and reduce reliance on cars for journeys where possible.

When using a car for journeys, emissions can be minimised by ensuring that the vehicle is not over revved, and that the engine is switched off when the vehicle is stationary (parked) or is likely to be stationary for a period of time (over a minute). Emissions can be further reduced by removing unnecessary loads from boots and roof carriers to minimise the weight which improves fuel efficiency. The newer the vehicle the greater the level of emission controls it will have and therefore produce less pollution than older vehicles. Electric vehicles produce no traditional exhaust pollutants but will still have tyre wear and brake dust and so particulates and dust will be emitted. Obviously, the electricity used to charge the vehicles would be better to be from renewable sources and the charging completed at a time during lower pressure periods on CO_2 on the national grid.

The following websites provide information to assist with travel in Central Bedfordshire:

- Get around for £2 scheme – scheme extended to 31 December 2024 and operators of many bus services in Central Bedfordshire are taking part.
- Central Bedfordshire Council - Bus timetables, bus routes and service changes | Central Bedfordshire Council
- Central Bedfordshire Council - Rail and travel cards | Central Bedfordshire Council
- Travel Choices - Travel Choices (cbtravelchoices.co.uk) – which has information regarding traffic and travel in/around the district

More general information regarding transport issues in Central Bedfordshire can be found on the Council's website:

- Transport, roads and parking - Transport, roads and parking | Central Bedfordshire Council

Local Responsibilities and Commitment

This ASR was prepared by the Pollution Team in Public Protection of Central Bedfordshire Council with the support and agreement of the following officers and departments:

Jo Borthwick – Head of Public Protection**,** Place & Communities Directorate

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Jo Freedman – Consultant in Public Health

Sarah Naylor – (Arcadis) working on behalf of National Highways

This ASR has been approved by:

Jo Borthwick - Head of Public Protection

This ASR has not been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to Kay Sterling at:

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1 Local Air Quality Management

This report provides an overview of air quality in Central Bedfordshire during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Central Bedfordshire Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in **Table E.1.**

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained and provide dates by which measures will be carried out.

A summary of AQMAs declared by Central Bedfordshire Council can be found in Table 2.1. The table presents a description of the three AQMA(s) that are currently designated within Central Bedfordshire. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMA(s) and the air quality monitoring locations in relation to the AQMA(s). The air quality objectives pertinent to the current AQMA designation(s) are as follows:

- NO_2 annual mean; the nitrogen dioxide annual mean (40µg/m^3 – microgrammes per cubic metre))
- NO_2 1 hour mean; the nitrogen dioxide 1 hour mean (200µg/m^3 not to be exceed more than 18 times a year)

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
AQMA 1 Dunstable	Jan 05	NO_2 Annual Mean	The AQMA incorporates Dunstable town centre the A505 from town centre to junction of Poynters Rd/Dunstable Rd; the A5 from Union St to Borough Rd and the B489/West St from town Centre to St Marys Gate.	NO	2004 = 41µg/m³	2023 = 30.7µg/m³	6 years (since 2018 - but some sites were still within 10% of AQO)	AQAP Dunstable AQAP 2006	Communications - AQAP 2006 Dunstable.pdf - All Documents (sharepoint.com)
AQMA 4 Sandy	Aug 15	NO_2 Annual Mean	The AQMA incorporates 10 metres from the kerbside of both sides of the A1 at the Georgetown exit, then south along the London Road A1 to the Bedford Road junction.	YES	2014 = 74µg/m³	2023 = 32.1µg/m³	2	AQAP Ampthill & Sandy 2019-2024	Communications - Air Quality Action Plan for Ampthill and Sandy 2019-2024.pdf - All Documents (sharepoint.com)
AQMA 4 Sandy	Aug 15	NO_2 1 Hour Mean	The AQMA incorporates 10 metres from the kerbside of both sides of the A1 at the Georgetown exit, then south along the London Road A1 to the Bedford Road junction.	YES	2014 = 74µg/m³	2023 = 32.1µg/m³	5 (since 2019)	AQAP Ampthill & Sandy 2019-2024	Communications - Air Quality Action Plan for Ampthill and Sandy 2019-2024.pdf - All Documents (sharepoint.com)

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
AQMA 3 Ampthill	Aug 15	NO_2 Annual Mean	The AQMA incorporates Bedford Street between Market Sq. & Brewers Lane on both sides of the road; and Church Street between Market Sq. and St Andrews Close on both sides of the road; and Woburn Street incorporating numbers 1 & 3 on both sides of the road; and Dunstable Street from Market Sq. incorporating numbers 114 to 86 and 123 to 99	NO	2014 = 42µg/m³	2024 = 29.2µg/m³	5 (since 2019)	AQAP Ampthill & Sandy 2019-2024	Communications - Air Quality Action Plan for Ampthill and Sandy 2019-2024.pdf - All Documents (sharepoint.com)

☒ Central Bedfordshire Council **confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Central Bedfordshire Council confirm that all current AQAPs have been submitted to Defra.**

µg/m³ – microgrammes per cubic metre

2.2 Progress and Impact of Measures to address Air Quality in Central Bedfordshire

Despite monitoring sites within and surrounding the Dunstable AQMA showing compliance with the NO_2 Annual AQO since 2018, Defra have advised not to revoke it, as some sites showed results within 10% of the AQO (i.e. above 36µg/m^3), which could mean that if there were to be a spike in emissions the AQO limit of 40µg/m^3 could be exceeded and a need for the re-declaration of an AQMA.

However, the Detailed Assessment and Source Apportionment Report (Dec 23) showed that an exceedance of the AQO was highly unlikely. It only showed that one location currently not in the AQMA (as it is a new receptor) may have emissions within 10% of the AQO. This new receptor is within the vicinity of Site 55 in West Street, Dunstable, for which the 2023 results were 30.7µg/m^3. A new monitoring site has been commissioned (Site 66) outside the new residential flats in West Street, Dunstable, which is a comparable distance from the road to that of Site 55 and so may have similar results. The results for Site 66 will be reported in the ASR25.

Defra had required Central Bedfordshire Council to submit a draft AQAP by the end of March 2024 and so work was in progress to produce this document, then Defra requested 2023 data set, suspending the need for submission of the draft AQAP until they reached a decision regarding the AQMA based on the data submitted. We are still awaiting a decision and have subsequently followed up with an enquiry as to when we may be advised of a decision and were informed that we will be contacted in due course.

Defra's appraisal of last year's ASR concluded:

1. There are some inconsistencies and small errors in multiple places throughout the report that the Council should watch out for in future reports. These include:

  a. In discussion the reported concentrations are to two decimal places compared to one decimal place in the Tables. **This matter has been reviewed and the decimal place limited to 1 place in both report and tables.**

  b. The style and formatting changes between Figures in Appendix D as noted in the 2022 ASR appraisal. **This matter has been noted and new figures published to ensure that style and formatting remains consistent in all the Appendix D Figures**

3. CBC used the national bias adjustment factor; no justification was given for this choice. In future, CBC could consider using a local bias adjustment factor if a co-location was set up at the MD3 automatic monitoring site. **Justification for the use of the national bias adjustment factor was included in the 23 ASR – pages 54 & 57. Justification for its use is also included in this ASR.**

4. CBC have carried out an extensive investigation into whether to revoke AQMA 1 including consultation with Defra and planning to carry out modelling to redefine the

boundary of the AQMA. **The Detailed Assessment & Source Apportionment Report (Dec 23) has shown that no monitoring sites within the AQMA are expected to exceed the AQO. However near to Site 55 (West Street Dunstable) which has been within 10% of the AQO, new sensitive receptors have been introduced (residential flats, including a ground floor flat fronting the road) further along the road. A new monitoring site has been set up on a lamppost directly outside the flats. The first results will be for the 2024 year and available after the necessary calculations have been applied (bias adjustment, etc) as in accordance with Defra guidance.**

5. The AQAP for the South Bedfordshire (Dunstable) AQMA 1 is still out of date and requires updating, as it was published more than 5 years ago, as highlighted in the previous ASR appraisal. This should be a priority of CBC in the next reporting year.

Defra had required Central Bedfordshire Council to submit a draft AQAP by the end of March 2024 and so work was in progress to produce this document, then Defra requested 2023 data set, suspending the need for submission of the draft AQAP until they reached a decision regarding the AQMA based on the data submitted. We are still awaiting a decision and have subsequently followed up with an enquiry as to when we may be advised of a decision and were informed that we will be contacted in due course.

6. The ASR contains a very detailed discussion and presentation of the trends observed in the monitoring data, as well as the potential causes for these trends.

7. South Bedfordshire AQMA as detailed on the LAQM Portal and UK Air is labelled as “AQMA 1 Dunstable” and the one-line description is also not consistent with that on the LAQM Portal or UK Air. The one-line description for both AQMA No.4 Sandy and AQMA No.3 Ampthill also do not match that on the LAQM Portal or UK Air. This should be reviewed on the LAQM Portal if incorrect. **The name of the AQMA 1 Dunstable and the one-line descriptions of that and those of the AQMA 3 & AQMA 4 should now match those in the UK-Air portal**

8. Table 2.1 stating the progress of measures for improving air quality does not state the funding status for any measures provided, this should be updated in future reports. **These details have been included where the information has been made available.**

Central Bedfordshire Council has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 25 measures are included within Table 2.2, with the type of measure and the progress Central Bedfordshire Council have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective Action Plans.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
DUNSTABLE															
3	Encourage the adoption of travel plans	Promoting travel alternatives	Workplace Travel Planning	2004	Ongoing	Local Authority Planning; Sustainable Transport Team	Developer; Workplace	No	Funded	Varies	Implementation	<1%	% planning applications with travel plans	Preparation of a travel plan may assist in obtaining planning permission and is a requirement for most major planning applications. New developments are encouraged to register with ModeshiftSTARS (an online platform to assist in monitoring & evaluation of travel plans)	
4	CBC Green Travel Plan	Promoting Travel Alternatives	Workplace Travel Planning	2012	2030	Local Authority Sustainable Transport Team	LA	NO	Not Funded	-	Implementation	<1%	Changes of modes of staff travel (Staff Surveys)	CBC electric cars for use for visits by some staff; secure bike storage. From June 2023 Central Beds Council introduced an electric car leasing scheme to employees to try to increase its sustainability commitments and reduce the grey fleet. Promotion of working from home (which has reduced staff travelling & thereby a positive impact on AQ emissions)	Distance of staff commute and need for travel around district. Combating anxiety with EV vehicle distance performance and recharging accessibility/availability
6	Encouraging walking, cycling & public transport	Promoting Travel Alternatives	Other	2012	2030	Local Authority Sustainable Transport Team; Public Health Team, Public Protection Team	LA	NO	Partially Funded	£1 million - £10 million	Implementation	<1%	passenger numbers / travel survey / time comparison	The Council has published its Sustainability Plan which details several areas in which the Council intends to influence, support, and enable residents and local businesses to adopt sustainable behaviours and practices. The Council has published its Local Cycling and Walking Infrastructure Plans (LCWIPS) which set out our planned approach to improving and expanding our walking and cycling network throughout the authority and connecting into neighbouring authority areas. The Council has published its Bus Service Improvement Plan (BSIP) which sets out our planned approach to improving public transport services throughout the authority and connecting into neighbouring authority areas. The Council have appointed App-Bike, who are establishing a cycle hire scheme within the authority. The Council have appointed HiyaCar, who are establishing an EV Car Club within the authority.	Publicising walking & cycling routes and the guided busway in Dunstable has helped to raise the profile of theses transport methods and improved their uptake. The cycle hire and EV car clubs once established and rolled out across the authority (linked to new development) will give residents an alternative to private car use.
8	Improve / extend cycle path network	Transport Planning and Infrastructure	Cycle network	2012	2030	Local Authority Transport Planning, Sustainable transport/travel	CBC	NO	Partially Funded	£1 million - £10 million	Planning	<1%	additions to network / no of users / no & length of cycle paths improved/created	The Council has published its Local Cycling and Walking Infrastructure Plans (LCWIPS) which set out our planned approach to improving and expanding our walking and cycling network throughout the authority and connecting into neighbouring authority areas. The Council has published its Sustainability Plan which details how	Work priorities changed with the Covid-19 pandemic; a large proportion of the public were working from home or were furloughed whilst in lockdown. This resulted in more people walking and cycling for leisure. As restrictions were lifted the aim was to encourage the levels of walking and cycling witnessed during the lockdowns.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														active travel will be systematically prioritised within transport investment hierarchies.	
10	Encourage use & benefits of public transport	Transport Planning and Infrastructure	Bus route improvements	2012	2030	Local Authority Passenger Transport Team;	LA & Central Government	NO	Funded	£1 million - £10 million	Implementation	2/3%	# Proportion of vehicles complying with emission standards to be 95% by 2024/25 # Including improving EURO Standards of vehicles # Passenger numbers	The Council has published its Bus Service Improvement Plan (BSIP) which sets out our planned approach to improving public transport services throughout the authority and connecting into neighbouring authority areas.	
16 & 33	Improvements to local road network	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2012	2030	LA Strategic Transport Team & Highways Team	CBC – integrated transport budget	NO	Funded	Up to £1,136 million to spend annually (up to 2026-2027) on highway improvement schemes. All scheme proposals to be prioritised.	Planning	1/2%	Congestion /road capacity / density statistics	The Council is currently refreshing the Local Transport Plan (LTP4) which will set out our priorities for expenditure on highway improvement schemes. One of the key priorities will be sustainability in transport, with AQMAs considered in relation to proposed schemes.	
15	Encourage car sharing /walking /cycling	Promoting Travel Alternatives	Other	2012	2030	Local Authority Sustainable Transport Team	CBC	NO	Not Funded		Implementation	<0.5%	Numbers of walkers / cyclists and car sharers registered on Travel Choice website	Green travel initiatives enhanced by Travel Choices programme promoting sustainable travel & reducing impact of journeys	Review council policies / strategies on alternative travel and target actions appropriately
23 & 24	Availability of alternate fuels / more efficient vehicles	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, as fuel recharging	2012	2030	Local Authority Sustainable Transport Team	LEVI	NO	Funded	£1,761,000	Implementation	1%	Number of EV charging points	The Council have been successful in securing grant funding to install electric vehicle charge points in off-street car parks throughout Central Bedfordshire. A full list of locations where electric vehicle charge points have been installed can be found on our website. The Council has also secured funding from the Local Electric Vehicle Infrastructure (LEVI) fund which will help to further expand the electric vehicle charge point provision in residential areas.	Electric vehicle use & the subsequent demand for charging infrastructure is increasing in Central Bedfordshire. Most of our residents will need access to EV charging points near their homes. The Council need to ensure that this need is met & promote the use of EV vehicles to help meet our sustainability commitments. see the EV Infrastructure Strategy 2023 for more information
31	Traffic Management	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2012	2030	Local Authority Passenger Transport Team & Highways Team	CBC – integrated transport budget	NO	Partially funded	Up to £1,136 million to spend annually (up to 2026-2027) on highway improvement schemes. All scheme proposals to be prioritised.	Implementation	<0.5%	Improved journey time reliability for public transport services	The Council has secured funding to implement selective vehicle priority (SVP) at traffic signals, extending green time or shortening red time for approaching buses, allowing buses to pass through a junction more quickly. SVP can assist reliability and punctuality by significantly reducing journey time variability.	No room for dedicated bus lanes to network. Priority traffic management for buses should be completed in Dunstable by end of March 2025

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
AMPTHILL & SANDY															
1	Improve links with Local Transport Plan (LTP)	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	2020	2026	Local Authority Strategic Transport Team & Public Protection Team	CBC – integrated transport budget	NO	Funded	Up to £1,136 million to spend annually (up to 2026-2027) on highway improvement schemes. All scheme proposals to be prioritised.	Implementation	<1%	Inclusion of AQ in LTP4 LTP4 consultation re AQ issues	The Council is currently refreshing the Local Transport Plan (LTP4) which will set out our priorities for expenditure on highway improvement schemes. One of the supporting strategies to LTP4 is a refreshed Freight Strategy which will set out our approach to the strategic routing of freight in Central Bedfordshire. Through the LTP4 consultation process it is likely that various freight related schemes will be promoted to help to further enhance the strategic routing approach set out in the strategy. Air quality related to transport will be considered in the overarching LTP 4 document.	Differing priorities of departments concerned. To raise awareness of AQ issues during the consultation period for LTP4.
3	Improve links with Public Health	Other	Other	2020	2030	Local Authority Public Protection Team & Public Health Team	CBC	NO	Not Funded		Planning	<1%	Number of joint projects; policies etc, in place to ensure air quality is considered where relevant	Develop working partnerships to identify suitable projects (encouraging walking / cycling etc.)	Identify projects which can be developed to be effective for both public health & air quality improvements. Pressure on resources / differing priorities of departments
6	on street parking & deliveries	Traffic Management	UTC, Congestion management, traffic reduction	2020	2030	Local Authority Strategic Transport Team & Highways Team	CBC – integrated transport budget	NO	Funded	Up to £1.136 million to spend annually (up to 2026-2027) on highway improvement schemes. All scheme proposals to be prioritised.	Implementation	<0.5%		The On-street Parking Management Strategy was adopted in December 2022. It sets out how as a local authority we have a legal obligation to manage the road network appropriately, on-street parking is part of this. Unrestricted parking can lead to congestion, obstruction, & pollution, particularly in areas where there is a high demand for on-street parking.	
8	Promote use of EV & ULEV	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2020	2030	Local Authority Sustainable Transport Team	LEVI	NO	Funded	£1,761,000	Implementation	1%	Number of EV charging stations	The Council have been successful in securing grant funding to install electric vehicle charge points in off-street car parks throughout Central Bedfordshire. A full list of locations where electric vehicle charge points have been installed can be found on our website. The Council has also secured funding from the Local Electric Vehicle Infrastructure (LEVI) fund which will help to further expand the electric vehicle charge point provision in residential areas.	Electric vehicle use & the subsequent demand for charging infrastructure is increasing in Central Bedfordshire. Most of our residents will need access to EV charging points near their homes. The Council need to ensure that this need is met & promote the use of EV vehicles to help meet our sustainability commitments. see the EV Infrastructure Strategy 2023 for more information
9	Green incentives for taxi drivers	Promoting Low Emission Transport	Taxi emission incentives	2020	2030	Local Authority Licensing Team	CBC	NO	Not funded		Planning	<0.5%	Emissions controlled via Certificate of Compliance check carried out by DVLA approved garage. Frequency dependent on vehicle age; annual check for 5 years & under and every 6 months for those over 5 years	Taxis must meet higher standards as their annual mileage is much greater and so reflects wear & tear. Emissions from vehicles are included in the testing. Newer vehicles meet the ever-stricter EURO emission standards.	No specific anti-idling conditions or incentives for EV/ULEV vehicle use

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
													Number of ULEV / electric vehicles		
10	Reducing emissions from goods vehicles	Freight and Delivery Management	Delivery and Service plans	2020	2030	LA Strategic Transport Team & Highways Team	CBC – integrated transport budget	NO		Up to £1.136 million to spend annually (up to 2026-2027) on highway improvement schemes. All scheme proposals to be prioritised.	Planning	<1%	Enforce delivery time restrictions (Ampthill); seek voluntary agreements with local businesses re anti-idling deliveries. Agree delivery policy prior to planning permission.	New "On street Parking Management Plan" published December 2022. This document sets out how as a local authority we have a legal obligation to manage the road network appropriately – it does briefly cover deliveries: • Allowing deliveries to take place in town and village centres is essential to ensure that businesses have the supplies they need to successfully trade. Many of our town and village centre streets were not designed to accommodate large delivery vehicles. Such vehicles carrying out deliveries in busy pedestrian areas can have a negative impact on the environment, especially for pedestrians, and in some cases cause a safety concern. • Encourage businesses that have access to a loading area to use it, rather than loading or unloading on-street. This may require staff to park their vehicles elsewhere & the loading area to be cleared of any stored materials to enable the loading area to be used. For businesses that don't have a vehicular access to a loading area, consider implementing loading restrictions to limit the times that loading can take place on-street. Each town or village will have its own peak times – where footfall is highest. Prohibiting loading at the busiest days & times on-street or when the shops are open will help. Before any restrictions are considered, knowledge of the businesses & their loading requirements will need to be understood. • Where space permits, provide loading bays within or near to town centre streets, especially if loading restrictions are implemented on-street. Although it won't be possible to provide a loading bay outside every business, this will allow some space for a larger vehicle to load during times where loading restrictions may prevent loading on-street. This will especially help delivery drivers who may have frequent visits to a town or village centre area with a small number or size of delivery. • Promote the use of parcel collection points for small deliveries. • Promote the use of low or zero-emission vehicles for deliveries, E-cargo bikes, drones, and any other emerging last mile solution that reduces the reliance on large vehicles carrying out regular deliveries in town and village centres.	New Freight Strategy in progress and will be published soon. Enforce delivery time restrictions (Ampthill); seek voluntary agreements with local businesses re anti-idling deliveries. Agree delivery policy prior to planning permission.
11	reducing emissions from Council's fleet	Vehicle Fleet Efficiency	Other	2020	2030	Local Authority Fleet Management Team	CBC Fleet Management	NO			Implementation	1%	Number of ULEV/electric vehicles in fleet	The Council purchased 7 electric vehiclesin April 2020 (replacing diesel vans From June 2023 Central Beds Council introduced an electric car leasing scheme to employees to try to increase its sustainability commitments and reduce	

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														the grey fleet. All Non-electric vehicles in the council's fleet are Euro 6 standard vehicles.	
12	Promote Lift-share, Dial-a-ride & Travel Choices	Alternatives to private vehicle use	Other	2020	2030	Local Authority Sustainable Transport Team & Passenger Transport Team	CBC	NO	Not funded		Implementation	<1%	User numbers	There are a range of shared community transport providers throughout Central Bedfordshire including Buzzer Buses, Flittabus, Greensands Country, Ivel Sprinter, Roadrunner, South Beds Dial a Ride and Wanderbus. They operate an extensive network of third-tier bus services, providing scheduled bus journeys linking rural areas and villages with town centres and retail facilities. Most of the services are limited to operate on specific days only – some on a weekly or monthly basis. Many of these providers also operate membership-based, Dial-a-Ride, door to door services. These services provide "lifeline" passenger transport journeys in many parts of Central Bedfordshire not served by the more regular services. The services are especially valued by residents living in rural areas, and by older and mobility impaired people, who appreciate the extra support offered by the drivers.	Green travel initiatives enhanced by Travel Choices Programme promoting sustainable travel & reducing impact of journeys
14	Support Public Health's initiatives to promote walking/cycling (Excess Weight Strategy)	Promoting Travel Alternatives	Other	2020	2030	Local Authority Public Protection & Public Health Teams	CBC	NO			Planning	<0.5%	Public Health aims to increase physical activity and reduce levels of obesity, whilst Public Protection aims to improve air quality and reduce concentration levels of pollution, the path to achieve these objectives can be a shared one	Covid impacts greatly restricted Public Health resources CBCs website has links to Active Lifestyles information with leaflets, getting active online and outdoors, giving walking routes and organisations providing walks. The site also offers the opportunity for referrals to Active Lifestyles via GPs	Covid impacts. Physical Activity Strategy 2020-2026
15	Participate with other council initiatives which could impact on AQ	Other	Other	2020	2030	Local Authority Public Protection Team	CCBC Public Protection	NO	Not funded		Planning	<0.5%	Number of initiatives involved with	Strategic Planning – creation of Sustainability Planning Working Group to review policies & ways to deliver Councils sustainability ambitions within the Local Plan	Review of policies (etc) ongoing. Review delayed due to absence of key government decisions on national policy & plan making, etc.
16	Promote travel planning	Promoting Travel Alternatives	Workplace Travel Planning	2020	2030	Local Authority Sustainable Transport Team, Planning Team	Developer.	NO	Funded	Varies	Implementation	<1%	Number of schemes, Planning conditions, / continue to work with schools, businesses and developers, STARS	New developments are encouraged to register with ModeshiftSTARS (an online platform to assist in monitoring & evaluation of Travel Plans) Active Travel England are consulted in all large planning applications as they became a statutory consultee from 1/6/2023. This means that they will be consulted for applications for developments equal to or exceeding 150 housing units, 7,500m2 of floorspace or an area of 5 hectares. It will involve some 3,100 applications per year and account for 60% of new homes.	In 2022, Active Travel England was established as a separate agency within the Department for Transport with a remit to drive a transformation towards active travel in larger towns and cities. Their remit is to work with local authorities to achieve the goal of 50% of local journeys undertaken on foot, by bike, or scooted by 2030.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														This will assist Local Authorities to implement good active travel design.	
17*	Promote walking / cycling	Promoting Travel Alternatives	Promotion of cycling	2020	2030	Local Authority Sustainable Transport Team, Public Health Team, Public Protection Team.	CBC.	NO	Partially funded	£1 million - £10 million	Implementation	<1%	Improvements or maintenance to/of environments, promote benefits, STARS	The Council has published its Sustainability Plan which details several areas in which the Council intends to influence, support, and enable residents and local businesses to adopt sustainable behaviours and practices. The Council has published its Local Cycling and Walking Infrastructure Plans (LCWIPS) which set out our planned approach to improving and expanding our walking and cycling network throughout the authority and connecting into neighbouring authority areas. The Council has published its Bus Service Improvement Plan (BSIP) which sets out our planned approach to improving public transport services throughout the authority and connecting into neighbouring authority areas. The Council have appointed App-Bike, who are establishing a cycle hire scheme within the authority. The Council have appointed HiyaCar, who are establishing an EV Car Club within the authority.	Publicising walking & cycling routes and the guided busway in Dunstable has helped to raise the profile of theses transport methods and improved their uptake. The cycle hire and EV car clubs once established and rolled out across the authority (linked to new development) will give residents an alternative to private car use.
17*	Promote walking / cycling	Promoting Travel Alternatives	Promotion of walking	2020	2030	Local Authority Sustainable Transport Team, Public Health Team, Public Protection Team	**CBC**	NO	Partially funded	£1 million - £10 million	Implementation	<1%	Improvements or maintenance to/of environments, promote benefits, STARS	As above	As above
18	Promote use of public transport	Promoting Travel Alternatives	Other	2020	2030	Local Authority Passenger Transport Team	CBC & Central Government	NO	Funded	£1 million - £10 million	Implementation	2/3%	Proportion of vehicles complying with emission standards to be 95% by 2024 / 25 / improving EURO Standards of vehicles / passenger numbers comparison	The Council has published its Bus Service Improvement Plan (BSIP) which sets out our planned approach to improving public transport services throughout the authority and connecting into neighbouring authority areas.	

<u>Dunstable</u>

- **Measure 8 –** Improve / extend the cycle path network – the Progress Report on the Sustainability Plan 2020-2030 V2 Sept 2020, for the period up to January 2023 detailed what has been achieved and the issues to be focussed on in 2023/24 and into 2024/25 such as the
    - Completion of the Local Cycling and Walking Infrastructure Plans (including one for Dunstable & Houghton Regis) and adoption by the council. **Five of six plans were adopted by the Council's Executive in April 2024 and work has commenced on designs for various network improvements to increase the proportion of shorter journeys in urban areas that are walked, wheeled or cycled.**
    - Develop a 10-year active travel investment plan that includes prioritised projects identified in LCWIP. **Work is now underway to develop the investment plan and a pipeline of schemes to be implemented as funding becomes available, with routes to schools, railway stations / mobility hubs and town centres to be afforded the highest priority.**
    - Ensure active travel is systematically prioritised within transport and investment hierarchies. Build on the Council's road safety work to improve cyclists and pedestrians' confidence. **How scheme investment will be prioritised will be addressed in Issue 4 of the Council's Local Transport Plan with a focus on achieving quantifies reductions in carbon emissions.**
    - Invest and facilitate investments in off-road cycle track and where possible, public transport, to improve countryside access and strategic connectivity between towns. Engage landowners and work with Town and Parish Councils to create safe cycling routes between villages. This will promote micro-mobility and increase access to key social services such as healthcare. **These objectives are being addressed through the development of a Local Cycling and Walking Infrastructure Plan specifically for more rural based routes and a suite of Green Wheel masterplans for all of the authority's main conurbations. The 'Rural Routes' LCWIP proposed network will be publicised in the summer of 2024 through a public engagement exercise. Four Green Wheels masterplans have been approved and three are in active development.**
    - **As there are very limited opportunities to create segregated infrastructure within the carriageway within Central Bedfordshire the priority is to provide adjacent to carriageway or off-road cycle tracks – which is set out in each LCWIP.**
    - Invest and facilitate investments in cycling and public transport facilities improvements including cycle parking, maintenance/repair stations and bus shelters.

See also Dunstable measures 6 & 15 and Ampthill & Sandy 17a & 17b

- **Measure 10 –** Encourage greater take up of available public transport services (it is noted that approximately 70% of all buses operating in Central Bedfordshire are Euro 6 compliant, but most of the buses operating in Dunstable are commercially operated and not supported by Central Bedfordshire Council and so not the council's fleet).

  The Strategy "Bus Back Better" aims to improve bus travel. Central Bedfordshire Council submitted their "Bus Service Improvement Plan" to the DfT. Their Enhanced Partnership Plan & Scheme is for the period 1 April 2022 to 31 March 2027 and can be viewed at Enhanced Partnership Plan & Scheme 2022-2027.docx works in conjunction with Central Bedfordshire Council's Bus Service Improvement Plan Reviewed October 2022 which can be viewed at Central Bedfordshire Council's Bus Service Improvement Plan (October 2022) to improve bus travel across the district. Goals include:

  - **Priority traffic management schemes for buses should be completed in Dunstable by end of March 2025**
  - **Progress is continuing the phased installation of bus shelter upgrades and Realtime Passenger Information Displays on selected routes – to enhance users experience & encourage greater usage.**
  - **Progress on multi-journey, multi-operator ticketing for travel in Central Bedfordshire and journeys to destinations beyond this boundary – the MoJo ticket scheme launched on 15 April 2024. However, work will continue with neighbouring Enhanced Partnerships to develop & co-ordinate such schemes (and the acceptance of MoJo tickets).**
  - **Luton-Dunstable Guided Busway to become Zero emission – working to identify all potential sources of funding for the conversion of the busway vehicle operating fleet to full zero emission.**
  - **Partnership will encourage the upgrade of vehicles operating core busway services to common minimum standards including EURO VI emission standards.**
  - **The Council will introduce additional requirements in its tendering for supported bus services to require defined standards for vehicle emissions and age limits on the vehicles operating contracted bus services.**
  - **Agreed that all new tenders should require that buses are EURO 5 as a minimum.**
  - ***At this time congestion is not at levels to warrant introducing further bus lanes (also there is very limited room for such a measure). However, the council will monitor the situation.***
  - ***Currently provision of electric buses is not, yet, commercially viable and the routes we provide are insufficient for us to do it in Dunstable. However, the costs will reduce, and the infrastructure will emerge so it may be a potential measure at some point in the future.***

See also Dunstable Measure 31 and Ampthill & Sandy Measure 18

- **Measures 16 & 33** – Improvements to local road network - Strategic highway improvements including re-prioritising road space away from cars, traffic demand management and access management, e.g., selective vehicle priority, bus priority, bus lanes, high vehicle occupancy lanes.

  Since 2011 there have been several changes that have affected transport priorities for Central Bedfordshire. These include the release of new national guidance such as LTN 1/20 Cycle Infrastructure Design; the adoption of documents such as the Local Plan and the Sustainability Plan; and the impact of Covid-19.

  Therefore, it was decided to start work on the Local Transport Plan (LTP4) to ensure that these changes and others are captured and so that the types of improvement schemes that are delivered reflect them.

  Commencement of work on LTP4 was approved at **Executive** in April 2022, with the view of having new documents approved and ready for adoption by spring/summer 2024. Documents that relate to LTP3 will remain active until they are superseded by updated LTP4 documents.

- **Measures 23 & 24** Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV recharging, gas fuel recharging.

  The council has already commenced improvements with new charging points in the district, as of July 2023 there were 128 publicly available EV charging points in the district, of which 17 are classed as rapid and above (representing 43.3 units per 100,000 population in comparison to a UK average of 65.7 per 100,000 population).

  Forecasts for Central Bedfordshire estimate that the number of public charge points required by 2030 is around 2,300 increasing to approximately 6,400 by 2050 (based on medium uptake projections and an approach lending residential and hub provision.

  It is important to note that not all these charge points are to be provided by the Council and public sector investment. The provision will be scattered across the variety of uses and locations, such as supermarkets and other popular destinations, widening the charging options available to drivers.

  The Council will be seeking to partner with private sector providers of electric vehicle infrastructure to install and grow the network within Central Bedfordshire. From the perspective of charge points, this will largely involve the installation of slow/standard/fast units for residential use, at a rate of circa 300 units per year, as this is where the bulk of the need is. These charge points will be complemented by rapid/ultra-rapid units in strategic locations, such as town centres and close to main transport routes, with this type of provision also having a role to play in residential charging.

  The Electric Vehicle Charging: Guidance for New Development Supplementary Planning Document (SPD) (PDF) sets out the requirements for electric vehicle charging points to be provided for all new developments in Central Bedfordshire &

provides guidance on the types, design, layout & standards of electric vehicle charging, as well as the information that developers are required to provide at the planning application stage. It was adopted on 6 December 2022 & it is a material consideration in determining planning applications. All development proposals will be required to demonstrate that they have taken it into consideration.

Alongside the development of the application for LEVI funding, the Council will start to compile tender specifications for the various projects contained within the EV Infrastructure Strategy, with a view to partner with operators and start work on delivery as soon as practicably possible.

See the Central Bedfordshire Council Electric Vehicle Infrastructure Strategy (2023) for more information

See also Sandy & Ampthill measure 8

- **Measure 31** Strategic highway improvements including reprioritising road space away from cars, traffic demand management and access management e.g., selective vehicle priority, bus priority, bus lanes, high vehicle occupancy lanes.

  Strategy “Bus Back Better” set to improve bus travel. Central Bedfordshire Council have submitted their “Bus Service Improvement Plan” to DfT. The Enhance Partnership Plan & Scheme is for the period 1 April 2022 to 31 March 2027 and can be viewed at Enhanced Partnership Plan & Scheme 2022-2027.docx works in conjunction with Central Bedfordshire Council's Bus Service Improvement Plan Reviewed October 2022 which can be viewed at Central Bedfordshire Council's Bus Service Improvement Plan (October 2022) to improve bus travel across the district. Goals include:

  The Partnership will use the Whole Route Implementation Plan (WRIP) approach outlined in M7 to assess key routes within Central Bedfordshire to identify potential hard and soft bus priority measures and will use the improved Highways Liaison Forum established in measure S8 to promote these schemes for implementation. The rural nature of much of Central Bedfordshire, and the constraints of the fabric of the market towns, mean that there will be few opportunities for the introduction of additional “hard” bus priority measures.

  However, soft measures such as selective vehicle priority (SVP) at traffic signals, extending green-time or shortening red-time for approaching buses, allowing buses to pass through a junction more quickly. SVP can assist reliability and punctuality by significantly reducing journey time variability. The Partnership will also lobby for the retention and improvement to access for buses in town centres.

  In addition, Central Bedfordshire Council will consult with the Partnership on new development proposals, as they come forward, to identify any opportunities for bus priority within the development design.

  - It is planned that bus priority traffic management arrangements should be in place by March 2025 (Dunstable) – no further information is available.

See also Dunstable Measure 10 and Ampthill & Sandy Measure 18

<u>Sandy & Ampthill</u>

- **Measure 1 –** improve links with Local Transport Plan (LTP)

Since 2011 there have been several changes that have affected transport priorities for Central Bedfordshire. These include the release of new national guidance such as LTN 1/20 Cycle Infrastructure Design; the adoption of documents such as the Local Plan and the Sustainability Plan; and the impact of Covid-19.

Therefore, it was decided to start work on the Local Transport Plan (LTP4) to ensure that these changes and others are captured and so that the types of improvement schemes that are delivered reflect them.

Commencement of work on LTP4 was approved at Executive in April 2022, with the view of having new documents approved and ready for adoption by spring/summer 2024. Documents that relate to LTP3 will remain active until they are superseded by updated LTP4 documents.

  - Consultation on new LTP4 is live (June 2024)

- **Measure 6 –** On street parking and deliveries

New "On street Parking Management Plan" published December 2022.
This document sets out how as a local authority we have a legal obligation to manage the road network appropriately, on-street parking is part of this.

  - Unrestricted parking can lead to congestion, obstruction, & pollution, particularly in areas where there is a high demand for on-street parking.
  - Better management of on-street parking can have a positive impact by ensuring spaces are used efficiently & effectively.

Having a consistent On-Street Parking Management Strategy will ensure that parking in local areas can be dealt with in a fair & consistent way. Good parking decisions can also improve safety & quality of life for residents. A well planned & managed approach to parking can help make our towns & local communities better places to live, work & visit.

- **Measure 8 –** Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV recharging, gas fuel re-charging

In January 2023 there were 128 publicly available EV charging points in the district (of which 17 are classed as rapid and above).

The council have been trialling schemes for residents with no off-road facilities to charge vehicles via pavement channels, the second scheme is ongoing and once this scheme is completed the results will be collated and both schemes compared. This will assist in how we can move forward with pavement cable channels and EV charging infrastructure in Central Bedfordshire. The cable channels could offer one small solution to the wider need for EV charging infrastructure but if the schemes are successful then we hope to be able to offer this as an option to residents at a cost.

See also Dunstable measures 23 & 24

- **Measure 10** – reducing emissions from goods vehicles

The Sustainability Plan (which was adopted in September 2020) includes actions to support the logistics sector reducing carbon footprint by facilitating use of EV or ULEV and enabling novel approaches to "last mile deliveries" and the creation of consolidation centres.

In July 2021 the Council's Local Plan was adopted, setting out how the area is to develop to 2035. The plan addresses future needs and opportunities in relation to infrastructure, homes, jobs and businesses, community facilities and the environment. It establishes clear principles and sound policies for all future development including the allocation of land for new growth. Policy T6 sets out the Council's policy for the movement and management of freight in relation to new development:

Where development will result in a movement of freight:

- Require evidence in Transport Assessment that realistic alternatives to road-based haulage are not possible/practical.
- Developments generating significant freight are located where least negative impact for the environment/local community (i.e. Industrial Areas close to the Designated Freight Road Network (DFRN)).
- Require Traffic Management measures & developer contributions to mitigate impact where necessary.

The Local Transport Plan (LTP) forms a long-term framework for investment in transport infrastructure and services in Central Bedfordshire. It considers the needs of all forms of transport including walking, cycling, buses, rail, freight, and car use. It is a statutory requirement for the authority to produce and maintain the LTP; it has been the method through which Central Government funds local transport schemes since 2000. The aim of the LTP is to enable a strategic approach to the delivery of transport schemes, and to help secure lasting changes in travel behaviour. The emerging Freight Strategy (2024) is one of the supporting transport strategies for the developing LTP4, which Executive Committee approved to commence work on in April 2022 (with the aim of having new documents approved and ready for adoption by Spring/Summer 2026), as part of our approach to network management.

The overall aim of the Freight Strategy 2024 is to support businesses, the local economy and residents by promoting the efficient movement of freight, whilst limiting emissions and minimising & managing the impact of vehicle movements on local communities.

Objectives include:

- Central Bedfordshire Council to encourage freight operators to use the most appropriate routes & to minimise the negative impact freight may have on local communities.

- o Central Bedfordshire Council to support freight operators in minimising environmental impact of freight movement in Central Bedfordshire.

The Freight Strategy goes into details how these objectives may be achieved, via the proposed actions to mitigate issues identified throughout the strategy.

In addition the New "On street Parking Management Plan" published December 2022. This document sets out how as a local authority we have a legal obligation to manage the road network appropriately – it does briefly cover deliveries:

- o Allowing deliveries to take place in town and village centres is essential to ensure that businesses have the supplies they need to successfully trade. Many of our town and village centre streets were not designed to accommodate large delivery vehicles. Such vehicles carrying out deliveries in busy pedestrian areas can have a negative impact on the environment, especially for pedestrians, and in some cases cause a safety concern.
- o Encourage businesses that have access to a loading area to use it, rather than loading or unloading on-street. This may require staff to park their vehicles elsewhere & the loading area to be cleared of any stored materials to enable the loading area to be used. For businesses that don't have a vehicular access to a loading area, consider implementing loading restrictions to limit the times that loading can take place on-street. Each town or village will have its own peak times – where footfall is highest. Prohibiting loading at the busiest days & times on-street or when the shops are open will help. Before any restrictions are considered, knowledge of the businesses & their loading requirements will need to be understood.
- o Where space permits, provide loading bays within or near to town centre streets, especially if loading restrictions are implemented on-street. Although it won't be possible to provide a loading bay outside every business, this will allow some space for a larger vehicle to load during times where loading restrictions may prevent loading on-street. This will especially help delivery drivers who may have frequent visits to a town or village centre area with a small number or size of delivery.
- o Promote the use of parcel collection points for small deliveries.
- o Promote the use of low or zero-emission vehicles for deliveries, E-cargo bikes, drones, and any other emerging last mile solution that reduces the reliance on large vehicles carrying out regular deliveries in town and village centres.

- **Measure 16 -** Promote travel planning.
  All new developments of any significant scale, including both residential and commercial are required to produce a travel plan as a condition of any planning approval and are encouraged to register with ModeshiftSTARS (an online platform to assist in monitoring and evaluation of Travel Plan measures). The overarching target is to achiever at least a ten percent improvement in the number of journeys to/from a

development that are made by sustainable modes of transport against an agreed "baseline".

Active Travel England are now consulted in all large planning applications having become a statutory consultee from 1/6/2023. This includes all applications for developments equal to or exceeding 150 housing units, 7,500m^2 of floorspace or an area of 5 hectares. It will involve some 3,100 applications per year and account for 60% of new homes. Their comments are expected to assist the work of Local Authorities in implementing high quality active travel (walking and cycling) infrastructure serving both new and existing developments.

- **Measures 17a & 17b** – Promotion of cycling and walking

  The Progress Report on the Sustainability Plan 2020-2030 V2 Sept 2020, for the period up to January 2023 detailed what has been achieved and the issues to be focussed on in 2023/24 and into 2024/25 such as the

  - Completion of the Local Cycling and Walking Infrastructure Plans (including one for Dunstable & Houghton Regis) and adoption by the council. **Five of six plans were adopted by the Council's Executive in April 2024 and work has commenced on designs for various network improvements to increase the proportion of shorter journeys in urban areas that are walked, wheeled or cycled.**
  - Develop a 10-year active travel investment plan that includes prioritised projects identified in LCWIP. **Work is now underway to develop the investment plan and a pipeline of schemes to be implemented as funding becomes available, with routes to schools, railway stations / mobility hubs and town centres to be afforded the highest priority.**
  - Ensure active travel is systematically prioritised within transport and investment hierarchies. Build on the Council's road safety work to improve cyclists and pedestrians' confidence. **How scheme investment will be prioritised will be addressed in Issue 4 of the Council's Local Transport Plan with a focus on achieving quantifies reductions in carbon emissions.**
  - Invest and facilitate investments in off-road cycle track and where possible, public transport, to improve countryside access and strategic connectivity between towns. Engage landowners and work with Town and Parish Councils to create safe cycling routes between villages. This will promote micro-mobility and increase access to key social services such as healthcare. **These objectives are being addressed through the development of a Local Cycling and Walking Infrastructure Plan specifically for more rural based routes and a suite of Green Wheel masterplans for all the authority's main conurbations. The 'Rural Routes' LCWIP proposed network will be publicised in the summer of 2024 through a public engagement exercise. Four Green Wheels masterplans have been approved and three are in active development.**

- **As there are very limited opportunities to create segregated infrastructure within the carriageway within Central Bedfordshire the priority is to provide adjacent to carriageway or off-road cycle tracks – which is set out in each LCWIP.**
- Invest and facilitate investments in cycling and public transport facilities improvements including cycle parking, maintenance/repair stations and bus shelters.

See also Dunstable measures 6, 8 & 15

- **Measure 18** - Promote use of public transport.
  It is noted that approximately 70% of all buses operating in Central Bedfordshire are Euro 6 compliant.

  Strategy “Bus Back Better” set to improve bus travel. Central Bedfordshire Council submitted their “Bus Service Improvement Plan” to DfT. The Enhance Partnership Plan & Scheme is for the period 1 April 2022 to 31 March 2027 and can be viewed at Enhanced Partnership Plan & Scheme 2022-2027.docx works in conjunction with Central Bedfordshire Council's Bus Service Improvement Plan Reviewed October 2022 which can be viewed at Central Bedfordshire Council's Bus Service Improvement Plan (October 2022) to improve bus travel across the district.
  Goals include:

  - **Progress is continuing the phased installation of bus shelters and Realtime Passenger Information Displays on selected routes – to enhance users experience & encourage greater usage.**
  - **Progress on multi-journey, multi-operator ticketing for travel in Central Bedfordshire and journeys to destinations beyond this boundary – the MoJo ticket scheme launched on 15 April 2024. However, work will continue with neighbouring Enhanced Partnerships to develop & co-ordinate such schemes (and the acceptance of MoJo tickets).**
  - Partnership will encourage the upgrade of vehicles operating core busway services to common minimum standards including EURO VI emission standards.
  - **The Council will introduce additional requirements in its tendering for supported bus services to require defined standards for vehicle emissions & age limits on the vehicles operating contracted bus services.**
  - **Agreed that all new tenders should require that buses are EURO 5 as a minimum.**

  The Partnership will use the Whole Route Implementation Plan (WRIP) approach outlined in M7 to assess key routes within Central Bedfordshire to identify potential hard and soft bus priority measures and will use the improved Highways Liaison Forum established in measure S8 to promote these schemes for implementation. The rural nature of much of Central Bedfordshire, and the constraints of the fabric of the market towns, mean that there will be few opportunities for the introduction of additional “hard” bus priority measures.

However, soft measures such as selective vehicle priority (SVP) at traffic signals, extending green-time or shortening red-time for approaching buses, allowing buses to pass through a junction more quickly. SVP can assist reliability and punctuality by significantly reducing journey time variability. The Partnership will also lobby for the retention and improvement to access for buses in town centres.

In addition, Central Bedfordshire Council will consult with the Partnership on new development proposals, as they come forward, to identify any opportunities for bus priority within the development design.

See also Dunstable Measures 10 & 31

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Central Bedfordshire Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of AQMA 4 Sandy (with regards to the annual NO_2 AQO), although it is worth noting that all sites are showing compliance with the AQOs in 2023.

Given the continuing downward trend in NO_2 concentrations in annual results, that both Dunstable (AQMA 1) and Ampthill (AQMA 3) may likely be revoked with a few more years of monitoring to show compliance with the objective (and be under the 10% of the AQO - i.e. below 36µg/m^3).

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations.

The Environment Act 2021 introduced two legally binding long-term targets for $PM_{2.5}$:

- Annual mean concentration of 10 micrograms per cubic meter (µg/m^3)
  - With an interim target of 12µg/m^3 by 2028;
- Reduction in average population exposure by 35% by 2040, compared to 2018 baseline:
  - With an interim target of 22% reduction in average population exposure compared to 2018 baseline by 2028

Whilst the responsibility for meeting the $PM_{2.5}$ targets sites with national government; local authorities have a role to play in delivering reductions in $PM_{2.5}$.

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[8], local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). Actions to tackle NO_x/PM_{10} can be expected to contribute towards this.

There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Central Bedfordshire Council has not yet identified any measures targeted specifically at reducing $PM_{2.5}$ and it is considered unlikely that any such measures will be identified over the coming years. Instead, and in line with Technical Guidance LAQM.TG22 it is anticipated that:

- Measures to reduce emissions of NO_x by encouraging a move away from internal combustion engine vehicles to ultra-low emission vehicles (ULEV) will reduce $PM_{2.5}$ emissions from exhausts;
- Measures to reduce road travel altogether will reduce $PM_{2.5}$ emissions from brake and tyre wear and dust re-suspension.

The following measures that Central Bedfordshire Council are undertaking will benefit $PM_{2.5}$ emissions, as will a number that appear in Table 2.2 (on page 8)

- Increased evidence and awareness of the harm from exposure to $PM_{2.5}$ – through the acquisition of 3 lower-cost monitors which will monitor $PM_{2.5}$, PM_{10} and NO_2. These will be sited within the 3 current AQMAs and provide valuable real time information and data on these pollutant concentrations, they will help identify any areas with elevated emissions of $PM_{2.5}$ so that action can be taken to try to identify the sources and put in place measures to reduce concentrations of $PM_{2.5}$. Where

[8] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

areas are shown to be compliant with emission targets for $PM_{2.5}$ the monitors may be moved to suitable new locations to ascertain pollutant concentrations.

- To continue to provide LSO duties at the AURN real-time monitoring station in Sandy (adjacent to the A1) which monitors $PM_{2.5}$, PM_{10} and NO_2 and to help monitor concentrations of $PM_{2.5}$ to ensure that targets are being met.
- Quality Bus Partnership (Dunstable AQAP measures 10 & 31 and Ampthill & Sandy AQAP measure 18):
  - Luton-Dunstable Guided Busway to become Zero emission – working to identify all potential sources of funding for the conversion of the busway vehicle operating fleet to full zero emission.
  - Partnership will encourage the upgrade of the vehicles operating core busway services to common minimum standards including EURO VI emission standards.
  - The council will introduce additional requirements in its tendering for supported bus services to require defined standards for vehicle emissions & age limits on the vehicles operating contracted bus services.

Given the impacts on heath from smaller particles, focus has been directed on $PM_{2.5}$, Central Bedfordshire Council has been monitoring this pollutant at the automatic real-time station in Sandy since 2013.

On February 7th, 2019, the analysers monitoring PM_{10} and $PM_{2.5}$ were changed from TEOMs to BAMs, the site remains part of the AURN network for particulate matter. However, it makes direct comparison to previous years' results data difficult.

As can be seen by the results discussed later in this document – levels of $PM_{2.5}$ monitored have slightly dropped year on year since monitoring began in 2013 until a slight increase in 2018, before decreasing again. However, data capture rates were low and as such results were subject to annualisation calculations (as stipulated by Defra and carried out in accordance with their guidance) in years 2017, 2018, 2020 & 2021. The 2020 result of 9.2a µg/m^3, was solely based on BAM analyser data, which had a low data capture for the year 73.57% and therefore data was annualised. Similarly, the 2021 result of 9.2a µg/m^3 was annualised due to a low data capture rate of 70%. This was carried out in accordance with Defra guidance.

The 2022 result of 8 µg/m^3 (data capture of 87%), the result from 2023 was 8µg/m^3 (data capture of 90%) and therefore did not require annualisation.

The 2023 result meets the current UK legislative targets.

However, the WHO (World Health Organisation) 2005 guidelines recommended an "ultimate goal" for concentrations of 10µg/m^3. However, in 2021 this limit was subsequently reduced to 5µg/m^3.

To monitor results of the $PM_{2.5}$ Public Outcomes Framework Indicator (PHOI) for the fraction of mortality attributable to particulate air pollution measured as fine particulate matter ($PM_{2.5}$). On May 8th, 2023, the 2022 data was obtained from Public Health

Outcomes Framework - Data - OHID (phe.org.uk) The above is considered the most pragmatic and viable approach and it has also considered how Central Bedfordshire ranks in terms of PHOI alongside other areas of Bedfordshire and Hertfordshire (see table below)

PHOI – D01* Fraction of mortality attributable to particulate air pollution (2022 data)

Local Area	PHOI D01	Local Area	PHOI D01	Local Area	PHOI D01
Central Bedfordshire	6.5	Dacorum	6.7	Welwyn Hatfield	7.1
East Herts	6.5	Luton	7	Watford	7.3
North Herts	6.5	St Albans	7	Bedford	6.2
Stevenage	6.5	Three Rivers	7	East of England	6.2
Broxbourne	6.7	Hertsmere	7.1	England	5.8

The D01 measure of the PHOI are derived from the background annual average $PM_{2.5}$ concentrations for the year of interest and are modelled on a 1km x 1km grid using an air dispersion model and calibrated using measured concentrations taken from background sites in Defra's Automatic Urban & Rural Network Interactive map. By approximating LA boundaries to the 1km-by-1km grid and using census population data, population weighted background $PM_{2.5}$ concentrations for each lower tier LA are calculated. This work is completed under contract to Defra, as a small extension of its obligations under the Ambient Air Quality Directive (2008/50/EC). Concentrations of total $PM_{2.5}$ are used for estimating the mortality burden attributable to particulate air pollution (COMEAP 2022).

The $PM_{2.5}$ focussed PHOI reflects the adverse impact that this type of air pollution can have on public health because of the fine particles being carried deep into the lungs, where they can cause inflammation and a worsening of heart and lung diseases.

However, it is important to recognise that figures published for the PHOI D01 (like its predecessor 3.01) are estimates and therefore cannot be used for performance monitoring; they can only provide an indication of the scale of the issue.

There are no smoke control areas in Central Bedfordshire.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

This section sets out the monitoring undertaken within 2023 by Central Bedfordshire Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Central Bedfordshire Council utilised data from the automatic (continuous) monitoring at 1 site during 2023, which is owned by the Environment Agency and managed on their behalf by Bureau Veritas. Table A.1 in Appendix A shows the details of the automatic monitoring sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. The Sandy Roadside Latest Data – Air Quality monitoring service (airqualityengland.co.uk) page presents automatic monitoring results for Central Bedfordshire Council, with automatic monitoring results also available through the UK-Air website .

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Central Bedfordshire Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 38 sites during 2023. Table A.2 in Appendix A presents the details of the non-automatic sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2023 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

The 2023 dataset shows the continuance of declining concentrations of NO_2 in the majority of diffusion tube monitoring sites, with no exceedances of the AQO recorded at any site.

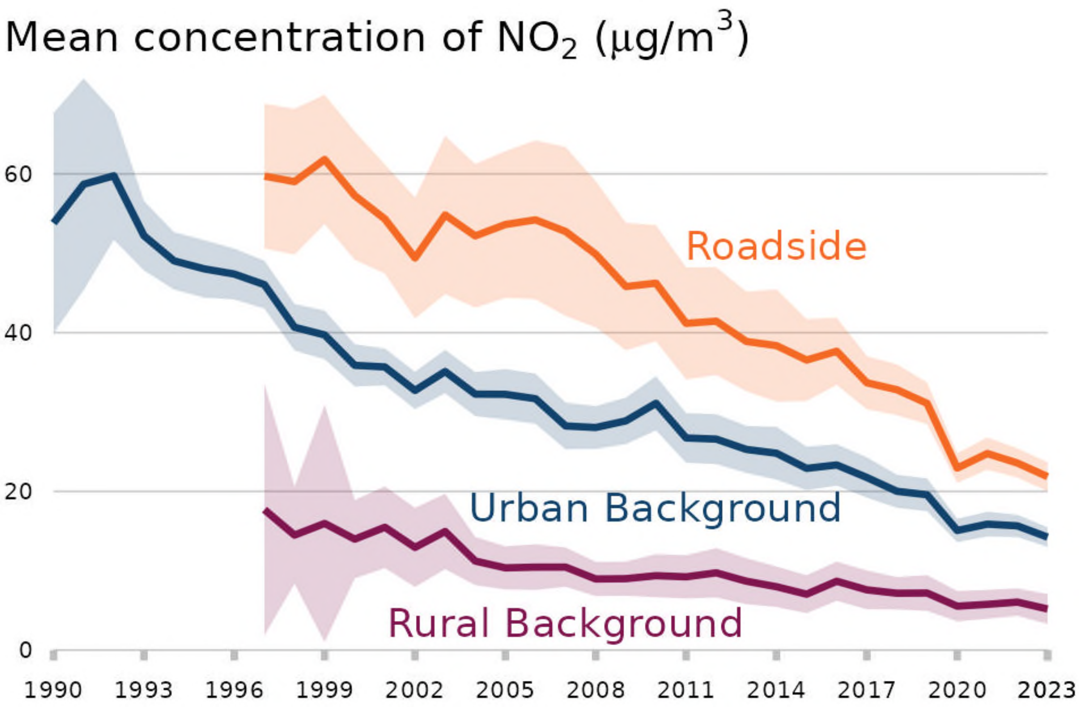
Site N20 which achieved compliance with the AQO in 2022 for the first time with the result 38.5µg/m3, that was still within 10% of the AQO, which is a figure of allowance in which exceedance of the objective may be possible, given a small change in circumstance that may elevate the pollution levels recorded (meteoriological, etc). However the 2023 result continued to show a marked decrease with a result of 32.1µg/m3 which is below 10% of the AQO.

The realtime analyser in Sandy recorded an NO_2 annual mean of 17µg/m^3. There were no exceedances of the NO_2 hourly mean (35 exceedances of this objective are permitted per year) and so the results show compliance with both of the NO_2 AQOs.

The continuing decline in concentrations of results in Central Bedfordshire are comparable with the national trends[9] as can be seen from the graph taken from the National Statistics (NO_2) Defra update of the 30 April 2024.

[9] National Statistics NO2 – Defra Nitrogen dioxide (NO2) updated 30 April 2024

Figure 1: Annual mean concentrations of NO2 in the UK, 1990 to 2023



Source - National Statistics NO2 – Defra (gov.uk)

There were a few changes to the diffusion tube network for 2023:

Site closures:

- site SB37 closed – due to the tube going missing frequently and causing gaps in monthly data and the need to apply annualisation calculation, causing the end figure to be an estimate.

Sites commenced:

- site 37a opened – this site is a small distance from the former site 37 (it is nearer to the junction with Bramley Court/Luton Road, Dunstable and nearer to the flats (59-69 odds entrance). This means that we can maintain the monitoring in this area and this site is nearer to the sensitive receptors (residential properties) to give an idea of the actual pollution concentrations, however the distance between the monitoring site and the façade of the properties is approximately 2/2.5metres.

Traffic flow data from monitoring sites on the A1 near Sandy was obtained from National Highways (via Webtris website on 9th May 2024). The sites are:

6823/1 – northbound between A603 & A603

6822/1 - southbound between A603 & A6001

6821/1 – northbound between A603 & A421 nr A421 junction

6820/1 – southbound between A421 & A603 nr Georgetown exit

Unfortunately there is no data for 2023 for Site 6822/1 (south).

Figure T.1 Traffic Count (AADT) on A1 Sandy between 2019 and 2023

Year	Site 6823/1 N	Site 6822/1 S	Site 6821/1 N	Site 6820/1 S
2019	21,675	22,463	14,340	17,247
2020	16,562	17,163	11,430	13,142
2021	18,492	18,805	12,670	14,841
2022	20,337	20,405	13,924	15,533*
2023	19,548	No data	13,428	16,376

*Average based on January – August figures

It can be seen that in 2 of the 3 sites that traffic flows numbers in 2023 have fallen from 2022 levels. However this drop in traffic is not likely to be completely responsible for the continuing decrease in NO_2 concentrations, especially as one traffic count site showed an increase in in numbers. It is to be noted that the decrease in NO_2 concentrations is a national trend.However, the A1 is a major trunk road and so the change in patterns of flow may be just a reflection of this. Local traffic flow on a local road network was sought to ascertain if the change in traffic flow was likely to be across the the whole network.

Local traffic flow data was obtained from https://roadtraffic.dft.gov.uk/manualcountpoints

Figure T.2 Traffic Count (AADT) Roads in Dunstable between 2016 and 2022

Year	West St/B489 809855	Luton Rd 38787*	Luton Rd 93016*	Church St 47870**	Church St 93017**	High St North 89005
2016	No data	28,775 mc	No data	17,949 e	No data	No data
2017	No data	28,791 e	No data	17,949 mc	No data	17,694 mc
2018	No data	28,603 e	No data	17,798 e	No data	17,584 e
2019	11,575 mc	28,856 e	No data	17,956 e	No data	17,733 e
2020	12,227 mc	29,858 mc	No data	13,930 e	No data	13,865 e
2021	13,456 e	No data	32,512 e	No data	15,292 e	15,219 e
2022	10,171 mc	No data	26,077 mc	No data	15,136 mc	16,269 e

*both count points have same grid reference 503032:222093

**both count points have same grid reference 502010:221920

e = estimated; mc = manual count

The overall downward trend in the traffic data flows from 2021 to 2022 may have some significance to the continuing downward trend in the NO_2 results. Although this may be tempered by the fact that traffic flows increased in the period 2020/21 and still NO_2 concentration results fell, however this occurred during Covid when lockdowns and other restrictions would have had an impact on pollution levels in the district and wider environs as a whole. Unfortunately, the 2023 data is not yet available for the local traffic data and so comparison to the Sandy A1 data (in Figure T.1) is not possible for this period.

The 2023 monitoring results dataset shows that only the annualisation (as necessary) and bias adjustment factor was required to be applied (in accordance with Defra Guidance) and **all sites including** N20 met the annual NO_2 AQO (40µg/m^3), additionally being below 10% of the AQO (36µg/m^3).

It is to be expected that meteoriological factors will play a significant role in the monitoring results and so wind data was obtained from Visual Crossing in May 2024 (data can be viewed in Appendix F) and wind roses and graphs to show the predominant wind direction and speeds.

The wind rose for Sandy (below) clearly shows that the predominant wind direction is from the Southwest (which pushes the emissions from the A1 towards the cottages sited adjacent to the to the road, Site N20). The predominant wind direction at all speeds is south-westerly at the Sandy location.

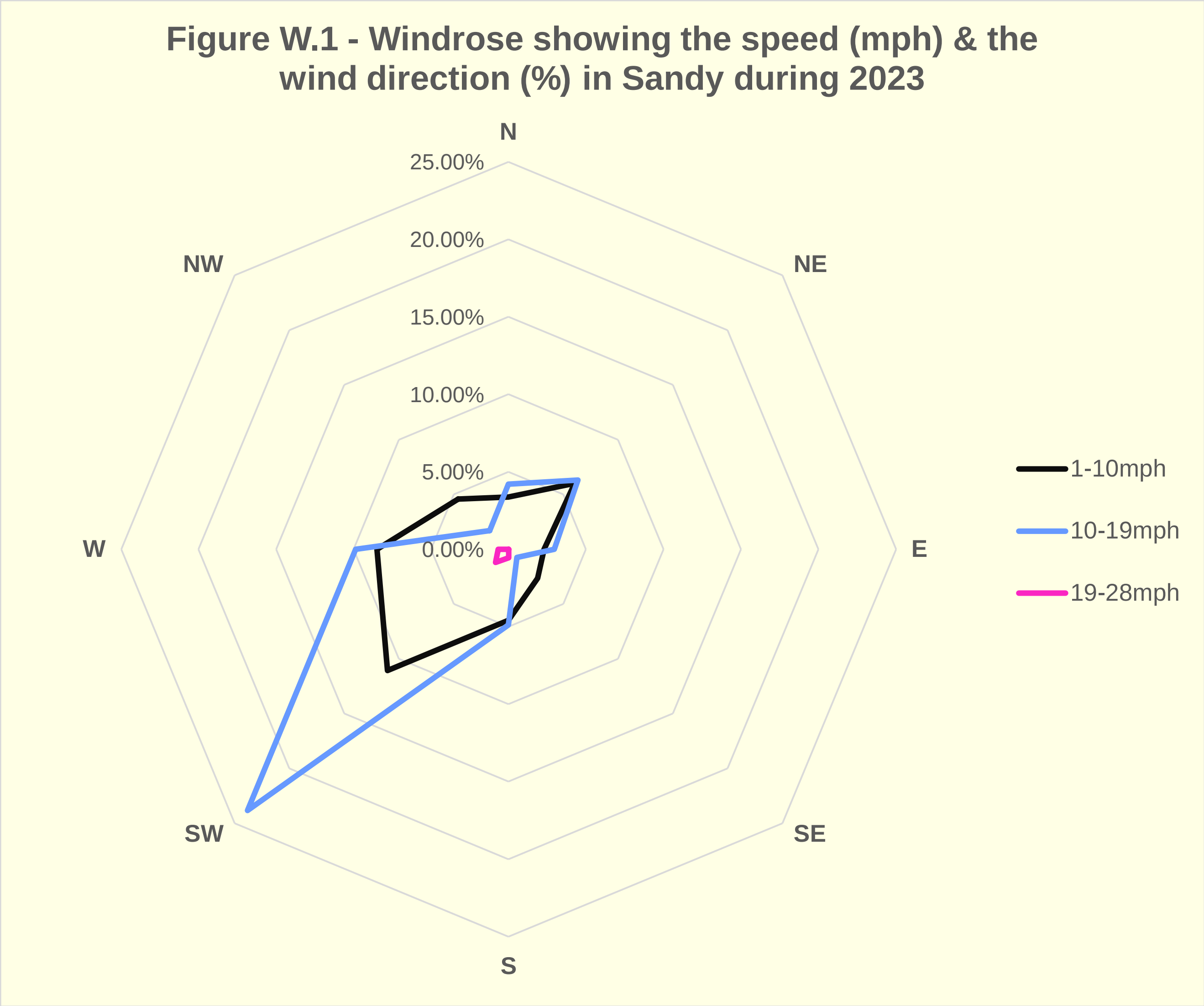


Figure W.1 - Windrose showing the speed (mph) & the wind direction (%) in Sandy during 2023
N
NE
E
SE
S
SW
W
NW
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1-10mph
10-19mph
19-28mph

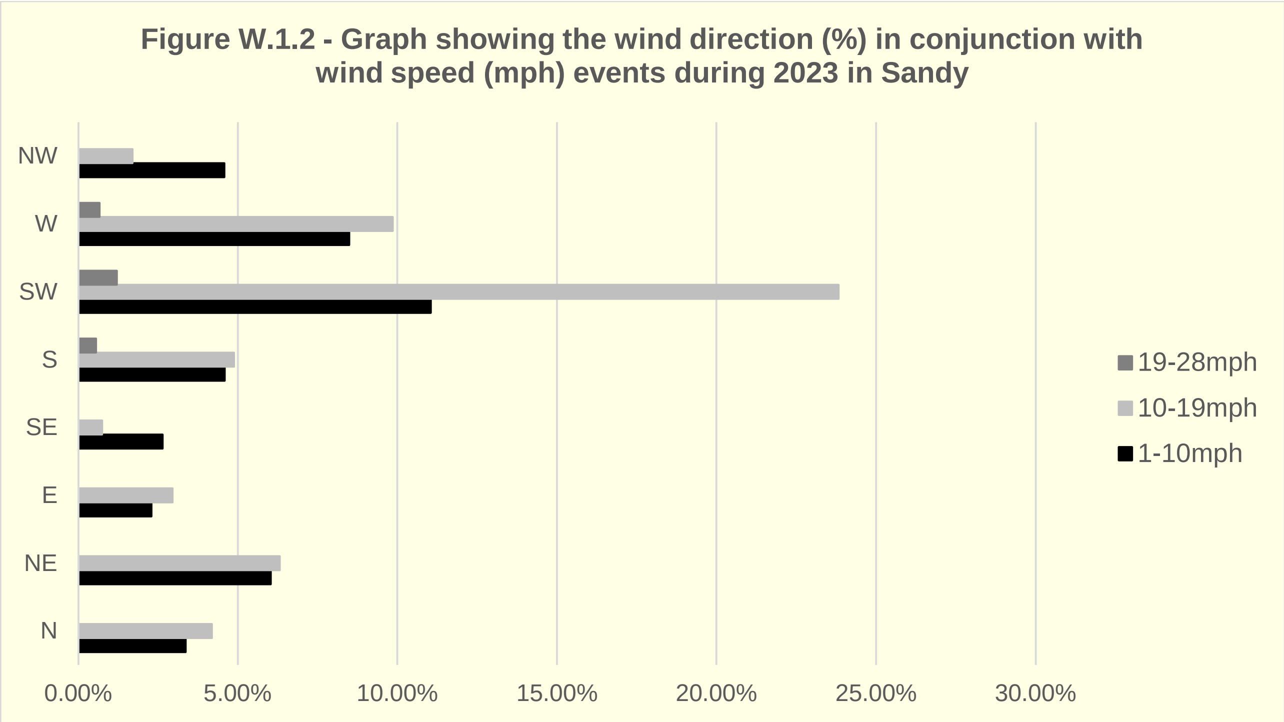


Figure W.1.2 - Graph showing the wind direction (%) in conjunction with wind speed (mph) events during 2023 in Sandy
NW
W
SW
S
SE
E
NE
N
0.00%
5.00%
10.00%
15.00%
20.00%
25.00%
30.00%
19-28mph
10-19mph
1-10mph

The Luton weather station provides data representative for the rest of Central Bedfordshire, it confirms that the predominant wind direction is southwesterly and the wind is dominant from either the southwest or west at all speeds.

Figure W.2 - Windrose showing the speed (mph) & the wind direction (%) in Bedfordshire during 2023

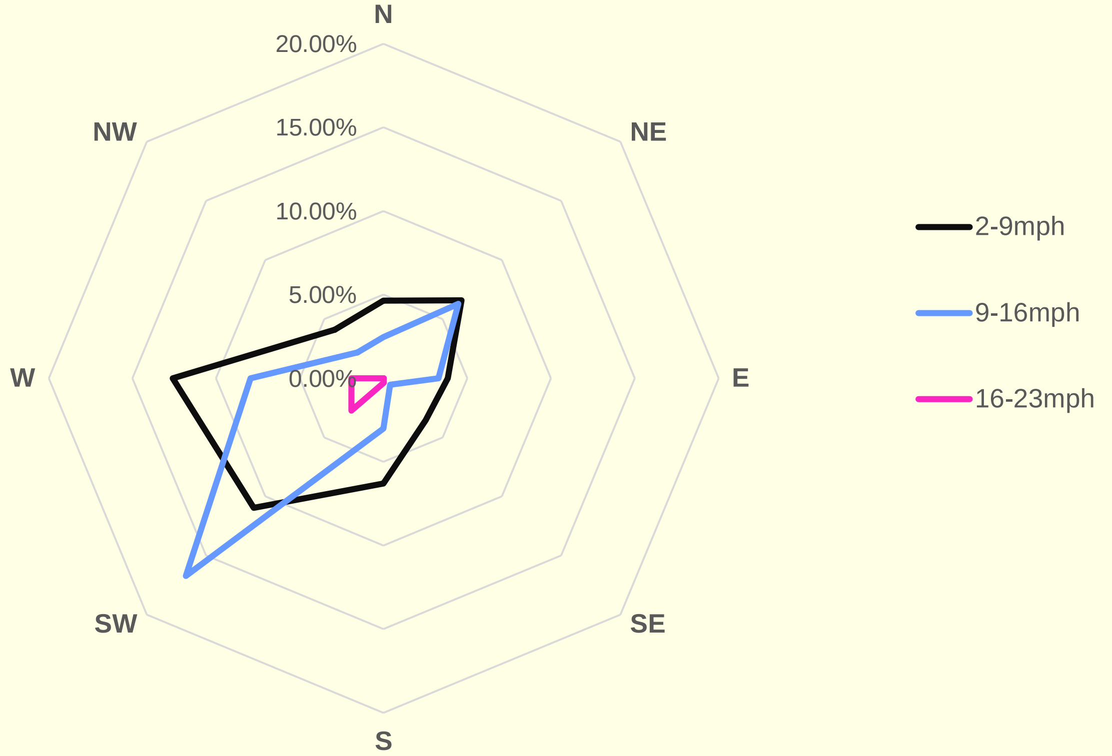
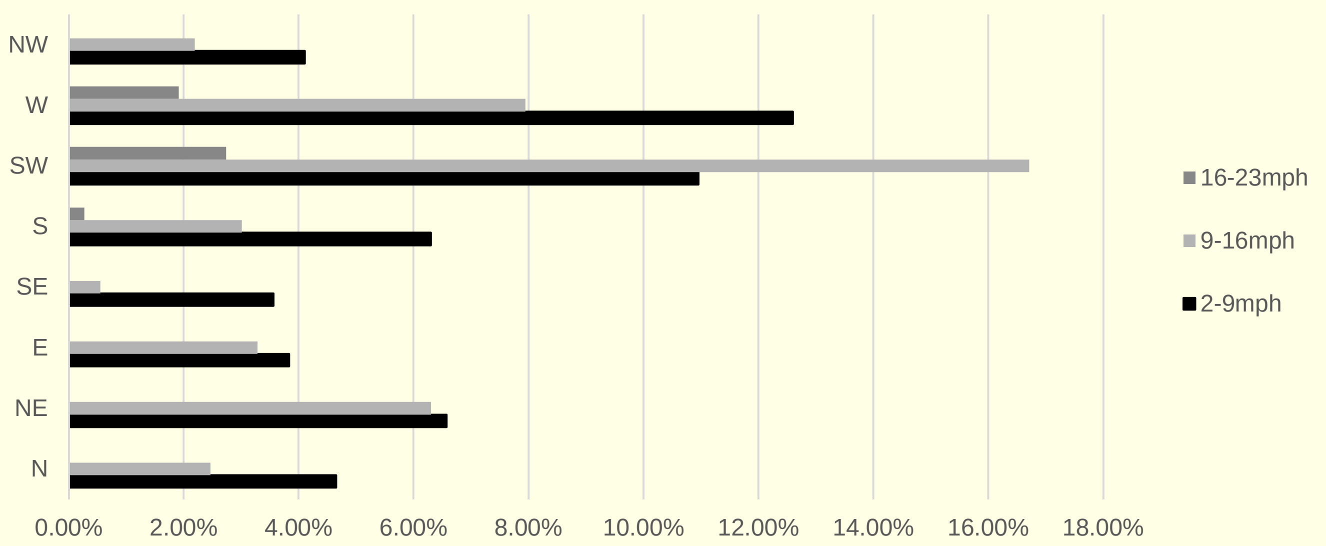


Figure W.2.1 - Graph showing the wind direction (%) in conjunction with wind speed (mph) events in 2023 for Bedfordshire



As reported in the ASR23, the Council tendered for a Detailed Assessment and Source Apportionment Report regarding the Dunstable AQMA, to assess and model the monitoring results to show the likely compliance with the annual NO_2 AQO. This was due to some sites showing concentrations over 36µg/m^3 (within 10% of the AQO), but below 40 µg/m^3 (the AQO), which could result in a spike in emissions which could push the result into an exceedance. Therefore, to revoke an AQMA results should be below 36µg/m^3 for 3-5 years, the years 2020 & 2021 cannot be used for this purpose and so although all sites in Dunstable have been compliant with the Objective since 2019 (i.e. below 40 µg/m^3), not all have been below 36 µg/m^3.

The Detailed Assessment and Source Apportionment Report (Air Quality Consultants, December 2023) concluded that detailed modelling of the roads within the current AQMA 1 Dunstable and a review of Central Bedfordshire Council's monitoring data has demonstrated that the predicted annual mean nitrogen dioxide concentrations in 2019 do not exceed the objective at locations of relevant exposure - pre-covid data was used to provide a more robust conservative approach.

The Report showed that all sites do meet the objectives as monitoring Site 50 (Luton Road, Dunstable) was on a lamppost some distance away from the receptors, when the distance correction factor was applied in accordance with Defra's Guidance then the concentration met the AQO.

The other receptors at Church Street (Site 33), High Street South (Sites 34 & 1) and West Street (Site 55) were all in 1st floor flats and therefore not included in the objectives as it is considered that pollutants will be adequately dispersed into the atmosphere by this distance (unfortunately the distance correction model does not calculate vertical distance only horizontal) however it is shown that nitrogen dioxide concentrations do decrease with distance.

However, new receptors have been identified in West Street (nearby to monitoring Site 55) a block residential flats including ground floor flat fronting West Street, which is outside of the current AQMA. Modelling indicated that the concentrations of NO_2 may be within 10% of the AQO (i.e. between 36-39.9µgm/^{3}) at this site. Therefore, we have set up a new monitoring site (Site 66) on a lamppost directly outside the flat (in West Street) and await the annual result for 2024 (results will be subject to bias adjustment, etc., in accordance with Defra Guidance).

If Site 66 has results similar to Site 55, then the AQO would likely be met in 2025, without any adjustment for distance correction (to calculate the fall-off in the pollution concentration over the distance between the monitoring site to the façade of the property), as measured concentrations have been low enough not to need the application of this factor to be below the AQO in recent years.

- **Site 55** (West Street, Dunstable) result for 2019 of 40.8µg/m^3 (with just bias adjustment), however the monitor/tube was located on a lamppost adjacent to West Street with properties a small distance away. Commercial units occupy the ground floor and residential units are above. Unfortunately, the NO_2 fall-off with distance calculator does not account for height (only horizontal distance). However, the concentrations do decrease with height as well as distance and this means that the flat is sited away from the ground level pollution concentrations and it is likely that the result of 40.8µg/m^3 at the monitoring site, is lower at the 1st floor level flat. This is supported by the findings in The Air Quality Consultant's Detailed Assessment & Source Apportionment Report (December 2023) which showed:

Table 3.4.1 Modelled results from locations including row of units in West Street, where Site 55 is located (modelled locations include both ground and 1st floor levels)

Site	Status	Height	Modelled Result ($\mu g/m^3$)
10	commercial	1.5	40
10	residential	4.5	23.6
11	commercial	1.5	39.8
11	residential	4.5	23.6
12	commercial	1.5	39.7
12	commercial	4.5	23.5
13	commercial	1.5	39.6
13	residential	4.5	23.5
14	commercial	1.5	39.5
14	residential	4.5	23.5
15	**residential**	**1.5**	**39.4**
15	residential	4.5	23.4
16	**residential**	**1.5**	**39**
16	residential	4.5	23.3

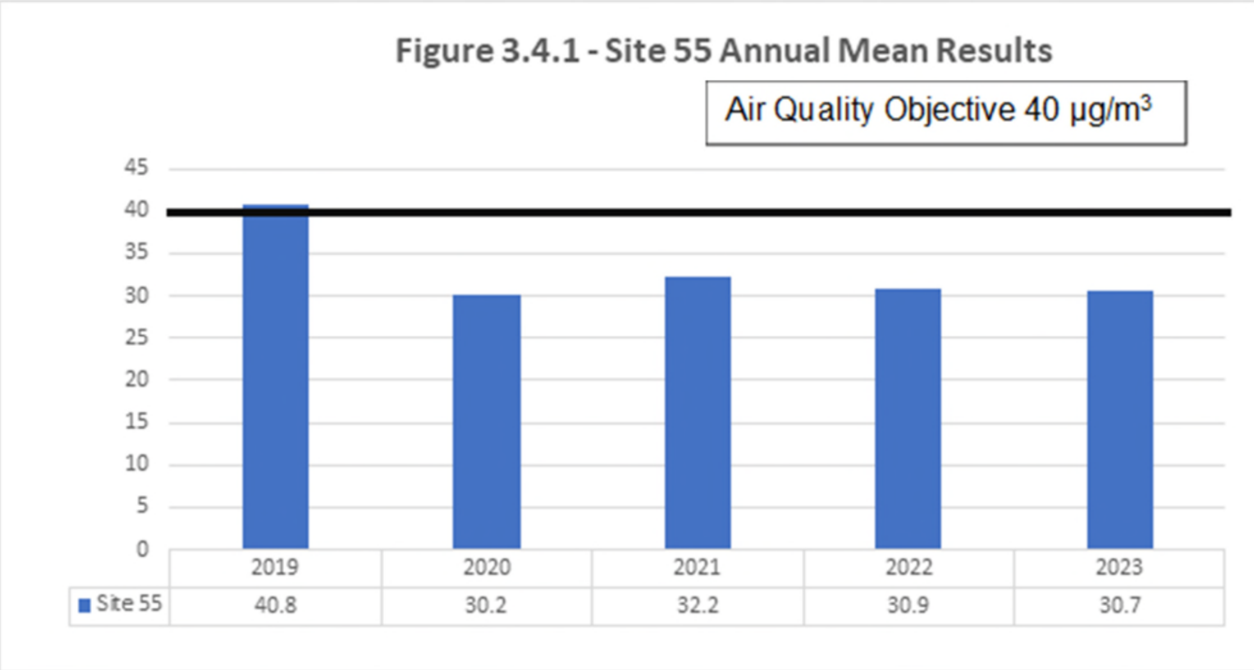
The ground floor (1.5m) sites 15 and 16 which represent the new residential receptors in West Street both are below the AQO of 40µg/m^3 but are very close to the objective level. However residential flats on the first floor all have much lower concentrations – all below 25 µg/m^3.

A monitoring site (Site 66) has been located on a lamppost between the flats and West Street to provide valuable data to inform of the actual NO_2 concentrations at this location.

Meanwhile we can estimate that the required reduction in road NO_x emissions (using Defra's NO_2 to NO_x Calculator) for concentrations to be under 36µg/m^3 (and no longer within 10% of the AQO). Based on Site 15 ground floor residential modelled 2019 concentration of 39.4µg/m^3 and decreasing to 35.4% (which cannot be rounded up to 36 µg/m^3) requires a **16.2% reduction** in road NO_x emissions.

However subsequent monitoring results at Site 55 (since 2020) have shown compliance with the AQO and the 10% of the AQO too – this has been without the need for distance correction.

Figure 3.4.1 Monitoring results for Site 55 show:



2019 – 40.8µg/m³ (no distance correction as NO_2 fall-off with distance calculator does not account for height, only horizontal distance). If we apply a distance correction from the monitoring site to the ground floor unit (which is a similar distance from that of the new receptors from the new monitoring site in West Street), it shows that the concentration of NO_2 is 31.2µg/m³ - as the relevant receptor is the 1st floor flat it is likely that the concentration at this location will be lower as pollutants disperse into the wider atmosphere. This also highlights that the new monitoring site outside the new receptors (the ground floor residential flats) fronting West Street, may show 2024 annual results well within the AQO, this will be reported in the 2025 Annual Status Report as data is being collected currently.

Therefore it is likely that the concentration of NO_2 in West Street is already compliant with the AQOs as the data in the Detailed Assessment report was based on 2019 data (pre-Covid) and results from this year were higher than they are in 2023. The 2024 monitoring data results may reflect this ongoing trend of declining concentration of NO_2 and will be reported in the 2025 ASR.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m³.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year.

Although Central Bedfordshire Council no longer operates the real-time monitor at Sandy (adjacent to the A1), having handed the site to the Environment Agency as the Particulate monitors are part of the AURN network which monitors PM_{10} (alongside $PM_{2.5}$ & NO_2). The LSO duties are undertaken by Central Bedfordshire Council and the site remains part of the Herts & Beds Monitoring Network.

Once again there have been no exceedances of either the Annual or 24hour mean Air Quality Objectives for this pollutant in 2023.
Reviewing the last 5 years data shows that the number of exceedances of the 24hr mean (number of exceedances of 50µg/m^3, not to be exceeded more than 35 times per year) has remained constantly well below the objective and only having 4 exceedances in 2019, and none in 2020, 2021, 2022 and 2023.
Reviewing the last 5 years of data shows the annual mean objective (40µg/m^3) has been constantly achieved although concentrations in 2019 (18µg/m^3) were higher than those in 2020 (16.9µg/m^3) & 2021 (16a µg/m^3). There has been a small increase in the 2022 result (17µg/m^3) but has fallen again in 2023 (16µg/m^3)

There were no exceedances of either objective in 2023.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

Given the impacts on health from smaller particles, focus has been directed on $PM_{2.5}$ Central Bedfordshire Council has been monitoring this pollutant at the automatic real-time monitoring station in Sandy (adjacent the A1 southbound carriageway) since 2013.

On February 7th, 2019, the analysers monitoring PM_{10} and $PM_{2.5}$ were changed from TEOMs to BAMs, the site remains part of the AURN network for particulate matter. However, it makes direct comparison to previous years' results data difficult.

Levels of $PM_{2.5}$ monitored have slightly dropped year on year since monitoring began in 2013 until a slight increase in 2018, before decreasing again. However, data capture rates were low and as such results were subject to annualisation calculations (as stipulated by Defra and carried out in accordance with their guidance) in years 2017, 2018, 2020 & 2021.

The 2020 result of 9.2a µg/m^3, was solely based on BAM analyser data, which had a low data capture for the year 73.6% and therefore data was annualised. Similarly, the 2021 result of 9.2a µg/m3 was annualised due to a low data capture rate of 70%. This was carried out in accordance with Defra guidance.

Both the 2022 (8 µg/m^3) and 2023 (8 µg/m^3) results did not require annualisation as the data capture were 87% and 90% respectively.

The $PM_{2.5}$ EU Emission second stage Limit Value of 20µg/m^3 has not been exceeded.

Although, the WHO (World Health Organisation) 2005 guidelines recommended an “ultimate goal” for concentrations of 10µg/m3. However, in 2021 this limit was subsequently reduced to 5µg/m^3.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
MD3	Sandy Roadside	Roadside	516436	496600	NO_2, PM_{10} & $PM_{2.5}$	YES – AMQA 4 (Sandy)	<Chemiluminescent & Continuous BetaAttenuation (BAM)	N/A	2	1.5

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable

Table A.2 – Details of Non-Automatic Monitoring Sites

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
SB01	High St South, Dunstable	Roadside	501936	221837	NO2	YES - AQMA 1 (Dunstable)		1.0	No	2.0
SB10	Houghton Regis	Roadside	501991	223965	NO2	No		2.0	No	2.0
SB18	Argos (High St North), Dunstable	Roadside	501705	222089	NO2	YES - AQMA 1 (Dunstable)		1.0	No	2.0
SB27	Luton Rd, Dunstable (lamppost o/s 89)	Roadside	503195	222119	NO2	YES - AQMA 1 (Dunstable)	4.0	1.0	No	2.0
SB33	Church St, Dunstable	Roadside	501962	221884	NO2	YES - AQMA 1 (Dunstable)	2.0	8.0	No	2.0
SB34	5 High St South, Dunstable	Roadside	501991	221853	NO2	YES - AQMA 1 (Dunstable)	4.0	1.0	No	1.5
SB37a	Luton Rd, Dunstable (lamppost 10 o/s 59-69 Bramley Court)	Roadside	502877	222081	NO2	YES - AQMA 1 (Dunstable)	2.5	2.5	No	2.0
SB39	Houghton Road, Dunstable	Roadside	501151	222821	NO2	No	3.0	1.0	No	2.0
SB48	185 Poynters Rd (nr Katherine Drive), Dunstable	Roadside	503745	222914	NO2	No	4.0	1.0	No	2.0
SB49a	Poynters Road, Dunstable (lamppost nr bus stop adj Hadrian Ave)	Roadside	503535	223060	NO2	No	6.0	1.0	No	2.0
SB50	Luton Rd, Dunstable (lamppost o/s 24)	Roadside	502815	222065	NO2	YES - AQMA 1 (Dunstable)	6.0	1.0	No	2.0
SB52	Hockliffe St, Leighton Buzzard	Roadside	492512	225235	NO2	No	2.0	1.0	No	2.0
SB55	West St, Dunstable (lamppost o/s Jonquils)	Roadside	503459	221768	NO2	YES - AQMA 1 (Dunstable)		1.0	No	2.0
SB58	Hockliffe - A5 Watling St (lamppost HC028 o/s Chester Cottage)	Roadside	497400	226675	NO2	No	2.0	2.0	No	2.0
SB59	Marston Moretaine - Beancroft Rd (lamppost to the side of 4 Bedford Rd)	Roadside	499563	241471	NO2	No	1.0	1.0	No	2.0
SB60	Luton Rd, Dunstable (lamppost o/s 233 nr Dale Rd)	Roadside	503774	222300	NO2	YES - AQMA 1 (Dunstable)	2.5	1.0	No	2.0
SB61	Streatley (lamppost nr St Margarets Close junction)	Roadside	507407	228685	NO2	No		1.0	No	2.0
SB64	Harlington (lamppost o/s 19 Church Rd)	Roadside	503750	230568	NO2	No	1.2	1.0	No	2.0
N4	A1, Beeston (northbound)	Roadside	517160	248190	NO2	No	2.0	1.5	No	2.0
N6	Bedford Rd, Sandy (o/s 86)	Roadside	516621	249100	NO2	YES - AQMA 4 (Sandy)	4.0	1.0	No	2.5
N16	Bedford Rd, Sandy (o/s 49)	Roadside	516593	249083	NO2	YES - AQMA 4 (Sandy)	3.5	1.0	No	2.0
N17	Bedford Rd, Sandy (nr A1 roundabout)	Roadside	516569	249074	NO2	YES - AQMA 4 (Sandy)	6.0	1.0	No	2.0
N18	Eddies Cottage, Bedford Rd, Sandy (cottage façade)	Roadside	516579	249070	NO2	YES - AQMA 4 (Sandy)	0.0	6.0	No	1.5
N31	Bedford Rd, Sandy (lamppost opp 70)	Roadside	516534	249109	NO2	YES - AQMA 4 (Sandy)	4.0	1.0	No	2.0
N35	A1/Bedford Rd, Sandy (lamppost SA215)	Roadside	503444	249175	NO2	YES - AQMA 4 (Sandy)	5.0	1.0	No	2.0
N20	A1, Sandy (façade of cottages southbound)	Roadside	503466	249974	NO2	YES - AQMA 4 (Sandy)		1.0	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
N25	A1, Sandy (Taj Mahal, southbound)	Roadside	503458	250174	NO2	YES - AQMA 4 (Sandy)		1.0	No	2.0
N28	Carter St, Sandy	Roadside	516568	238167	NO2	No	1.5	1.0	No	2.0
N30	A1/Carter St, Sandy (southbound)	Roadside	494900	249942	NO2	YES - AQMA 4 (Sandy)	4.0	1.0	No	2.0
N21	Bedford St, Ampthill (o/s 15)	Roadside	516551	238141	NO2	YES - AQMA 3 (Ampthill)	3.0	3.0	No	3.0
N22	Bedford St, Ampthill (o/s 4b)	Roadside	516551	238141	NO2	YES - AQMA 3 (Ampthill)		1.0	No	2.0
N23	Dunstable St, Ampthill (o/s 111)	Roadside	516524	238039	NO2	YES - AQMA 3 (Ampthill)		1.0	No	2.0
N27	Church St, Ampthill	Roadside	516690	238167	NO2	No	2.0	1.0	No	2.0
N26	High St, Woburn (o/s lower school)	Roadside	514201	233230	NO2	No	2.0	1.0	No	2.0
N36	London Rd, Biggleswade (nr junction with Holme Court Drive)	Roadside	520284	243464	NO2	No	6.0	1.0	No	2.0
N37	Crane Way, Cranfield (at junction with Bedford Rd)	Roadside	496424	242847	NO2	No	0.0	1.0	No	2.0
N38	Dunstable St, Ampthill (o/s 99)	Roadside	503437	237964	NO2	YES - AQMA 3 (Ampthill)	1.0	1.0	No	2.0

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
MD3	516436	249600	Roadside		98	28	20	**20a**	20	16

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☒ **Reported concentrations are those at the location of the monitoring site (annualised, as required), i.e. prior to any fall-off with distance correction.**

☐ **Where exceedances of the NO_2 annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023.**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
SB01	501936	221837	Roadside		99.5	33.0	25.1	26.9	24.3	23.6
SB10	501991	223965	Roadside		99.5	29.5	22.3	22.7	22.3	20.3
SB18	501705	222089	Roadside		99.5	34.3	26.1	27.4	25.3	22.4
SB27	503195	222119	Roadside		91.8	28.7	20.1	22.7	19.7	18.2
SB33	501962	221884	Roadside		99.5	36.7	27.6	27.4	24.2	22.1
SB34	501991	221853	Roadside		91.8	31.9	27.4	27.7	23.2	22.9
SB37a	502877	222081	Roadside		76.5					23.7
SB39	501151	222821	Roadside		91.8	32.0	21.8	22.9	22.3	20.1
SB48	503745	222914	Roadside		99.5	29.6	22.5	23.4	23.7	21.3
SB49a	503535	223060	Roadside		99.5				21.6	21.8
SB50	502815	222065	Roadside		99.5	30.1	34.7	33.9	30.7	29.8
SB52	492512	225235	Roadside		91.8	33.5	26.6	26.7	26.4	24.4
SB55	503459	221768	Roadside		99.5	31.2	30.2	32.2	30.9	30.7
SB58	497400	226675	Roadside		66.9	32.5	22.2	20.9	22.5	18.7
SB59	499563	241471	Roadside		91.8	31.2	25.0	24.2	24.0	21.3
SB60	503774	222300	Roadside		99.5		26.4	26.5	24.5	22.7
SB61	507407	228685	Roadside		99.5		21.3	21.7	22.1	20.0
SB64	503750	230568	Roadside		99.5					15.4
N4	517160	248190	Roadside		91.8	29.8	21.6	21.4	21.4	17.4
N6	516621	249100	Roadside		99.5	29.7	23.2	22.5	22.6	20.2
N16	516593	249083	Roadside		99.5	33.3	26.2	25.9	24.1	22.3
N17	516569	249074	Roadside		99.5	32.3	34.7	30.6	33.2	29.8
N18	516579	249070	Roadside		99.5	27.9	22.0	20.3	20.2	17.8
N31	516534	249109	Roadside		89.9	27.0	20.2	20.7	18.7	17.6
N35	503444	249175	Roadside		99.5	33.3	33.3	31.1	31.3	26.0
N20	503466	249974	Roadside		99.5	**57.5**	**43.6**	**43.0**	38.5	32.1
N25	503458	250174	Roadside		99.5	32.4	24.6	23.1	23.3	19.5
N28	516568	238167	Roadside		99.5	21.1	15.4	15.1	15.3	13.4
N30	494900	249942	Roadside		99.5	34.0	34.3	34.0	32.0	24.8
N21	516551	238141	Roadside		99.5	25.1	16.6	17.7	18.1	16.2
N22	516551	238141	Roadside		99.5	26.8	29.0	28.1	27.6	26.3
N23	516524	238039	Roadside		99.5	**40.3**	28.4	32.7	31.0	29.2
N27	516690	238167	Roadside		99.5	30.1	22.2	23.8	22.8	20.3
N26	514201	233230	Roadside		99.5	31.0	22.7	22.5	23.8	21.3
N36	520284	243464	Roadside		99.5	26.2	17.0	17.2	18.1	16.6
N37	496424	242847	Roadside		99.5			16.9	18.6	13.9
N38	503437	237964	Roadside		99.5				14.9	21.2

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☒ **Diffusion tube data has been bias adjusted.**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction.**

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the NO_2 annual mean objective of 40µg/m³ are shown in **bold**.

NO_2 annual means exceeding 60µg/m³, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

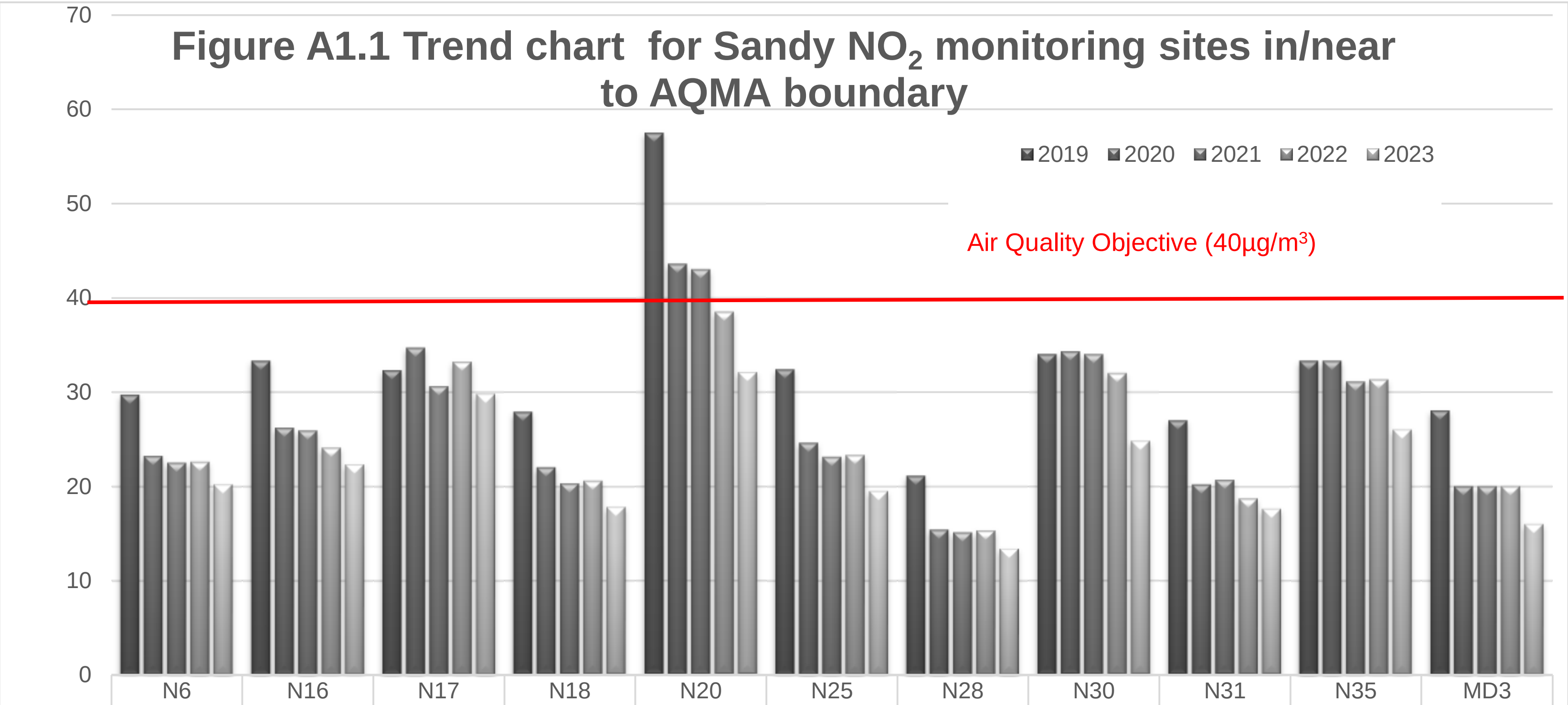
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

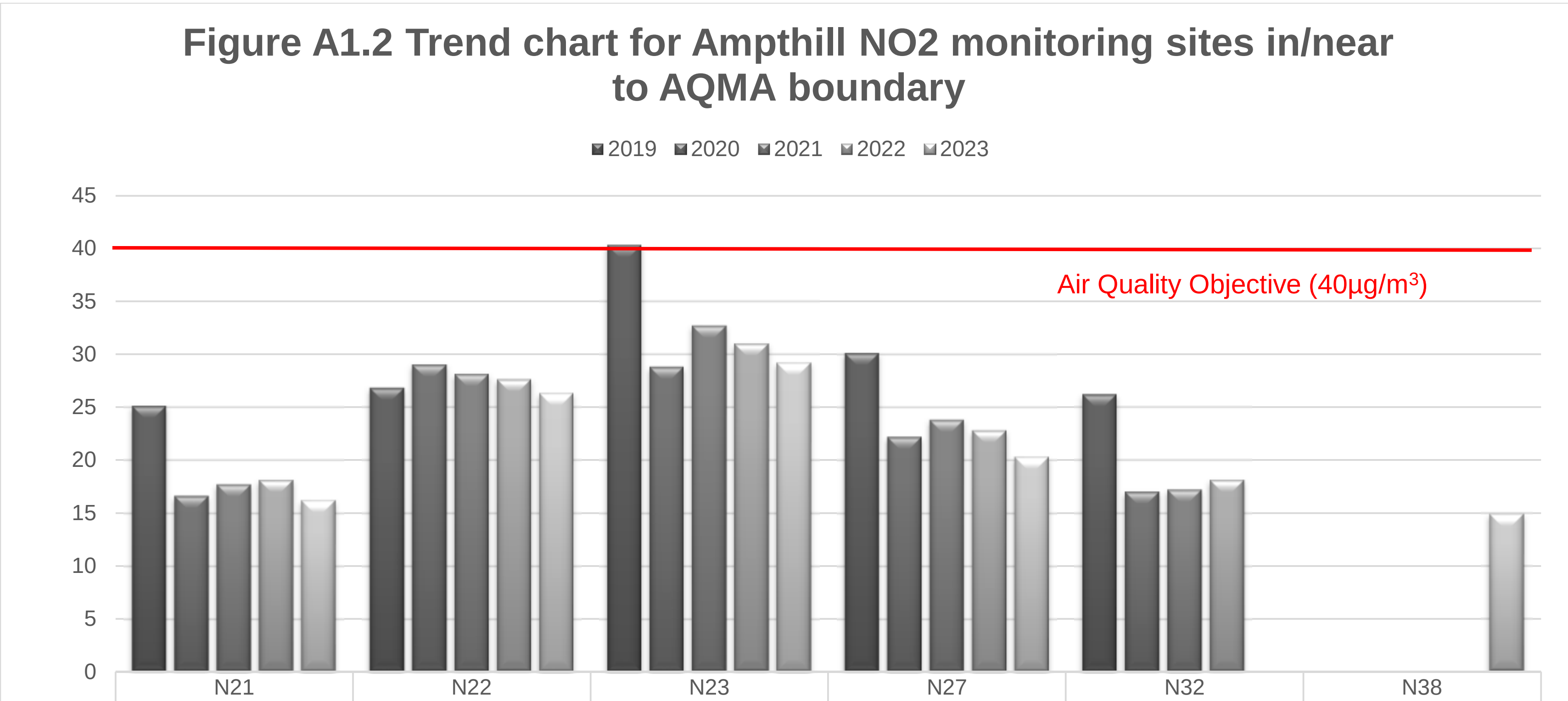
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

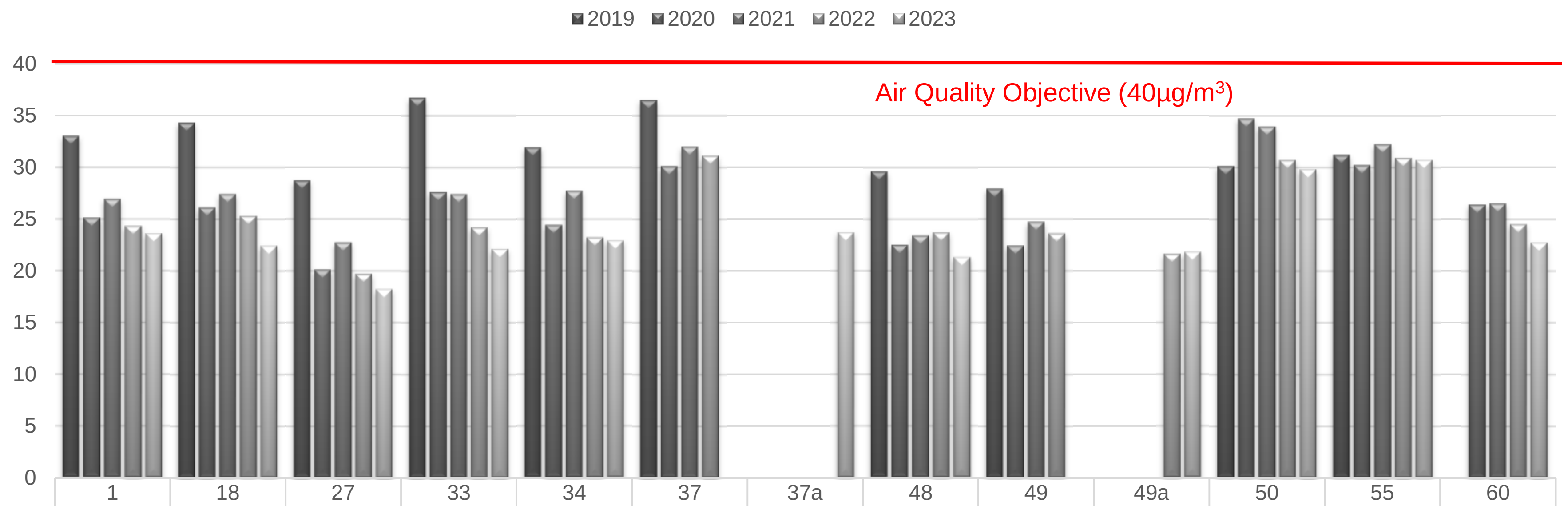


	N6	N16	N17	N18	N20	N25	N28	N30	N31	N35	MD3
2019	29.7	33.3	32.3	27.9	57.5	32.4	21.1	34	27	33.3	28
2020	23.2	26.2	34.7	22	43.6	24.6	15.4	34.3	20.2	33.3	20
2021	22.5	25.9	30.6	20.3	43	23.1	15.1	34	20.7	31.1	20
2022	22.6	24.1	33.2	20.6	38.5	23.3	15.3	32	18.7	31.3	20
2023	20.2	22.3	29.8	17.8	32.1	19.5	13.4	24.8	17.6	26	16



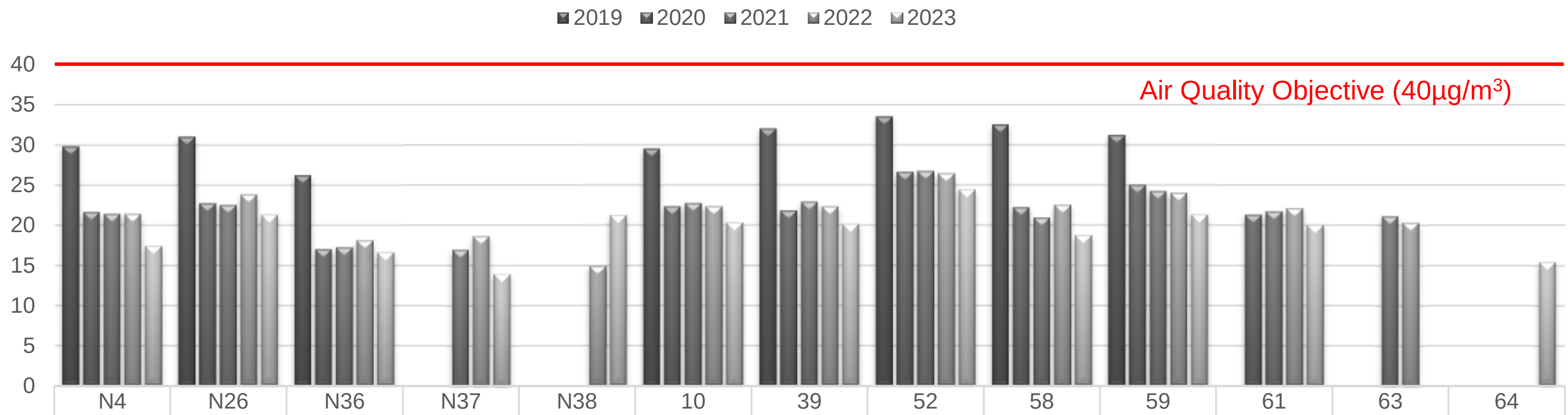
	N21	N22	N23	N27	N32	N38
2019	25.1	26.8	40.3	30.1	26.2	
2020	16.6	29	28.8	22.2	17	
2021	17.7	28.1	32.7	23.8	17.2	
2022	18.1	27.6	31	22.8	18.1	
2023	16.2	26.3	29.2	20.3		14.9

Figure A1.3 Trend chart for Dunstable NO2 monitoring sites in/near to AQMA boundary



	1	18	27	33	34	37	37a	48	49	49a	50	55	60
2019	33	34.3	28.7	36.7	31.9	36.5		29.6	27.9		30.1	31.2	
2020	25.1	26.1	20.1	27.6	24.4	30.1		22.5	22.4		34.7	30.2	26.4
2021	26.9	27.4	22.7	27.4	27.7	32		23.4	24.7		33.9	32.2	26.5
2022	24.3	25.3	19.7	24.2	23.2	31.1		23.7	23.6	21.6	30.7	30.9	24.5
2023	23.6	22.4	18.2	22.1	22.9		23.7	21.3		21.8	29.8	30.7	22.7

Figure A1.4 Trend chart for NO2 monitoring sites not in/near any AQMAs



	N4	N26	N36	N37	N38	10	39	52	58	59	61	63	64
2019	29.8	31	26.2			29.5	32	33.5	32.5	31.2			
2020	21.6	22.7	17			22.3	21.8	26.6	22.2	25	21.3		
2021	21.4	22.5	17.2	16.9		22.7	22.9	26.7	20.9	24.2	21.7	21.1	
2022	21.4	23.8	18.1	18.6	14.9	22.3	22.3	26.4	22.5	24	22.1	20.3	
2023	17.4	21.3	16.6	13.9	21.2	20.3	20.1	24.4	18.7	21.3	20		15.4

Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
MD3	516436	496600	Roadside		98	0	0	0 (71)	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
MD3	516436	496600	Roadside		96	**18**	**17**	**16a**	**17**	**16**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the PM_{10} annual mean objective of 40µg/m³ are shown in **bold**.

All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
MD3	516436	496600	Roadside		96	4	**0 (26)**	**0 (23)**	2	0

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m³ have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
MD3	516436	496600	Roadside		90	10	9.2a	9.2a	8	8

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22**

Notes:

The annual mean concentrations are presented as µg/m³.

All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO_2 2023 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SB01	501936	221837	37.7	33.6	29.7	34.3	35.6	34.8	18.0	21.8	28.1	27.2	29.6	19.1	29.1	23.6		
SB10	501991	223965	31.9	30.3	24.8	28.8	23.5	23.0	17.5	21.0	26.5	26.6	27.1	20.5	25.1	20.3		
SB18	501705	222089	31.8	31.0	27.1	32.4	30.3	31.5	19.4	23.1	30.2	27.4	28.6	19.6	27.7	22.4		
SB27	503195	222119		31.0	23.6	25.7	24.6	23.6	13.8	17.5	22.9	22.8	23.4	17.9	22.4	18.2		
SB33	501962	221884	24.6	32.8	25.2	28.4	24.3	25.6	24.1	25.3	31.6	30.3	30.5	25.0	27.3	22.1		
SB34	501991	221853	35.8	32.8	27.3	33.2		29.3	21.1	24.6	29.1	27.5	29.5	20.8	28.3	22.9		
SB37a	502877	222081		29.7	31.1	31.6	30.5	27.3	25.8	26.1			35.3	26.3	29.3	23.7		
SB39	501151	222821		33.3	26.0	26.5	21.5	17.7	19.8	20.1	29.5	26.8	29.6	21.9	24.8	20.1		
SB48	503745	222914	29.4	31.5	25.6	30.1	27.7	26.0	20.1	21.4	27.2	27.4	28.7	20.6	26.3	21.3		
SB49a	503535	223060	32.8	34.9	25.9	29.4	23.1	22.7	21.3	21.7	27.4	28.1	31.5	24.2	26.9	21.8		
SB50	502815	222065	40.6	43.6	37.6	39.1	38.0	40.2	30.1	29.6	40.8	36.9	37.0	28.5	36.8	29.8		
SB52	492512	225235	37.9	36.8	29.3	29.9	23.8	23.3	25.3	28.2		31.9	35.3	29.6	30.1	24.4		
SB55	503459	221768	40.5	44.3	36.2	41.2	44.1	40.7	30.7	32.5	40.8	34.5	40.3	29.4	37.9	30.7		
SB58	497400	226675	27.0	29.4	23.8	24.8		16.4		19.5	23.0	23.0			23.4	18.7		
SB59	499563	241471	33.5	33.3	25.6	24.6	21.3	20.2	21.2	21.3	27.7	29.1	31.2		26.3	21.3		
SB60	503774	222300	33.6	37.0	27.3	32.8	25.8	26.4	19.1	22.5	29.9	28.2	31.3	22.4	28.0	22.7		
SB61	507407	228685	29.0	28.3	24.6	26.4	29.7	29.3	19.5	23.8	27.1	26.7	13.8	18.1	24.7	20.0		
SB64	503750	230568	26.3	26.8	20.2	20.1	19.7	18.3	7.4	17.2	22.5	21.9	11.8	15.9	19.0	15.4		
N4	517160	248190	30.0	26.1	20.5	19.2	16.7	17.7	15.6	18.7	23.5	21.8	26.7	18..2	21.5	17.4		
N6	516621	249100	34.6	32.8	23.7	20.8	18.4	21.5	20.3	20.6	27.3	27.1	28.6	23.7	24.9	20.2		
N16	516593	249083	40.6	33.8	28.1	25.7	21.1	23.5	22.1	23.2	29.6	28.8	28.2	24.8	27.5	22.3		
N17	516569	249074	47.4	39.4	34.2	32.7	26.8	31.9	37.8	35.1	43.8	36.3	40.3	36.1	36.8	29.8		
N18	516579	249070	31.6	28.6	21.8	18.1	15.3	14.3	19.8	20.2	24.4	24.0	25.7	20.3	22.0	17.8		
N31	516534	249109	31.6	30.3	23.0	19.0	15.0		14.8	17.4	20.0	20.6	24.7	23.1	21.8	17.6		
N35	503444	249175	44.6	38.5	33.7	27.1	22.2	22.2	16.1	30.4	35.4	39.7	41.5	33.9	32.1	26.0		
N20	503466	249974	46.9	46.8	36.3	37.0	36.5	36.7	30.0	36.0	47.1	45.9	45.0	31.7	39.6	32.1		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
N25	503458	250174	35.6	29.7	23.4	20.0	18.3	16.5	17.5	18.8	26.8	28.4	30.8	23.0	24.0	19.5		
N28	516568	238167	26.9	24.2	16.1	12.6	9.1	10.3	12.2	13.4	14.8	19.4	21.1	18.4	16.5	13.4		
N30	494900	249942	43.9	39.1	27.7	24.5	25.1	25.5	24.0	28.2	30.8	33.4	38.7	27.4	30.7	24.8		
N21	516551	238141	24.9	25.8	20.4	22.2	19.1	17.0	13.1	16.5	22.1	21.4	23.0	15.1	20.0	16.2		
N22	516551	238141	42.6	39.9	32.0	31.2	24.7	23.1	30.0	28.2	36.3	33.4	38.5	29.4	32.4	26.3		
N23	516524	238039	41.9	40.5	37.6	36.7	36.4	34.0	28.9	31.0	40.9	37.8	39.5	27.9	36.1	29.2		
N27	516690	238167	16.2	34.6	26.9	26.6	22.2	23.4	20.4	23.7	29.0	27.6	30.2	20.8	25.1	20.3		
N26	514201	233230	31.4	32.4	29.0	25.5	23.3	24.8	22.7	22.7	27.3	27.3	28.5	21.2	26.3	21.3		
N36	520284	243464	27.2	25.1	19.7	20.4	19.8	18.1	12.4	14.7	23.6	23.7	23.7	17.4	20.5	16.6		
N37	496424	242847	22.3	22.1	16.2	15.8	14.7	14.0	11.6	13.2	17.4	19.7	22.3	16.2	17.1	13.9		
N38	503437	237964	31.1	30.5	27.7	29.0	24.7	22.7	19.9	21.7	30.8	29.0	26.0	20.4	26.1	21.2		

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

☐ **Where applicable, data has been distance corrected for relevant exposure in the final column.**

☒ **Central Bedfordshire Council confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

New or Changed Sources Identified Within Central Bedfordshire During 2023.

The Covanta waste incinerator sited at Stewartby (which is just outside Central Bedfordshire Council's district and within Bedford Borough Council's area) was granted a permit by the Environment Agency on 26th January 2018. The permit can be viewed on the Environment Agency website [Environment Agency website - Covanta permit]

The permit has conditions relating to pollution emissions and monitoring and the Environment Agency are the responsible authority for ensuring the permit conditions are met and the site is operating within the relevant EU/UK legislation. Following a lengthy commissioning process the site became operational in January 2022.

Due to concern from local residents as to the impact from this site from emissions (despite the Environmental Agency conditions on Covanta within the permit for testing, emission limits, etc.) a NO_2 diffusion tube was added to the network in January 2022 sited in Cranfield, results from the site were 2022 = 18.6µg/m^3 & 2023 = 13.9µg/m^3 both of which are significantly below the Government's Annual NO_2 Air Quality Objective of 40µg/m^3, this site has now been decommissioned.

The site in Marston Moretaine is closer to the Covanta site and is sited near a busier road/junction which leads to the A421 slip road. The results from this site are obviously higher, given its location adjacent to the road; 2022 = 24µg/m^3 & 2023 = 21.3µg/m^3, again both are below the Government's Annual NO_2 Air Quality Objective of 40µg/m^3. This site is being retained as there is considerable debate regarding significant development in the area and so a trend in air quality concentrations will be beneficial to mitigate the impact of development, if any.

The planned M1-A6 road adds to the provision of east-west routes through the district and aims to divert traffic from driving through villages such as Lower Sundon and Streatley and will link up with the A5-M1 road at the Junction 11a of the M1 motorway. There are plans for a new sub-regional rail freight interchange at Sundon accessed via the planned M1-A6 road. Documents pertaining to this development can be viewed on Central Bedfordshire Council's website [M1-A6 road documents]

Additionally, there are a few ongoing planning projects, etc which may impact on the Sandy AQMA, the East-West Rail Link and proposed roadworks to the Black Cat roundabout on the A1. To this end the Pollution Team are in discussions on how the air pollution impacts will be minimised.

The Local Plan identified four planned large developments - which may impact the air quality in Central Bedfordshire:

- Marston Vale new villages. Development of up to 5,000 new homes, up to 30ha of employment land, open spaces, schools, cycle & pedestrian routes etc. More information regarding this can be found in the Planning Portal Case Documents - Central Bedfordshire Council (aifusion.io) and in the Local Plan Marston Vale development - Local Plan | Central Bedfordshire Council.
  The planning application decision is still pending following several extensions of time to determine the decision, the latest extension was to end of April 2024 and so a decision may be imminent.

- Biggleswade new village. Development of around 1,500 homes, community facilities and services. A planning application has been received in respect of this and more information can be found in the Planning Portal Case Documents - Central Bedfordshire Council (aifusion.io). A plan of the site location Biggleswade New Village (centralbedfordshire.gov.uk)

- Arlesey new homes. Development of around 2,000 homes, community facilities & services. The new relief road has been built providing a link between Arlesey and the A507. However I think plans to develop this site may be completed in phases over several years – I am unaware of any formal planning application in relation to this site and so no update is available. A plan of the overall site location Arlesey New Homes (centralbedfordshire.gov.uk)

- Expanding Luton. Development of around 3,600 homes, community facilities & services, pedestrian & cycle links, green spaces and 20ha of employment land. No formal application has been submitted for this development, but it is likely that any development would occur in phases over several years. A plan of the overall site location Expanding Luton (centralbedfordshire.gov.uk)

Additional Air Quality Works Undertaken by Central Bedfordshire Council During 2023

Central Bedfordshire Council commissioned a Detailed Assessment & Source Apportionment Report (December 2023 – AQ consultants) - See Appendix G, to review the situation in Dunstable, if an update of the 2006 AQAP was required to be produced or, if the AQMA could be revoked. Although monitoring has shown all sites to be compliant with the UK Government's annual Air Quality Objective with regards to NO_2. since 2019, some sites showed results that were within 10% of the AQO (above 36µg/m^3)

The modelling carried out as part of the report showed that concentrations of NO_2 are currently (and are predicted) to be compliant with the UK Government's NO_2 annual Air Quality Objective. Modelling showed one site with a possibility of having result within 10% of the AQO (above 36µg/m^3). However current monitoring of the site nearby (Site 55) shows results are significantly below both the AQO and the 10% of the AQO.

Defra had required Central Bedfordshire Council to submit a draft AQAP by the end of March 2024 and so work was in progress to produce this document, then Defra requested 2023 data set, suspending the need for submission of the draft AQAP until they reached a decision regarding the AQMA based on the data submitted. We are still awaiting a decision and have subsequently followed up with an enquiry as to when we may be advised of a decision and were informed that we will be contacted in due course.

QA/QC of Diffusion Tube Monitoring

Central Bedfordshire Council use Gradko International Ltd for the supply and analysis of the NOx diffusion tubes. The 20% TEA/Water methodology is utilised.

The latest diffusion tube precision studies for Gradko 20% TEA/Water methodology show good precision in 21 tests carried out during 2023 (no bad results), this information was obtained in May 2024 from Precision and Accuracy - LAQM (Defra.gov.uk) which shows the results from 2021 – 2023.

Gradko participates in the AIR NO_2 proficiency Testing Scheme, which commenced in 2014 (combining the two long running PT Schemes: LGC Standards STACKS PT and HSE WASP PT).

AIR NO_2 PT forms an integral part of the UK NO_2 Network's QA/QC and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). Testing is carried out on a quarterly basis and results are available from WASP – Annual Performance Criteria for NO2 Diffusion Tubes (defra.gov.uk)

The latest rounds showed that in rounds AR055 (January-February 2023); AR056 (May-June 20230; AR058 (July-August 2023) and AR059 (September-October 2023) the percentage of results submitted which were subsequently determined to be satisfactory was 100%.

The NO_2 diffusion tube monitoring did not differentiate from the 2023 diffusion tube monitoring calendar schedule.

Central Bedfordshire Council utilised the National Bias Adjustment Factor (spreadsheet 03/24 downloaded 26/3/24) available from Defra - National Bias Adjustment Factor 2023 a copy of the screenshot can be viewed below – as can be seen a bias adjustment factor of 0.81 was factored from 23 studies with regards to the Gradko 20%TEA/Water diffusion tubes. This figure was used in all Central Bedfordshire Council calculations as required by Defra.

The National Bias Adjustment Factor was used as there is no co-located diffusion tubes set up at the automatic monitoring site (MD3 – Sandy). Given the size of the district and the spread of the diffusion tubes throughout it, a Local Bias Adjustment Factor, which would be calculated from measurements taken next to the busy A1 in Sandy, would not be applicable to other monitoring sites within the district. Therefore, it was decided that use of the National Bias Adjustment would be more appropriate.

<table>
<tr><td colspan="3">National Diffusion Tube Bias Adjustment Factor Spreadsheet</td><td></td><td>Spreadsheet Version Number: 03/24</td></tr>
<tr><td colspan="4">Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.</td><td>This spreadsheet will be updated at the end of June 2024

LAQM Helpdesk Website</td></tr>
<tr><td colspan="3">The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.</td><td colspan="2">Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.</td></tr>
<tr><td>Step 1:</td><td>Step 2:</td><td>Step 3:</td><td colspan="2">Step 4:</td></tr>
<tr><td>Select the Laboratory that Analyses Your Tubes from the Drop-Down List</td><td>Select a Preparation Method from the Drop-Down List</td><td>Select a Year from the Drop-Down List</td><td colspan="2">Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.</td></tr>
<tr><td>If a laboratory is not shown, we have no data for this laboratory.</td><td>If a preparation method is not shown, we have no data for this method at this laboratory.</td><td>If a year is not shown, we have no data[2]</td><td colspan="2">If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953</td></tr>
</table>

Analysed By[1]	Method To undo your selection, choose (All) from the pop-up list	Year[5] To undo your selection, choose (All)	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m^3)	Automatic Monitor Mean Conc. (Cm) (µg/m^3)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in Water	2023	R	Monmouthshire County Council	11	33	26	26.5%	G	**0.79**
Gradko	20% TEA in water	2023	R	Blackburn With Darwen Bc	12	23	16	43.8%	G	**0.70**
Gradko	20% TEA in water	2023	R	Lancaster City Council	10	35	27	28.6%	G	**0.78**
Gradko	20% TEA in water	2023	R	Eastleigh Borough Council	12	33	26	26.4%	G	**0.79**
Gradko	20% TEA in water	2023	R	Eastleigh Borough Council	12	22	19	12.5%	G	**0.89**
Gradko	20% TEA in water	2023	R	Plymouth City Council	12	35	26	38.3%	S	**0.72**
Gradko	20% TEA in water	2023	R	Plymouth City Council	10	39	31	24.2%	S	**0.80**
Gradko	20% TEA in water	2023	UC	Belfast City Council	10	26	19	38.3%	G	**0.72**
Gradko	20% TEA in water	2023	R	Cheshire West And Chester	12	35	32	10.0%	G	**0.91**
Gradko	20% TEA in water	2023	R	Cheshire West And Chester	10	32	28	14.6%	G	**0.87**
Gradko	20% TEA in water	2023	R	Dudley Mbc	12	27	23	17.1%	G	**0.85**
Gradko	20% TEA in water	2023	UB	Dudley Mbc	12	19	13	45.4%	G	**0.69**
Gradko	20% TEA in water	2023	R	Dudley Mbc	12	40	37	7.7%	G	**0.93**
Gradko	20% TEA in water	2023	R	Gateshead Council	12	23	20	17.7%	G	**0.85**
Gradko	20% TEA in water	2023	R	Gateshead Council	11	23	18	26.9%	G	**0.79**
Gradko	20% TEA in water	2023	R	Gateshead Council	12	27	22	20.7%	G	**0.83**
Gradko	20% TEA in water	2023	R	Gateshead Council	12	29	23	25.9%	G	**0.79**
Gradko	20% TEA in water	2023	R	Gateshead Council	12	30	33	-7.8%	G	**1.08**
Gradko	20% TEA in water	2023	KS	Marylebone Road intercomparison	11	45	38	20.3%	G	**0.83**
Gradko	20% TEA in water	2023	B	South Holland District Council	10	8	7	12.4%	G	**0.89**
Gradko	20% TEA in water	2023	R	Worcestershire	12	12	11	17.4%	G	**0.85**
Gradko	20% TEA in Water	2023	R	Ards And North Down Borough Council	12	33	21	60.2%	G	**0.62**
Gradko	20% TEA in Water	2023	R	Lisburn & Castlereagh City Council	11	24	20	22.1%	G	**0.82**
Gradko	20% TEA in water	2023		**Overall Factor[3] (23 studies)**				**Use**		**0.81**

[1] For Casella Stanger/Bureau Veritas (NOT Bureau Veritas Labs) use Gradko 50% TEA in Acetone. For Casella Seal/GMSS/Casella CRE/Bureau Veritas Labs/Eurofins/ use Environmental Scientific Groups. From 2011 for Environmental Scientific Groups use ESG Glasgow. From 2011 for Harwell Scientific Services use ESG Didcot. For 2017 for SOCOTEC use ESG Didcot, as name changed mid- year. For 2018 SOCOTEC entered as Didcot and Glasgow. Glasgow analysis lab moved to Didcot mid 2018. For Staffordshire CC SS/Staffordshire County Analyst use Staffordshire Scientific Services. For Bodycote Health Sciences and Clyde Analytical Laboratories use Exova. For Rotherham MBC use South Yorkshire Labs. For Dundee CC use Tayside SS. For Leicester Scientific Services use Staffordshire Scientific Services. For South Yorkshire Air Quality Samplers use South Yorkshire Labs. As of January 2010 sampler body changed. As of April 2010 sampler cap changed. Lancashire County Analysts withdrew from the Field intercomparison at the end of 2010. No submissions were supplied in 2011. Walsall MBC closed in March 2011. Bristol Scientific Services closed at the end of 2011. Somerset County Council did not start the Marylebone road intercomparison until June 2012. Exova stopped providing diffusion tubes at the end of 2013. Kent Scientific Services stopped providing diffusion tubes at the end of 2013. Kirklees Council stopped providing diffusion tubes in the middle of 2016. Northampton BC stopped providing diffusion tubes in 2017. 2018 - Gradko preparation method for 50% TEA in acetone tubes changed from pipetting to dipping of grids to coat them in TEA. West Yorkshire Analytical Services stopped providing diffusion tubes in 2020. South Yorkshire Air Quality Samplers stopped providing diffusion tubes in 2022.
[2] In this situation it would be reasonable to use data from the nearest year.
[3] Overall factors have been calculated using orthogonal regression to allow for uncertainty in both the automatic monitor and diffusion tube. The uncertainty of the diffusion tube has been assumed to be double that of the automatic monitor.
[4] If you have your own co-location study, please send your data to us, so that it can be included here. If this is not possible, but you wish to combine these factors with your own, select and copy the relevant data from this spreadsheet and paste them into a new one (otherwise your calculations will include hidden data). Then add your own data and calculate the bias. To obtain a new correction factor that includes your data, average the bias (B) values, expressed as a factor, i.e. -16% is -0.16. Next add 1 to this value, e.g. -0.16 + 1.00 = 0.84 in this example, then take the inverse to give the bias adjustment factor 1/0.84 = 1.19. (This will not be exactly the same as the correction factor calculated using orthogonal regression as used in this spreadsheet, but will be reasonably close). To add data download a questionnaire
[5] Where an annual data set falls into two years it has been ascribed to the year in which most of the data has fallen.
[6] Tube precision is determined as follows: G = Good precision - coefficient of variation (CV) of diffusion tube replicates is considered G when the CV of eight or more periods is less than 20%, and the average CV of all monitoring periods is less than 10%; P = Poor precision - CV of four or more periods >20% and/or average CV >10%; S = Single tube, therefore not applicable; na = not available.

Based on the monitoring in 2023, Central Bedfordshire Council have concluded that currently no further AQMAs need to be declared.

Diffusion Tube Annualisation

One diffusion tube site required annualisation (Site 58 - Hockliffe), as its data capture was less than 75% but greater than 25% during 2023. Details of the annualisation calculation can be found in Table C1 below. The sites used for the calculation were Northampton Spring Park and Borehamwood Meadow Park both have a background status and are part of the AURN (Automatic Urban & Rural Network) network of sites and are within 50 miles of the site to be annualised. The annualisation has been carried out in accordance with Defra Guidance and using the Diffusion Tube Data Processing Tool (DTDES) to perform the necessary calculations as can be seen in Table C.1 (below).

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Borehamwood Meadow Park	Annualisation Factor Northampton Spring Park	Annualisation Factor <Site 3 Name>	Annualisation Factor <Site 4 Name>	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
SB58	0.9794	1.0005			0.9900	23.4	23.1

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2024 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance regarding the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

The National Bias Adjustment Factor was used as there is no co-located diffusion tubes set up at the automatic monitoring site (MD3 – Sandy). Given the size of the district and the spread of the diffusion tubes throughout it, a Local Bias Adjustment factor, which would be calculated from measurements taken next to the busy A1 in Sandy, would not be applicable to other monitoring sites within the district. Therefore, it was decided that the use of the National Bias Adjustment would be more appropriate.

Central Bedfordshire Council have applied a national bias adjustment factor of 0.81 to the 2023 monitoring data (spreadsheet 03/24 downloaded 26/3/24). A summary of bias adjustment factors used by Central Bedfordshire Council over the past five years is presented in Table C.2.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.81
2022	National	03/23	0.83
2021	National	03/22	0.84
2020	National	03/21	0.81
2019	National	03/20	0.93

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

However, no diffusion tube NO_2 monitoring locations within Central Bedfordshire required distance correction during 2023, or, given the location of the tube distance correction may not be possible; for example, in the case of Site N20, distance correction was not possible as the tube is sited on the downpipe of the property façade and therefore there is no physical distance from monitoring point to the façade of the property.

Table C.3 – Non-Automatic NO_2 Fall off With Distance Calculations (concentrations presented in $\mu g/m^3$)

No sites had annual mean results of $36\mu g/m^3$ or above after annualisation and bias adjustment and therefore fall-off with distance calculation was not required to be applied.

QA/QC of Automatic Monitoring

The Sandy site monitors NO_2 and Particulates. The PM_{10} and $PM_{2.5}$ monitors at the site are part of the AURN network and as such Sandy's site data management is carried out by Bureau Veritas (as from 1st October 2021).

The automatic monitor at Sandy which was run by Central Bedfordshire Council was transferred to the Environment Agency on 1st December 2022 and is now operated by Defra by Bureau Veritas.

Central Bedfordshire Council continues to provide Local Site Operator (LSO) duties for the Sandy automatic monitoring site, for both NO_x analyser and both BAM analysers (PM_{10} & $PM_{2.5}$).

However, the NO_x analyser is not part of the AURN network and so the data is managed by Ricardo.

Calibrations are carried out every 2-4 weeks and audits/servicing every 6 months.

All monitoring data used within this ASR have been ratified.

Monitoring data both live and historical are available through:

- Sandy Roadside Latest Data - Air Quality monitoring service (airqualityengland.co.uk)
- Interactive monitoring networks map - Defra, UK (AURN)

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The BAM PM10 & PM2.5 have been corrected for slope by Ricardo-AEA as shown below:

PM_{10}: BAM Gravimetric Equivalent (correction applied) (01/01/2023 to 31/12/2023)

PM_{25}: BAM Gravimetric Equivalent (correction applied) (01/01/2023 to 31/12/2023)

Automatic Monitoring Annualisation

All automatic monitoring locations within Central Bedfordshire recorded data capture of greater than 75%, therefore it was not required to annualise any 2023 data sets (NO_2, PM_{10} & $PM_{2.5}$).

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within Central Bedfordshire required distance correction during 2023.

Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D1 - Ampthill monitoring sites

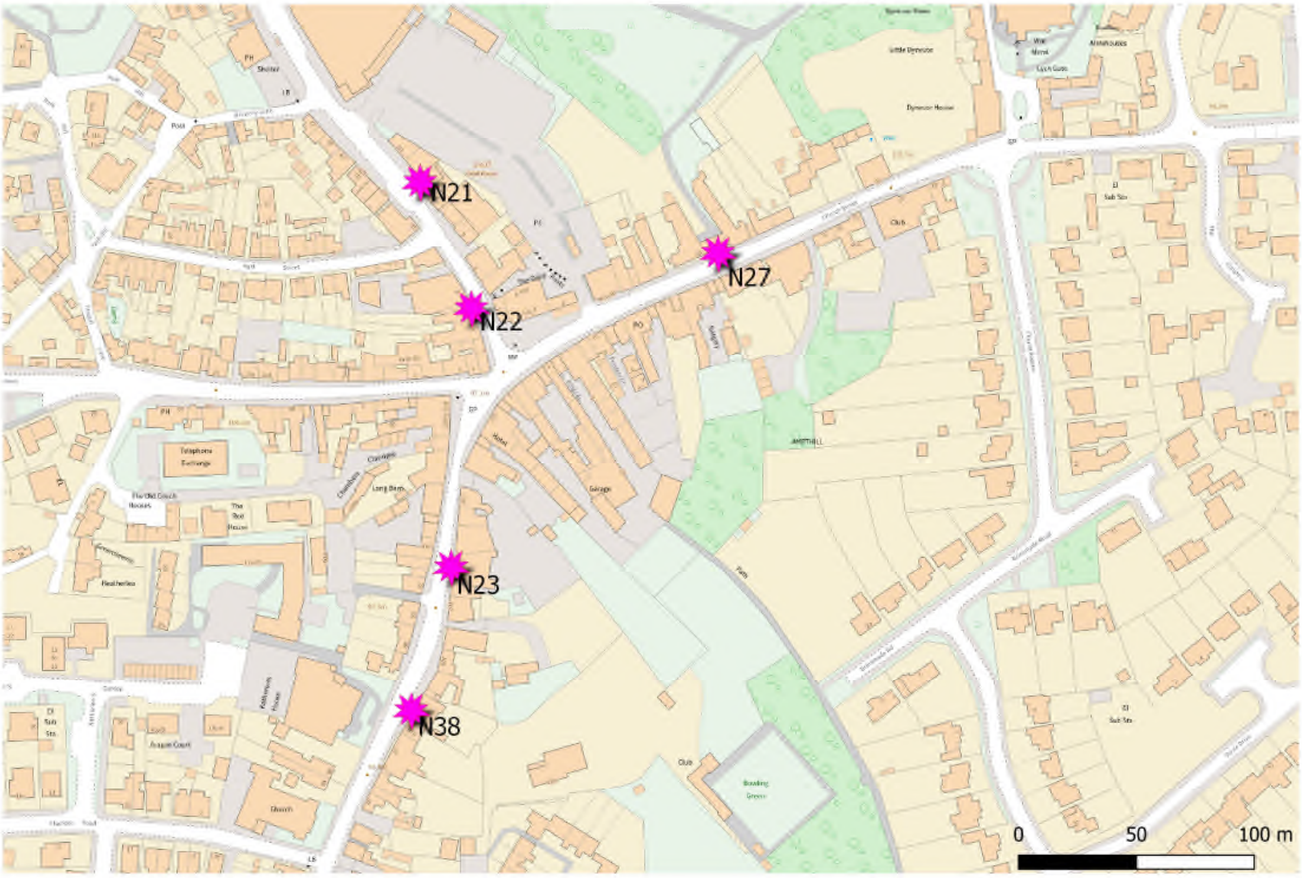


Figure D1a - AQMA 3 Ampthill Boundary and Monitoring Sites

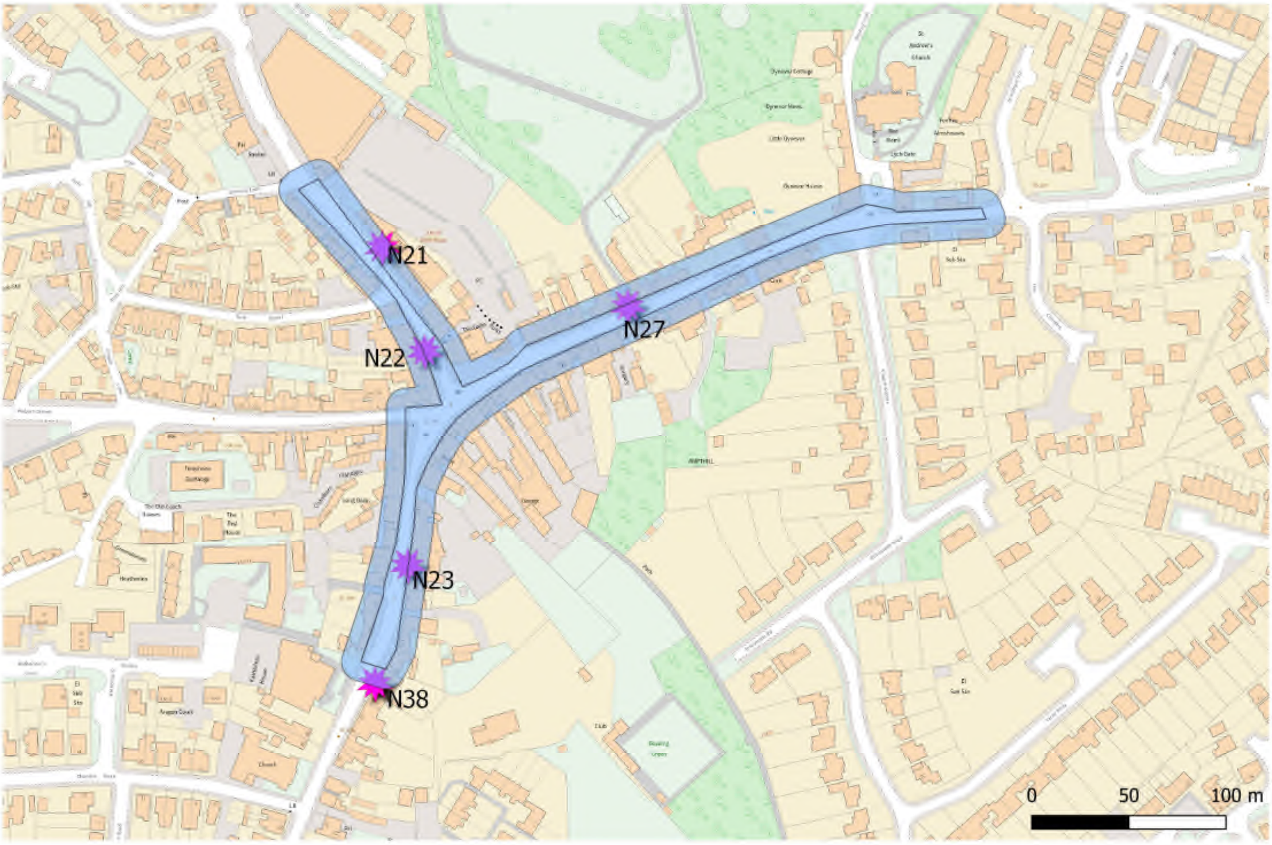


Figure D2 - Beeston monitoring site

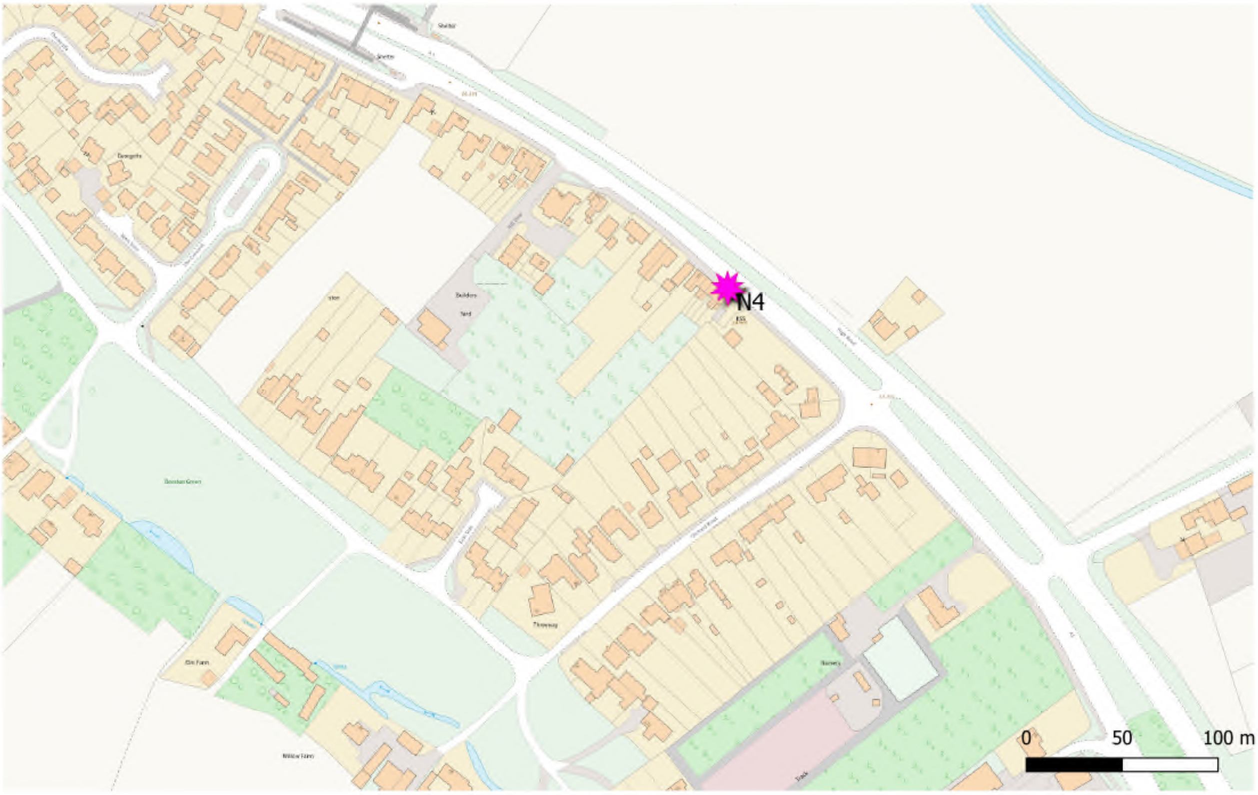


Figure D3 - Map of Leighton Buzzard monitoring site

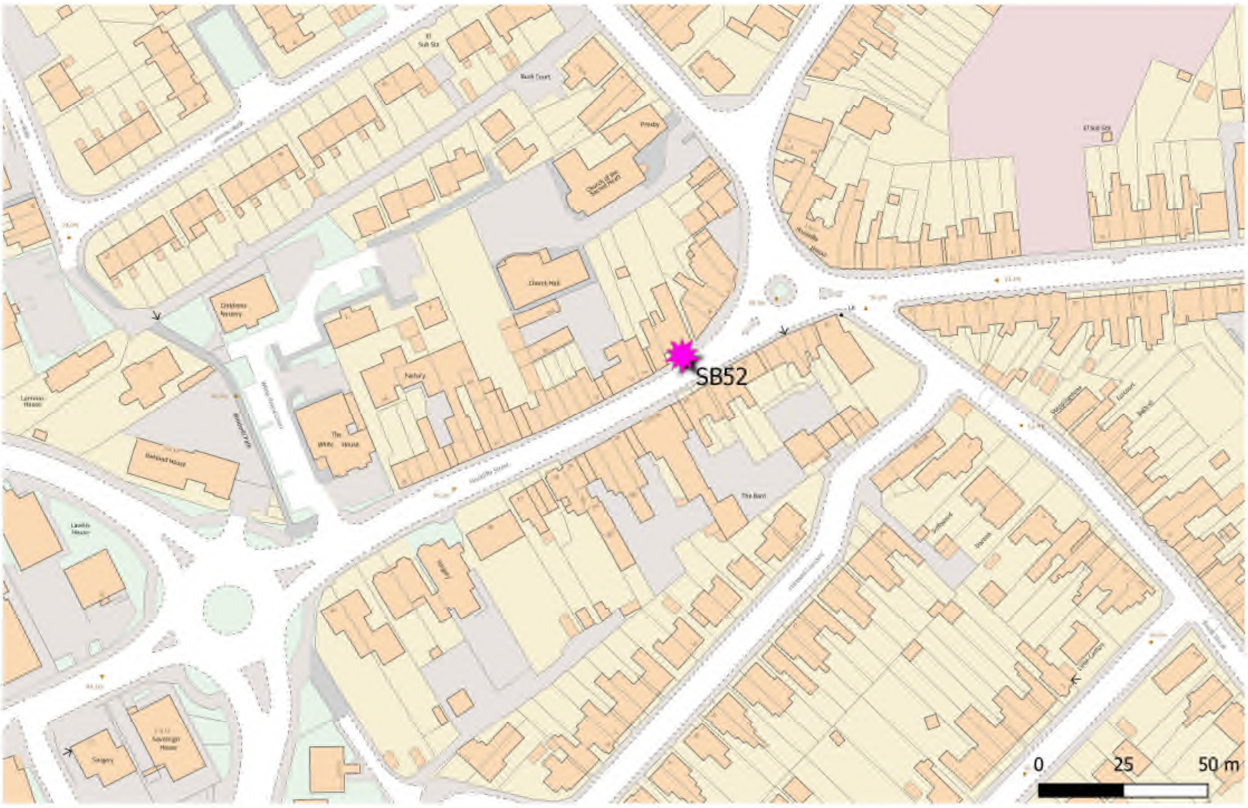


Figure D4 - Marston Moretaine monitoring site

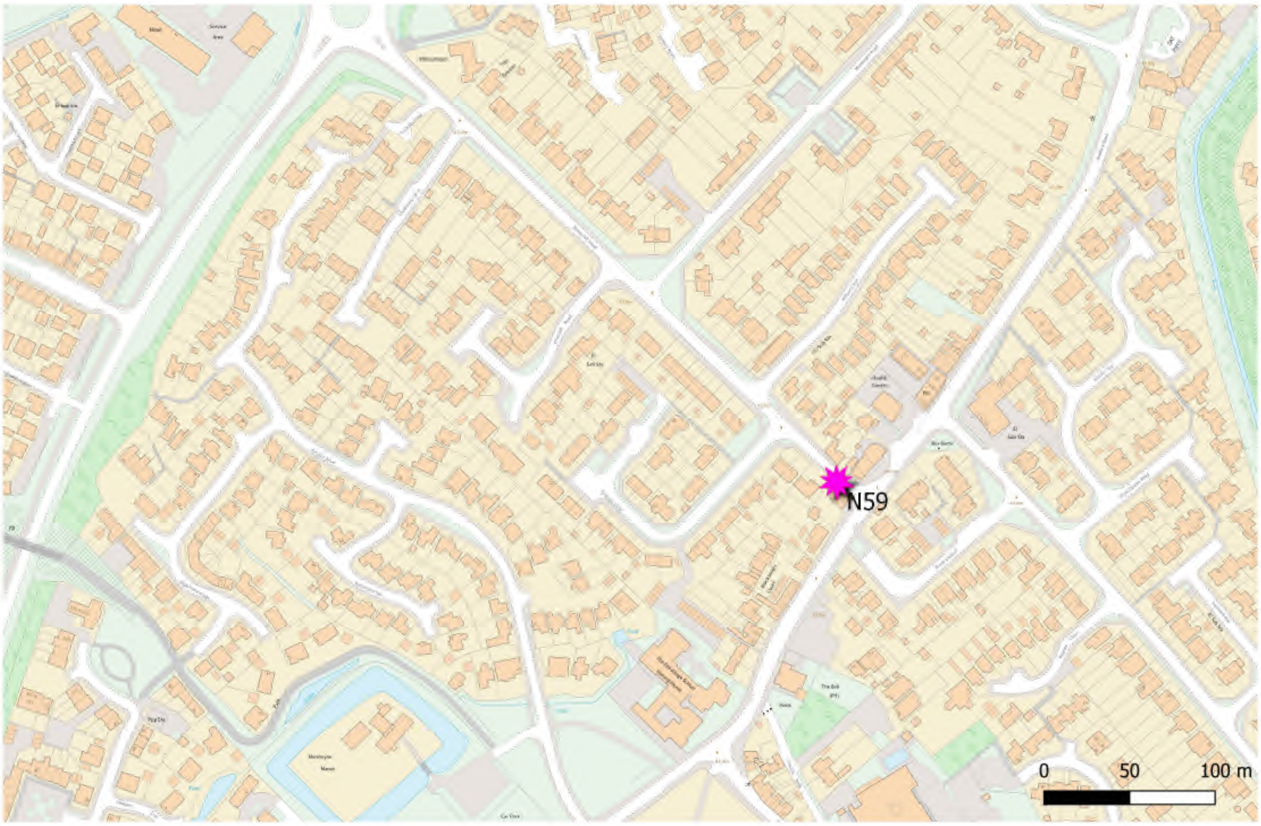


Figure D5 - Houghton Regis monitoring site

Figure D6 - Woburn monitoring site

Figure D7 - Dunstable monitoring sites

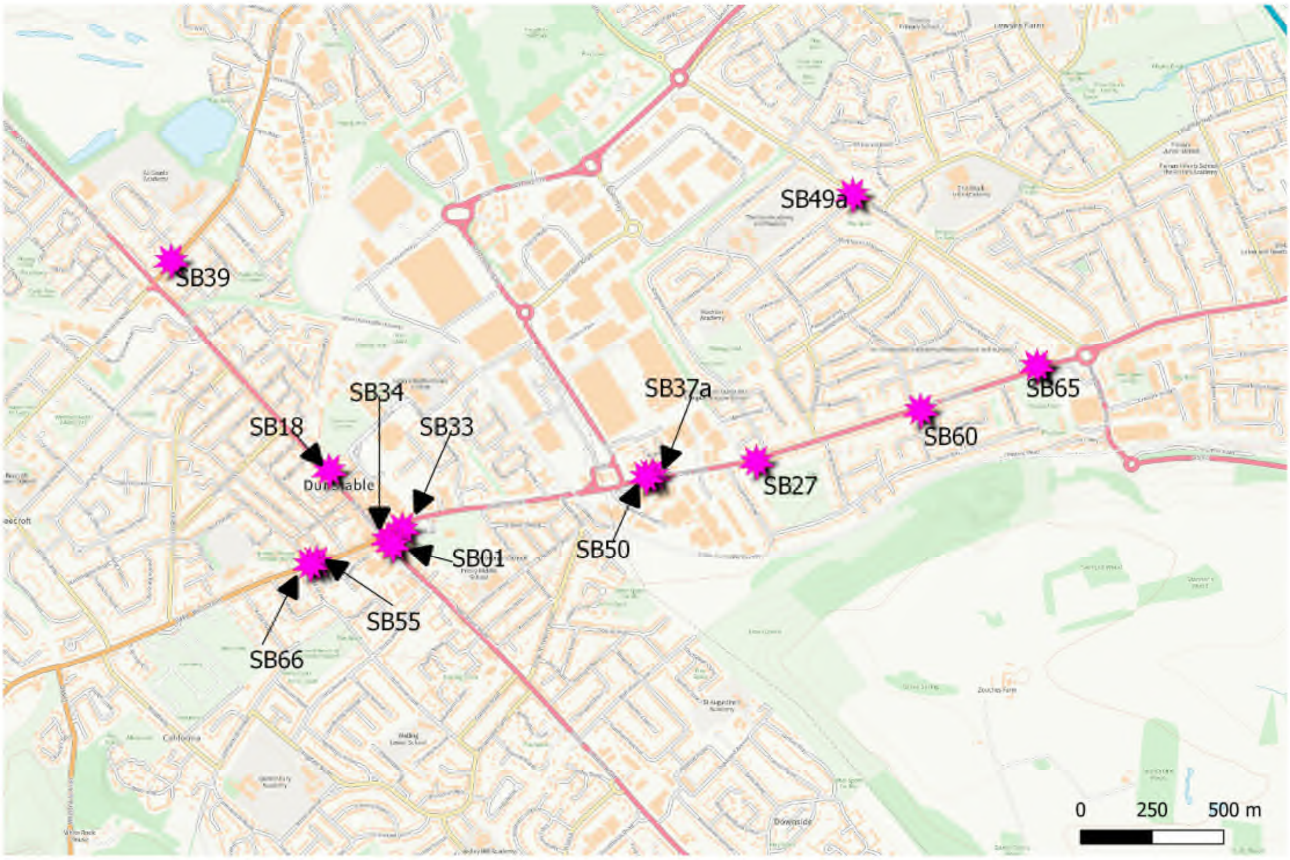


Figure D7a - AQMA 1 Dunstable Boundary and Monitoring Sites

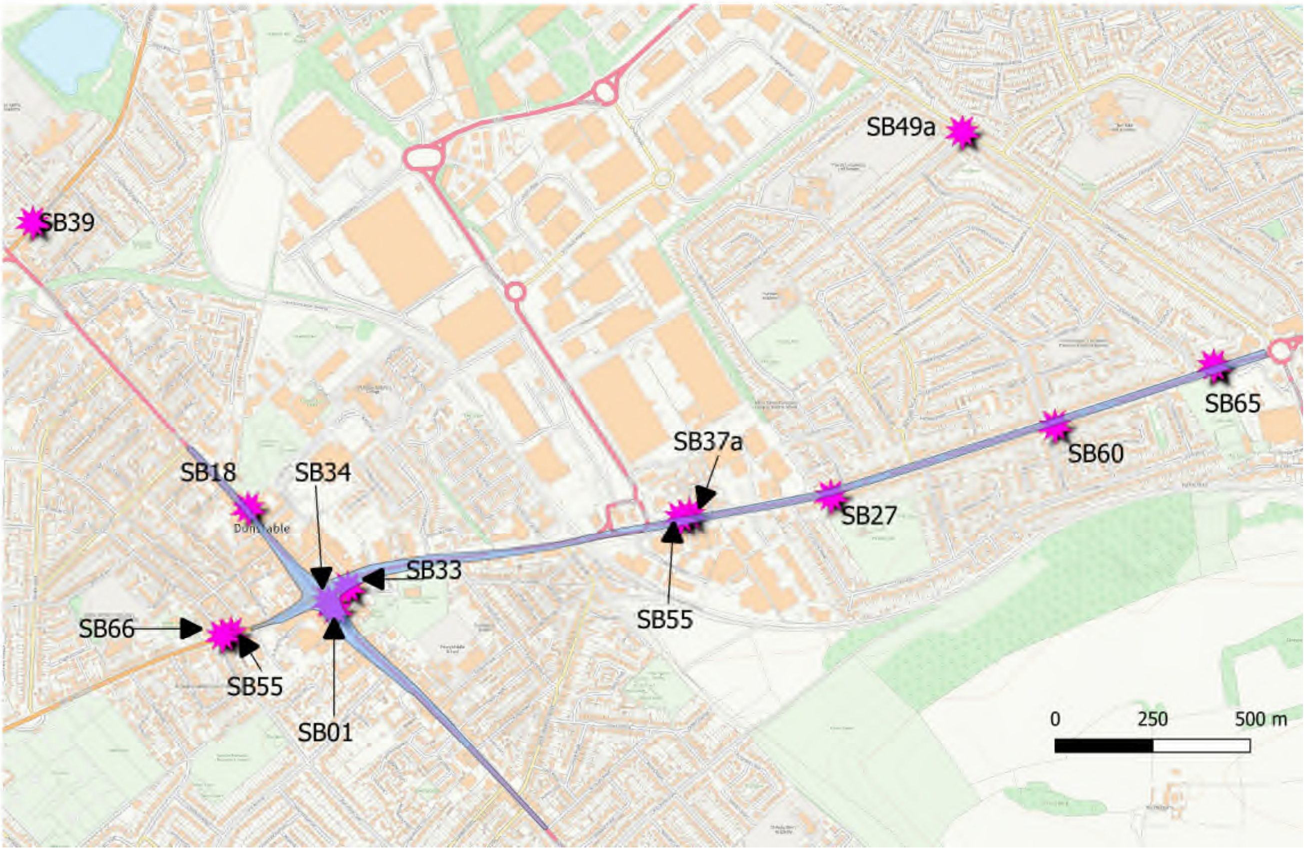


Figure D8 - Hockliffe monitoring site

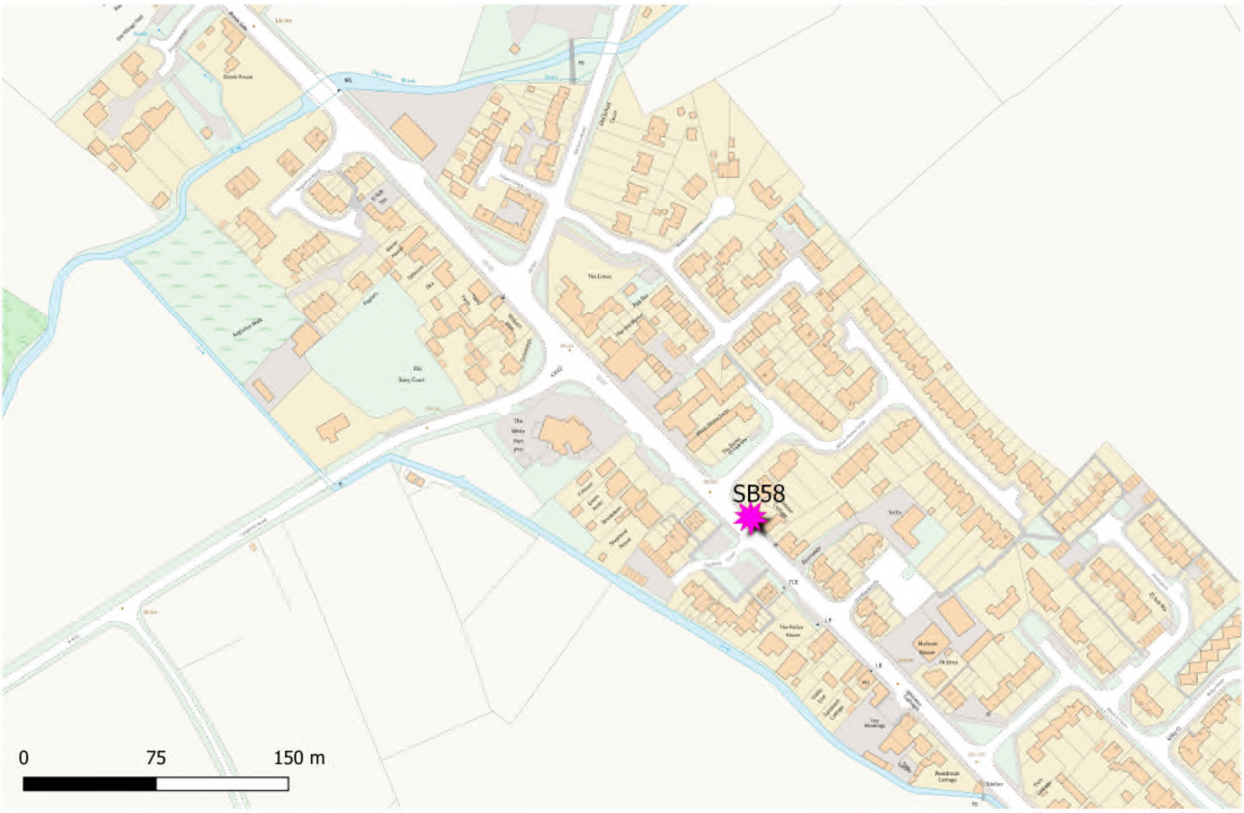


Figure D9 - Harlington monitoring sites

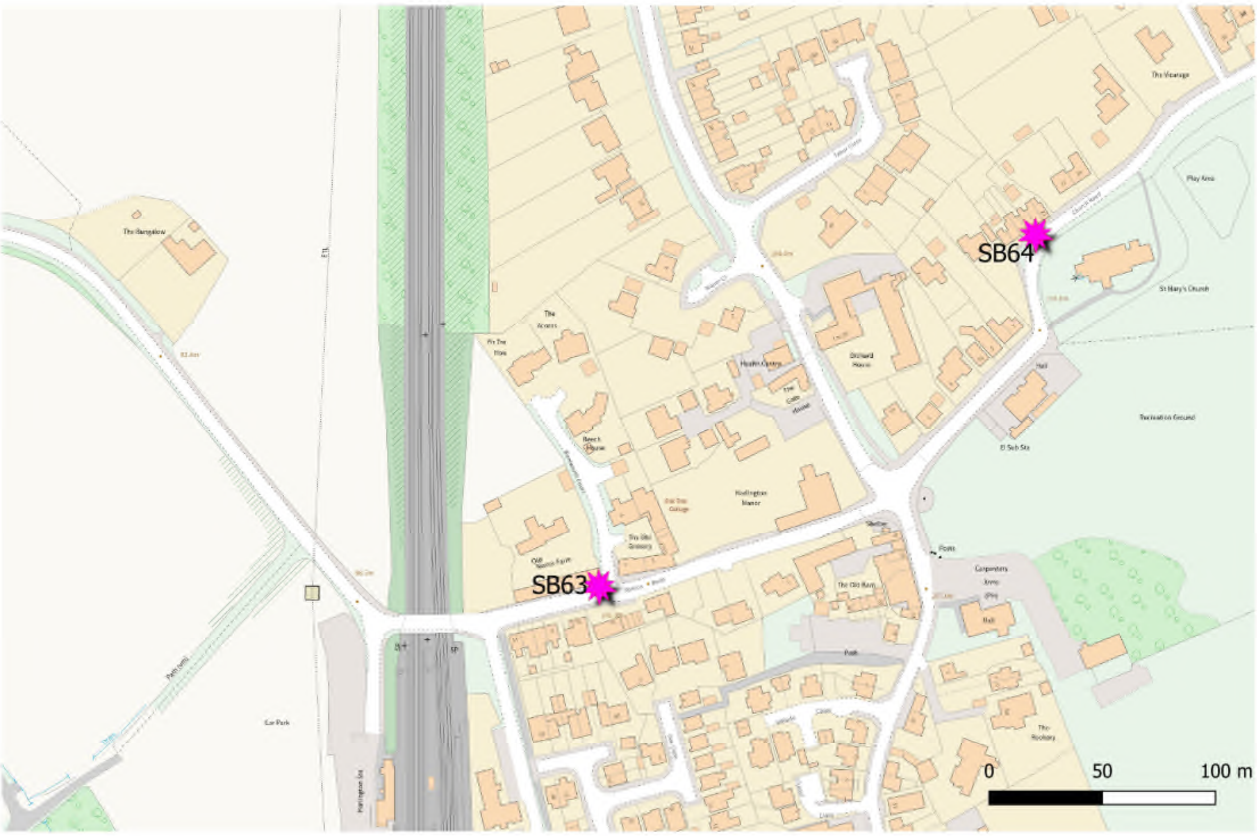


Figure D10 - Streatley monitoring site

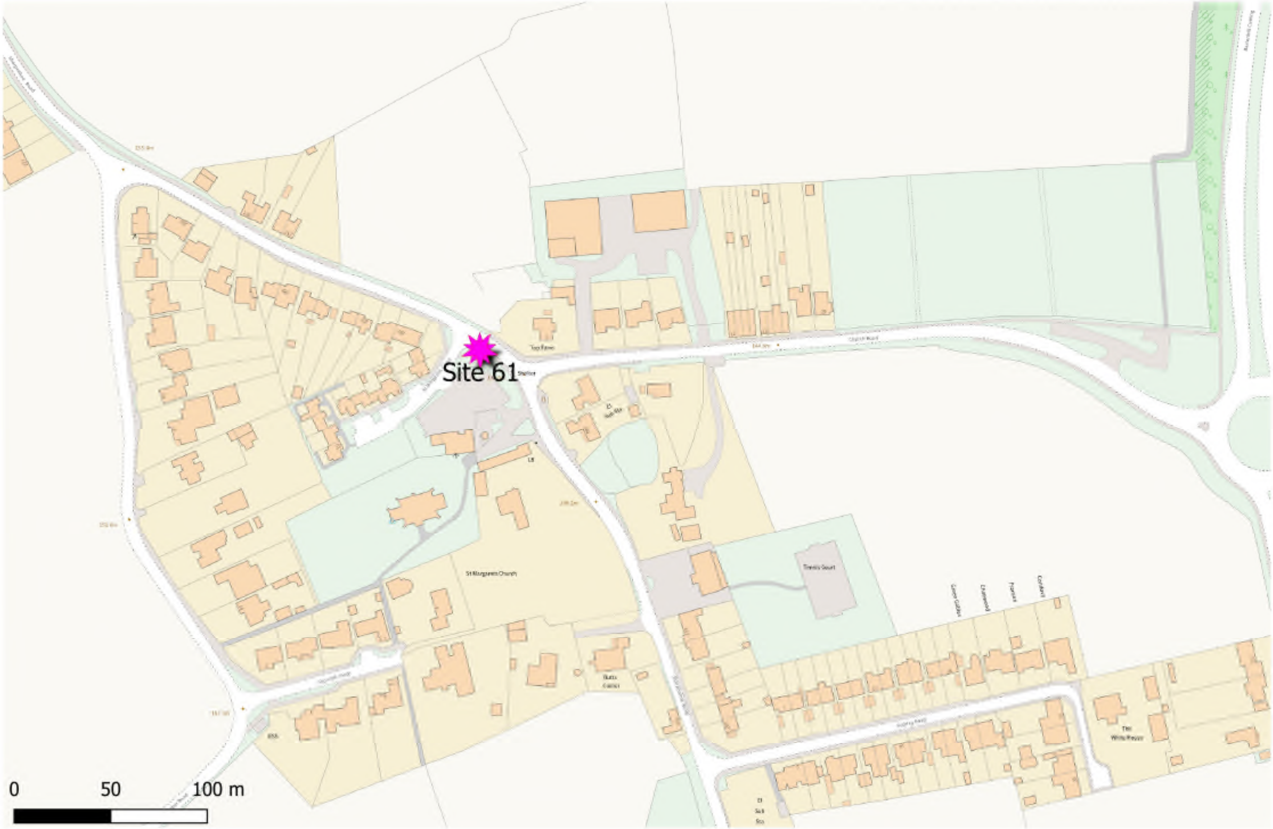


Figure D11 - Biggleswade monitoring site

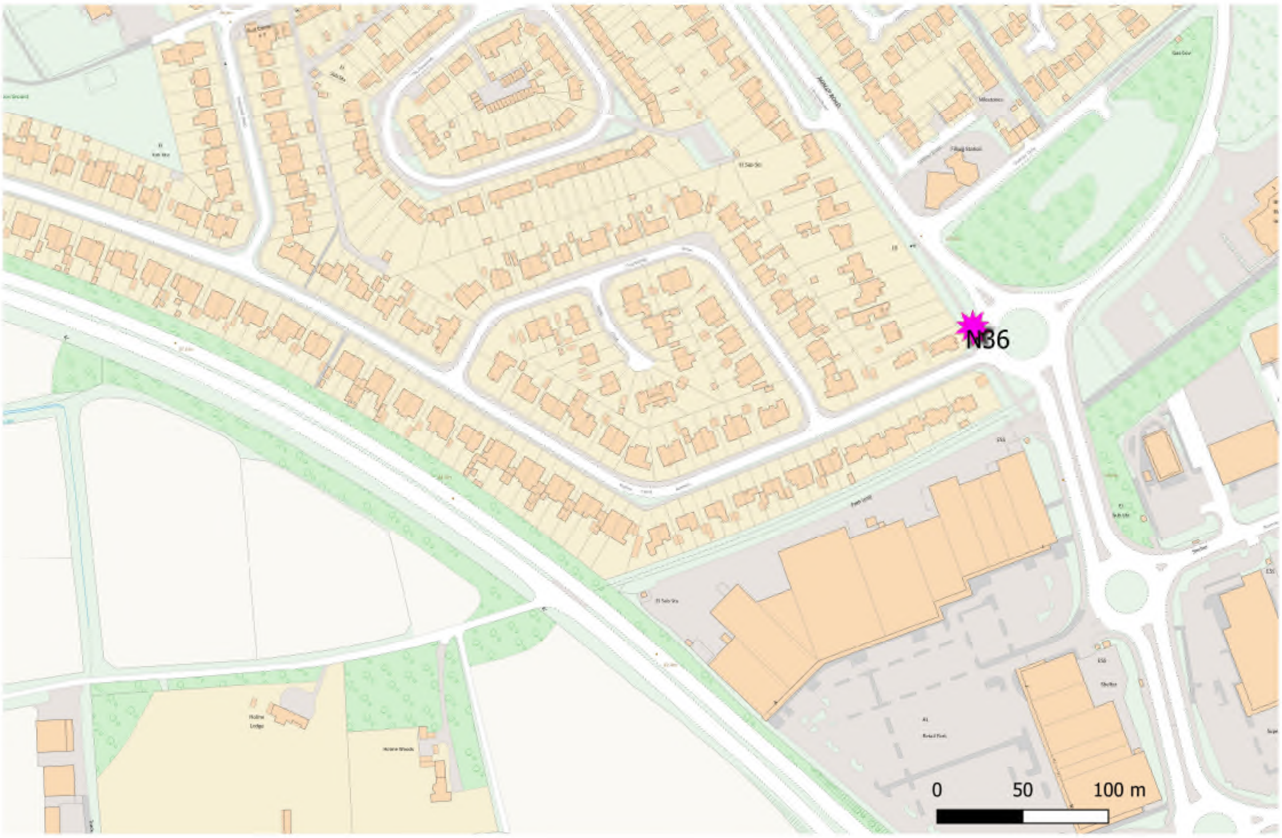


Figure D12 - Cranfield monitoring site

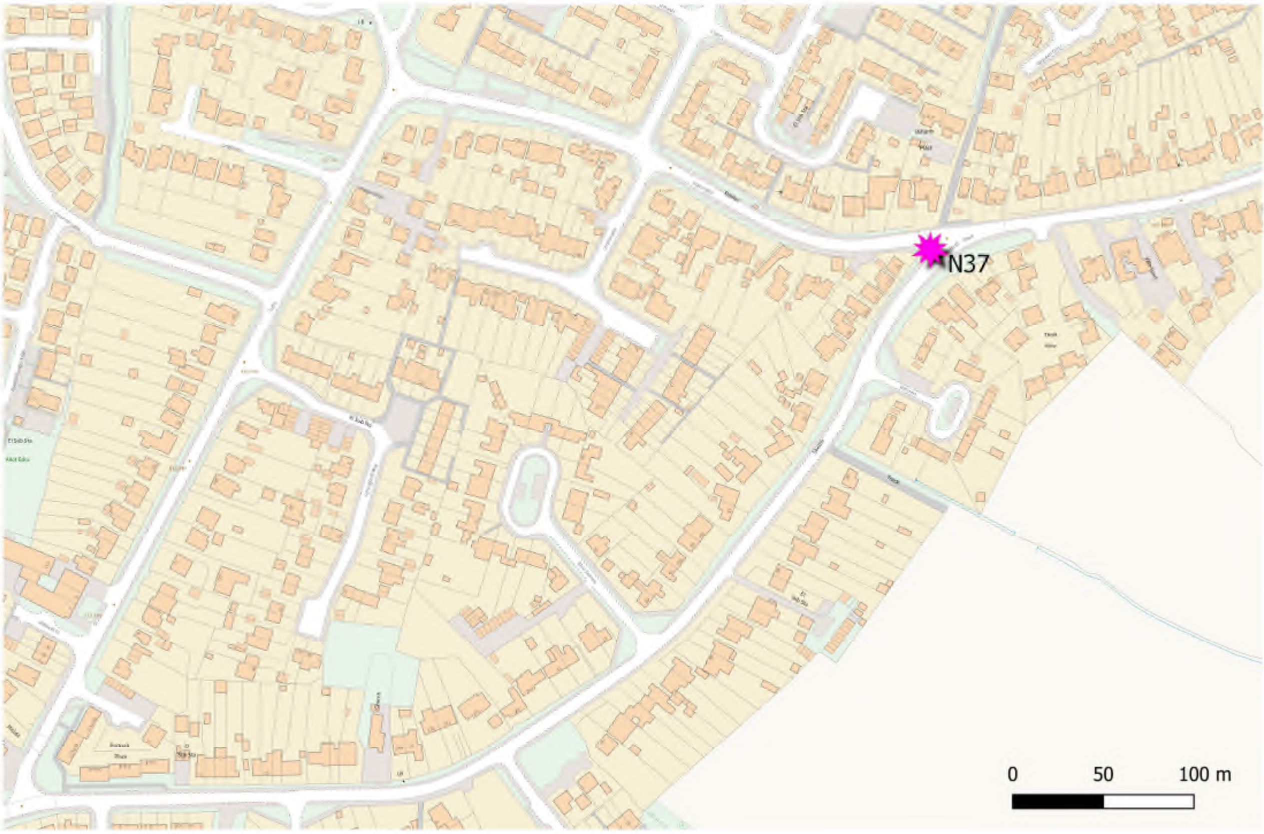


Figure D13 - Sandy monitoring sites (A) - (N6; N16; N17; N18; N31 & N35)

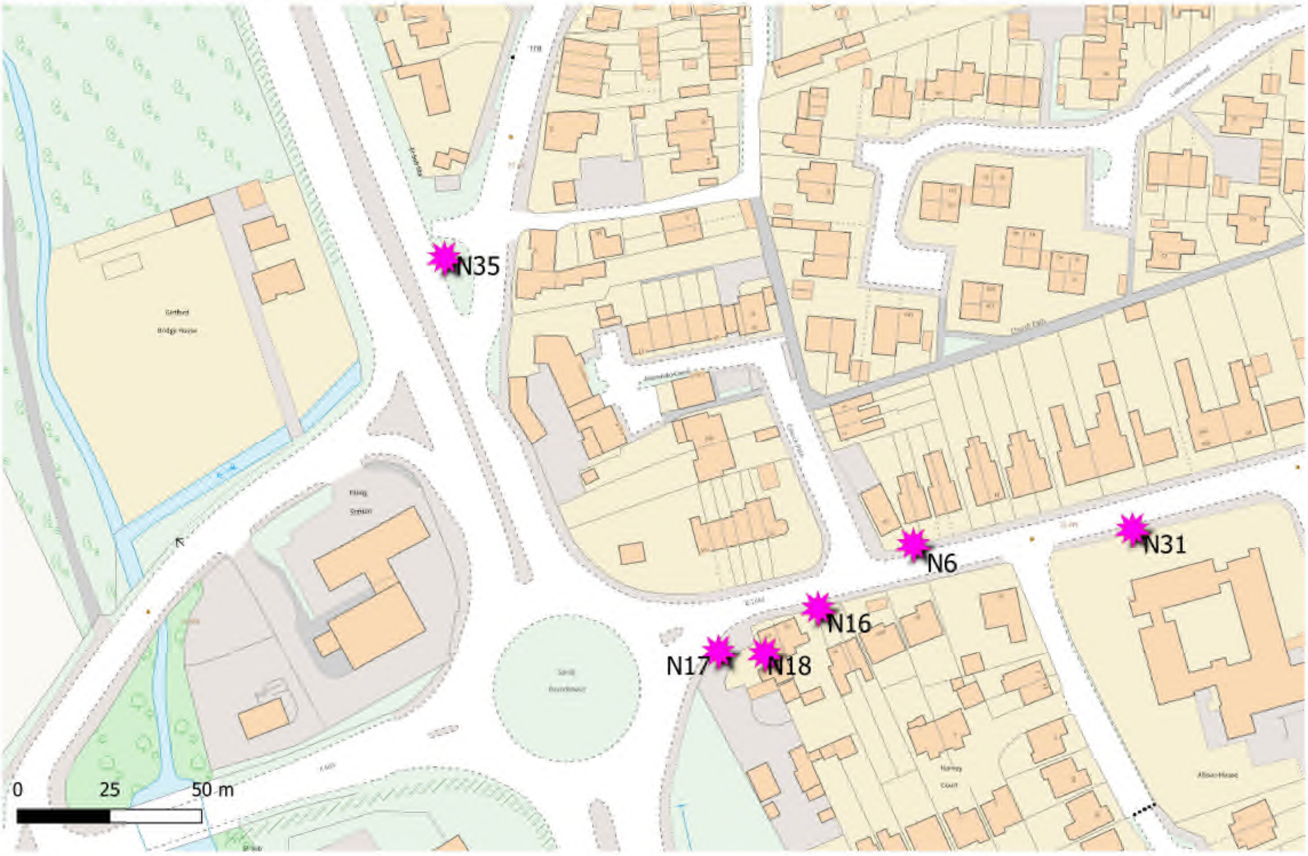


Figure D14 - Sandy monitoring sites (B) - (N20; N25; N28; N30 and the Realtime Monitoring Station)

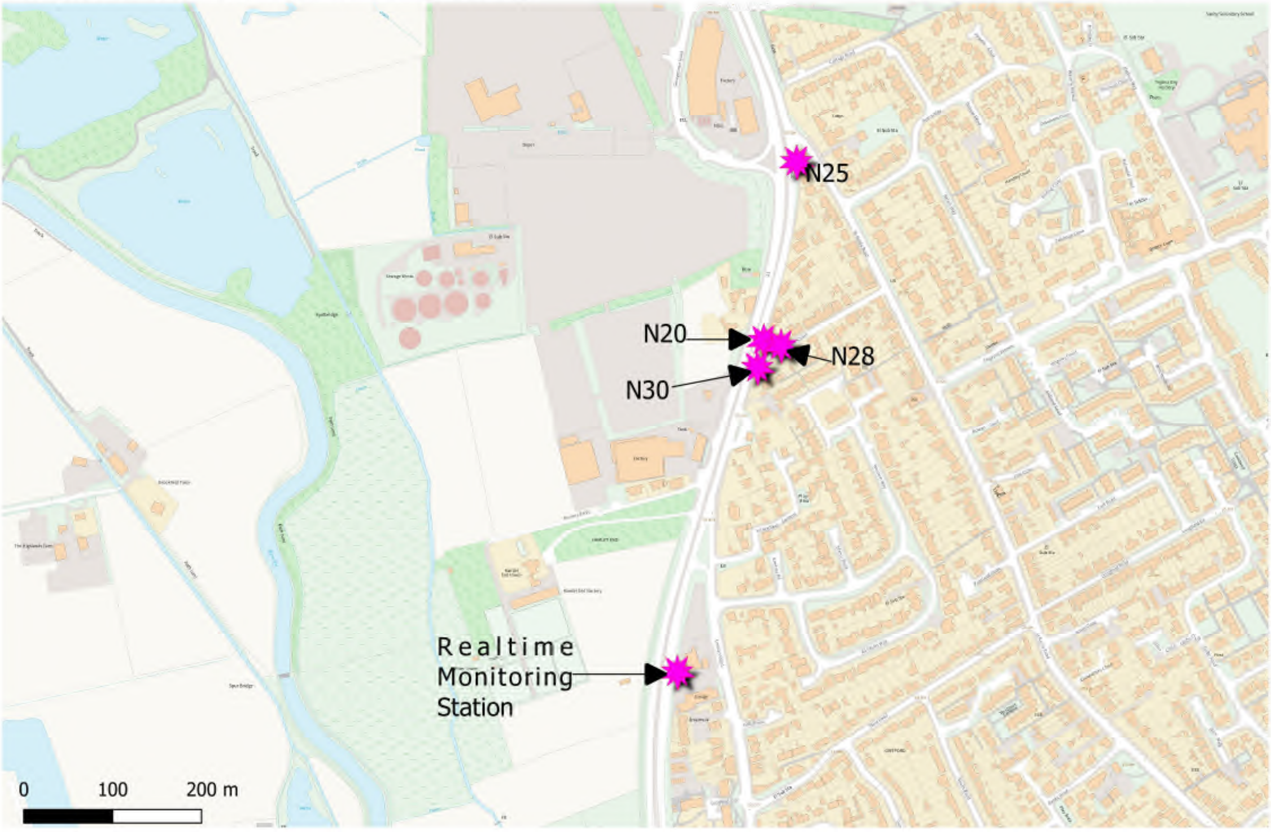
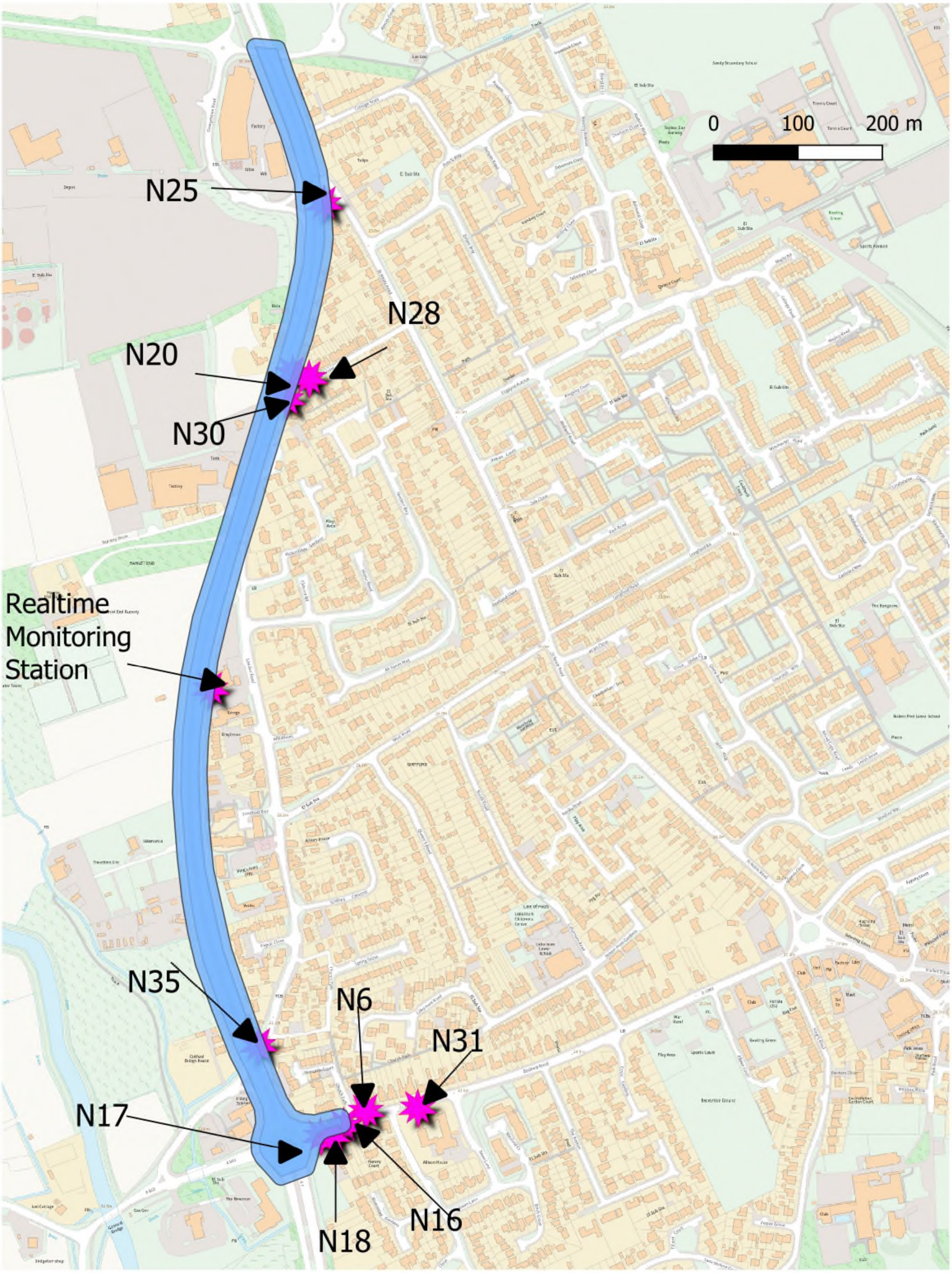


Figure D15 - AQMA 4 Sandy Boundary and Monitoring Sites (including Realtime Monitoring Station)



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[10]

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO_2)	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM_{10})	40µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO_2)	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO_2)	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[10] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Appendix F: Weather Data

Table F.1 Weather Data – Sandy 2023

datetime	Windspeedmean (mph)	winddir	Wind 2	Wind 4	Wind 8
2023-01-01	12.6	214.3	S	E	SW
2023-01-02	6.6	237	S	E	SW
2023-01-03	14.4	190.9	S	E	S
2023-01-04	17	236	S	E	SW
2023-01-05	12.6	218.9	S	E	SW
2023-01-06	13.6	211.6	S	E	SW
2023-01-07	19.4	193.3	S	E	S
2023-01-08	14.4	200.5	S	E	S
2023-01-09	10.6	252.6	S	E	W
2023-01-10	15.2	207.9	S	E	SW
2023-01-11	14.7	230.6	S	E	SW
2023-01-12	18.5	233.6	S	E	SW
2023-01-13	18.1	250.3	S	E	W
2023-01-14	16.6	224.8	S	E	SW
2023-01-15	12.7	231.7	S	E	SW
2023-01-16	9.9	327.6	N	S	NW
2023-01-17	6.5	275.7	N	S	W
2023-01-18	9.5	268.1	S	E	W
2023-01-19	7.8	266.7	S	E	W
2023-01-20	9.8	307.3	N	S	NW
2023-01-21	3.7	39	N	N	NE
2023-01-22	2.6	163.3	S	E	S
2023-01-23	3.2	159.8	S	E	S
2023-01-24	3.3	218.4	S	E	SW
2023-01-25	6.9	258.7	S	E	W
2023-01-26	12.1	353.1	N	S	N
2023-01-27	7.4	2.9	N	N	N
2023-01-28	5	271.8	N	S	W
2023-01-29	9.7	243.4	S	E	SW
2023-01-30	12.1	279.7	N	S	W
2023-01-31	12.3	258.2	S	E	W
2023-02-01	12.7	257	S	E	W
2023-02-02	12.1	253.5	S	E	W
2023-02-03	11.2	259.6	S	E	W

2023-02-04	7.3	250.3	S	E	W
2023-02-05	7	343.7	N	S	N
2023-02-06	4.1	231.5	S	E	SW
2023-02-07	3.9	220.5	S	E	SW
2023-02-08	6	203.6	S	E	SW
2023-02-09	7.3	272.3	N	S	W
2023-02-10	9.1	240	S	E	SW
2023-02-11	5.2	250.7	S	E	W
2023-02-12	4	161.5	S	E	S
2023-02-13	7.4	153.3	S	E	SE
2023-02-14	4.7	189.8	S	E	S
2023-02-15	7.1	210.9	S	E	SW
2023-02-16	11.3	219.7	S	E	SW
2023-02-17	14.8	245.7	S	E	SW
2023-02-18	12.8	250	S	E	W
2023-02-19	11.8	266.1	S	E	W
2023-02-20	12.2	238.5	S	E	SW
2023-02-21	7.4	227.1	S	E	SW
2023-02-22	7.4	277.3	N	S	W
2023-02-23	11.1	7.6	N	N	N
2023-02-24	10.7	337.1	N	S	NW
2023-02-25	12.2	1.2	N	N	N
2023-02-26	9.7	29.8	N	N	NE
2023-02-27	9.1	27.5	N	N	NE
2023-02-28	10.7	19.3	N	N	N
2023-03-01	9.8	30.5	N	N	NE
2023-03-02	9.6	37.5	N	N	NE
2023-03-03	7.9	22.9	N	N	NE
2023-03-04	7.8	347.5	N	S	N
2023-03-05	6.1	281.7	N	S	W
2023-03-06	9.1	264.1	S	E	W
2023-03-07	6.3	295.1	N	S	NW
2023-03-08	11.2	72.6	N	N	E
2023-03-09	11.3	71.5	N	N	E
2023-03-10	14.5	0.9	N	N	N
2023-03-11	7.2	166.9	S	E	S
2023-03-12	13.2	219.8	S	E	SW
2023-03-13	21.8	219.5	S	E	SW
2023-03-14	12.3	302.7	N	S	NW
2023-03-15	8.7	197.6	S	E	S
2023-03-16	13.9	191.8	S	E	S
2023-03-17	8	187.5	S	E	S

2023-03-18	6.6	183.5	S	E	S
2023-03-19	9.6	277.2	N	S	W
2023-03-20	10.7	219.8	S	E	SW
2023-03-21	14.7	215.7	S	E	SW
2023-03-22	17.1	212	S	E	SW
2023-03-23	14.9	212.3	S	E	SW
2023-03-24	14.9	222.1	S	E	SW
2023-03-25	14.8	250.8	S	E	W
2023-03-26	9.7	34.6	N	N	NE
2023-03-27	5.6	324.7	N	S	NW
2023-03-28	11.8	184.4	S	E	S
2023-03-29	11.9	197.3	S	E	S
2023-03-30	14.6	224.7	S	E	SW
2023-03-31	11.7	224.3	S	E	SW
2023-04-01	12.3	347.6	N	S	N
2023-04-02	11.2	23.1	N	N	NE
2023-04-03	7.2	85.2	N	N	E
2023-04-04	5.5	130.1	S	E	SE
2023-04-05	7.6	205.1	S	E	SW
2023-04-06	10.9	280.3	N	S	W
2023-04-07	7.2	336	N	S	NW
2023-04-08	4.8	81	N	N	E
2023-04-09	8.1	158.2	S	E	S
2023-04-10	14.5	220.6	S	E	SW
2023-04-11	14.5	213	S	E	SW
2023-04-12	15.5	217.7	S	E	SW
2023-04-13	15	261.4	S	E	W
2023-04-14	7.3	147.1	S	E	SE
2023-04-15	7.5	359	N	S	N
2023-04-16	4.9	236.8	S	E	SW
2023-04-17	6.2	59	N	N	NE
2023-04-18	15	53.4	N	N	NE
2023-04-19	13.5	58.5	N	N	NE
2023-04-20	13.9	37	N	N	NE
2023-04-21	8.7	60.3	N	N	NE
2023-04-22	5.8	202.2	S	E	S
2023-04-23	9.9	264.6	S	E	W
2023-04-24	8.8	347.2	N	S	N
2023-04-25	6.7	359	N	S	N
2023-04-26	7.1	149.5	S	E	SE
2023-04-27	11.4	129	S	E	SE
2023-04-28	9.6	306.3	N	S	NW

2023-04-29	4.3	139.5	S	E	SE
2023-04-30	7.8	191.7	S	E	S
2023-05-01	8.5	292.3	N	S	W
2023-05-02	7.7	81.8	N	N	E
2023-05-03	9	92.4	S	E	E
2023-05-04	11.9	86.2	N	N	E
2023-05-05	7.6	200.8	S	E	S
2023-05-06	7	161.6	S	E	S
2023-05-07	5.9	247.9	S	E	W
2023-05-08	8.7	201.3	S	E	S
2023-05-09	5.9	260.6	S	E	W
2023-05-10	7.4	269.6	S	E	W
2023-05-11	6	295.5	N	S	NW
2023-05-12	15	14.9	N	N	N
2023-05-13	10.3	20	N	N	N
2023-05-14	4.6	261.8	S	E	W
2023-05-15	10.9	346.8	N	S	N
2023-05-16	8.2	312.4	N	S	NW
2023-05-17	6.8	337.9	N	S	N
2023-05-18	4.1	144.7	S	E	SE
2023-05-19	6.1	61.8	N	N	NE
2023-05-20	11	29.6	N	N	NE
2023-05-21	11.1	23.5	N	N	NE
2023-05-22	11.1	5.4	N	N	N
2023-05-23	6.2	11.6	N	N	N
2023-05-24	7.4	339.4	N	S	N
2023-05-25	7.8	50.4	N	N	NE
2023-05-26	8	69.7	N	N	E
2023-05-27	5.3	58	N	N	NE
2023-05-28	8.8	37.2	N	N	NE
2023-05-29	10.8	38.9	N	N	NE
2023-05-30	11.2	39.8	N	N	NE
2023-05-31	11.8	41	N	N	NE
2023-06-01	12.1	38.3	N	N	NE
2023-06-02	12.1	34.8	N	N	NE
2023-06-03	11	29.8	N	N	NE
2023-06-04	10.2	31.8	N	N	NE
2023-06-05	10.2	38.4	N	N	NE
2023-06-06	10.3	44.6	N	N	NE
2023-06-07	10	46.9	N	N	NE
2023-06-08	10.8	49.5	N	N	NE
2023-06-09	13.7	40.1	N	N	NE

2023-06-10	11.2	68.6	N	N	E
2023-06-11	6.4	59.6	N	N	NE
2023-06-12	6.4	47.8	N	N	NE
2023-06-13	10.3	53.9	N	N	NE
2023-06-14	8.9	36.6	N	N	NE
2023-06-15	6.7	47.1	N	N	NE
2023-06-16	5.9	62.2	N	N	NE
2023-06-17	6.5	97.1	S	E	E
2023-06-18	6.6	107.8	S	E	E
2023-06-19	8	216.1	S	E	SW
2023-06-20	7.6	188.8	S	E	S
2023-06-21	6.8	232.9	S	E	SW
2023-06-22	5.8	4.7	N	N	N
2023-06-23	5.9	247.1	S	E	SW
2023-06-24	6.1	223.2	S	E	SW
2023-06-25	10.4	196.1	S	E	S
2023-06-26	10.2	267.8	S	E	W
2023-06-27	7.4	240.7	S	E	SW
2023-06-28	7.4	234.9	S	E	SW
2023-06-29	8.5	327.3	N	S	NW
2023-06-30	9.4	223.6	S	E	SW
2023-07-01	11.7	275.6	N	S	W
2023-07-02	10.9	265.8	S	E	W
2023-07-03	11.7	250.8	S	E	W
2023-07-04	7.2	234.8	S	E	SW
2023-07-05	11.1	269.7	S	E	W
2023-07-06	9.2	219.9	S	E	SW
2023-07-07	8.5	153.9	S	E	SE
2023-07-08	7.2	141.9	S	E	SE
2023-07-09	6.8	210.9	S	E	SW
2023-07-10	10.6	209.9	S	E	SW
2023-07-11	11.5	214.7	S	E	SW
2023-07-12	9.6	241.5	S	E	SW
2023-07-13	7.3	241.3	S	E	SW
2023-07-14	9.2	155.8	S	E	SE
2023-07-15	16.3	205	S	E	SW
2023-07-16	15.2	225.8	S	E	SW
2023-07-17	9.4	243.6	S	E	SW
2023-07-18	5.3	250.6	S	E	W
2023-07-19	7.3	293.9	N	S	NW
2023-07-20	6.4	306.9	N	S	NW
2023-07-21	8.2	285.8	N	S	W

2023-07-22	11.1	207.6	S	E	SW
2023-07-23	12.1	233.5	S	E	SW
2023-07-24	8.8	15.3	N	N	N
2023-07-25	7.6	296.2	N	S	NW
2023-07-26	8.1	226.8	S	E	SW
2023-07-27	10.1	233.6	S	E	SW
2023-07-28	8.3	229.5	S	E	SW
2023-07-29	11.2	238.8	S	E	SW
2023-07-30	11.5	238.5	S	E	SW
2023-07-31	11.4	235.8	S	E	SW
2023-08-01	9.8	256.4	S	E	W
2023-08-02	10.6	240.9	S	E	SW
2023-08-03	10.5	323	N	S	NW
2023-08-04	8.7	296.6	N	S	NW
2023-08-05	9.6	48.4	N	N	NE
2023-08-06	11.7	310.8	N	S	NW
2023-08-07	9.3	283	N	S	W
2023-08-08	6.3	258.9	S	E	W
2023-08-09	6.2	268.6	S	E	W
2023-08-10	7.3	191.7	S	E	S
2023-08-11	10.2	227.2	S	E	SW
2023-08-12	11.3	216.4	S	E	SW
2023-08-13	10.5	222.7	S	E	SW
2023-08-14	12.1	195.8	S	E	S
2023-08-15	6.2	257.5	S	E	W
2023-08-16	6.6	32.3	N	N	NE
2023-08-17	10	79	N	N	E
2023-08-18	10.9	90.1	S	E	E
2023-08-19	11.5	210.9	S	E	SW
2023-08-20	8.1	233.7	S	E	SW
2023-08-21	8.2	231.9	S	E	SW
2023-08-22	9	241.9	S	E	SW
2023-08-23	4.9	251.5	S	E	W
2023-08-24	5.8	279.1	N	S	W
2023-08-25	7.8	266.2	S	E	W
2023-08-26	6.2	231.9	S	E	SW
2023-08-27	9.3	284.5	N	S	W
2023-08-28	8.5	294.9	N	S	NW
2023-08-29	7	245.2	S	E	SW
2023-08-30	9.7	289.9	N	S	W
2023-08-31	5.6	204.9	S	E	SW
2023-09-01	4.4	65.7	N	N	NE

2023-09-02	6.7	51.7	N	N	NE
2023-09-03	3.4	129.7	S	E	SE
2023-09-04	6.1	100.3	S	E	E
2023-09-05	8.2	51.1	N	N	NE
2023-09-06	4.6	31.1	N	N	NE
2023-09-07	5.5	64.7	N	N	NE
2023-09-08	2.9	300.8	N	S	NW
2023-09-09	4.1	239.1	S	E	SW
2023-09-10	4.7	169.5	S	E	S
2023-09-11	8.4	234.8	S	E	SW
2023-09-12	7.4	331.7	N	S	NW
2023-09-13	7.9	26.3	N	N	NE
2023-09-14	6.4	215.4	S	E	SW
2023-09-15	5.2	151.7	S	E	SE
2023-09-16	9.7	41	N	N	NE
2023-09-17	9.5	82.1	N	N	E
2023-09-18	9.8	236.6	S	E	SW
2023-09-19	16.3	220	S	E	SW
2023-09-20	18	203.8	S	E	SW
2023-09-21	5.8	216.8	S	E	SW
2023-09-22	7.9	267.5	S	E	W
2023-09-23	8	246.9	S	E	SW
2023-09-24	15.6	185.9	S	E	S
2023-09-25	9.7	214.9	S	E	SW
2023-09-26	9.3	198.7	S	E	S
2023-09-27	11.2	170.3	S	E	S
2023-09-28	11.7	207.9	S	E	SW
2023-09-29	9.1	265.6	S	E	W
2023-09-30	7.9	202.5	S	E	SW
2023-10-01	10.4	218.1	S	E	SW
2023-10-02	4.3	228.4	S	E	SW
2023-10-03	11.9	277.1	N	S	W
2023-10-04	10.5	238.3	S	E	SW
2023-10-05	10.7	227.8	S	E	SW
2023-10-06	12.5	232.6	S	E	SW
2023-10-07	10.2	235.1	S	E	SW
2023-10-08	5.8	242.7	S	E	SW
2023-10-09	6	255.9	S	E	W
2023-10-10	9.2	233.1	S	E	SW
2023-10-11	10.8	237.8	S	E	SW
2023-10-12	5.5	32.8	N	N	NE
2023-10-13	13.4	236.3	S	E	SW

2023-10-14	10.2	280.9	N	S	W
2023-10-15	7.1	306.3	N	S	NW
2023-10-16	5.1	44.8	N	N	NE
2023-10-17	11.4	84.7	N	N	E
2023-10-18	14.3	87.8	N	N	E
2023-10-19	11.9	168	S	E	S
2023-10-20	8.1	78.3	N	N	E
2023-10-21	6.2	327	N	S	NW
2023-10-22	6.1	225.9	S	E	SW
2023-10-23	6.7	110.7	S	E	E
2023-10-24	4.1	277.1	N	S	W
2023-10-25	5.2	3.6	N	N	N
2023-10-26	4.4	156.7	S	E	SE
2023-10-27	4.7	191.8	S	E	S
2023-10-28	8.9	158	S	E	S
2023-10-29	9.7	200.7	S	E	S
2023-10-30	6.5	199.2	S	E	S
2023-10-31	3.7	178.9	S	E	S
2023-11-01	11.9	187.7	S	E	S
2023-11-02	16.5	263.6	S	E	W
2023-11-03	10.7	242.2	S	E	SW
2023-11-04	7.8	152.2	S	E	SE
2023-11-05	10.8	271.6	N	S	W
2023-11-06	10	232.9	S	E	SW
2023-11-07	8.6	241.5	S	E	SW
2023-11-08	9.8	214.4	S	E	SW
2023-11-09	9.9	216.5	S	E	SW
2023-11-10	8.8	276.6	N	S	W
2023-11-11	6.1	273	N	S	W
2023-11-12	5.5	128.4	S	E	SE
2023-11-13	15.9	220.7	S	E	SW
2023-11-14	10.7	239	S	E	SW
2023-11-15	10.8	254.9	S	E	W
2023-11-16	5.3	302.4	N	S	NW
2023-11-17	6	227.2	S	E	SW
2023-11-18	12.8	202.7	S	E	SW
2023-11-19	14.8	232.2	S	E	SW
2023-11-20	9.3	273.7	N	S	W
2023-11-21	12	351.8	N	S	N
2023-11-22	8.1	249.3	S	E	W
2023-11-23	13.6	263.9	S	E	W
2023-11-24	14.2	320.1	N	S	NW

2023-11-25	9.1	296.7	N	S	NW
2023-11-26	5	218.3	S	E	SW
2023-11-27	8.9	341.5	N	S	N
2023-11-28	7.4	313.5	N	S	NW
2023-11-29	4.6	304.5	N	S	NW
2023-11-30	6.7	12.2	N	N	N
2023-12-01	7.3	356.1	N	S	N
2023-12-02	1	270.4	N	S	W
2023-12-03	5.4	148.7	S	E	SE
2023-12-04	11	111.4	S	E	E
2023-12-05	9.2	350.2	N	S	N
2023-12-06	5.5	221	S	E	SW
2023-12-07	14.9	146.8	S	E	SE
2023-12-08	9.5	213.5	S	E	SW
2023-12-09	17.1	226.2	S	E	SW
2023-12-10	13.6	233.8	S	E	SW
2023-12-11	12	253.5	S	E	W
2023-12-12	7.4	178.9	S	E	S
2023-12-13	13.9	339.5	N	S	N
2023-12-14	7.1	255.6	S	E	W
2023-12-15	6.6	238.5	S	E	SW
2023-12-16	12.5	237.6	S	E	SW
2023-12-17	15.7	228	S	E	SW
2023-12-18	14	224.9	S	E	SW
2023-12-19	9.6	266.2	S	E	W
2023-12-20	13.7	253.7	S	E	W
2023-12-21	23.3	282.8	N	S	W
2023-12-22	17.1	272.6	N	S	W
2023-12-23	16.9	257.1	S	E	W
2023-12-24	17.4	243.5	S	E	SW
2023-12-25	11.4	243.8	S	E	SW
2023-12-26	8	244.7	S	E	SW
2023-12-27	16.8	187.8	S	E	S
2023-12-28	20.2	226.5	S	E	SW
2023-12-29	12.3	237.2	S	E	SW
2023-12-30	13.8	186.9	S	E	S
2023-12-31	13.9	214.8	S	E	SW

Table F.2 – Weather data -Bedfordshire 2023

datetime	Windspeedmean (mph)	winddir	wind 2	wind 4	wind 8
2023-01-01	11.3	221.3	S	S	SW
2023-01-02	5.5	245.1	S	W	SW
2023-01-03	12.1	196.1	S	S	S
1/4/2023	17.1	242.6	S	W	SW
2023-01-05	11.8	226	S	W	SW
2023-01-06	12	215.4	S	S	SW
2023-01-07	18	197.9	S	S	S
2023-01-08	12.7	205.3	S	S	SW
2023-01-09	11	259	S	W	W
2023-01-10	13.7	211.4	S	S	SW
2023-01-11	15.3	239.9	S	W	SW
2023-01-12	19.4	239.1	S	W	SW
2023-01-13	18.6	254.9	S	W	W
2023-01-14	16.5	231.3	S	W	SW
2023-01-15	13	237.1	S	W	SW
2023-01-16	9.5	333.2	N	N	NW
2023-01-17	3.9	280.8	N	W	W
2023-01-18	7.5	269.6	S	W	W
2023-01-19	5.9	272.6	N	W	W
2023-01-20	7.8	303.1	N	W	NW
2023-01-21	3.7	37.8	N	N	NE
2023-01-22	2	241.4	S	W	SW
2023-01-23	2.8	76.9	N	E	E
2023-01-24	4	21.3	N	N	N
2023-01-25	5.5	270.2	N	W	W
2023-01-26	10.4	3.8	N	N	N
2023-01-27	7.1	13.4	N	N	N
2023-01-28	4.2	291.8	N	W	W
2023-01-29	8.9	244.1	S	W	SW
2023-01-30	9.8	283.8	N	W	W
2023-01-31	11.2	261.6	S	W	W
2023-02-01	13.3	257.9	S	W	W
2023-02-02	12.2	255.5	S	W	W
2023-02-03	10.8	264.5	S	W	W
2023-02-04	7.2	260.6	S	W	W
2023-02-05	6.5	354.4	N	N	N
2023-02-06	3	240.2	S	W	SW
2023-02-07	2.4	277.1	N	W	W
2023-02-08	4.4	214	S	S	SW

2023-02-09	4.4	281.7	N	W	W
2023-02-10	7	247	S	W	SW
2023-02-11	5	261.1	S	W	W
2023-02-12	4.4	152.2	S	S	SE
2023-02-13	6.2	148.3	S	S	SE
2023-02-14	2.9	202.8	S	S	SW
2023-02-15	6.8	223	S	S	SW
2023-02-16	10.5	226.7	S	W	SW
2023-02-17	15.4	250.2	S	W	W
2023-02-18	14.3	254.3	S	W	W
2023-02-19	10.4	266.2	S	W	W
2023-02-20	11.8	244.7	S	W	SW
2023-02-21	6.4	233.1	S	W	SW
2023-02-22	6.3	275.4	N	W	W
2023-02-23	10.1	20.3	N	N	N
2023-02-24	7.8	345.9	N	N	N
2023-02-25	10.6	14.4	N	N	N
2023-02-26	9.1	36.3	N	N	NE
2023-02-27	8.7	34.4	N	N	NE
2023-02-28	9.8	28.7	N	N	NE
2023-03-01	8.9	37	N	N	NE
2023-03-02	8.9	38.4	N	N	NE
2023-03-03	7.8	25.9	N	N	NE
2023-03-04	7	4.2	N	N	N
2023-03-05	6.3	290.6	N	W	W
2023-03-06	8.7	262.8	S	W	W
2023-03-07	5.2	290.3	N	W	W
2023-03-08	10.4	73.8	N	E	E
2023-03-09	9	104.4	S	E	E
2023-03-10	11.1	355.2	N	N	N
2023-03-11	6.5	155	S	S	SE
2023-03-12	12.1	224.8	S	S	SW
2023-03-13	21.5	225	S	W	SW
2023-03-14	12.5	297.8	N	W	NW
2023-03-15	7.6	195.1	S	S	S
2023-03-16	12.5	193.3	S	S	S
2023-03-17	7.8	190	S	S	S
2023-03-18	6.6	200	S	S	S
2023-03-19	8.7	280.5	N	W	W
2023-03-20	10.1	221.5	S	S	SW
2023-03-21	13.2	216.4	S	S	SW
2023-03-22	16.6	215.2	S	S	SW

2023-03-23	15.5	218.1	S	S	SW
2023-03-24	14.4	228.4	S	W	SW
2023-03-25	16.1	251.4	S	W	W
2023-03-26	8.5	23.3	N	N	NE
2023-03-27	4.6	347.3	N	N	N
2023-03-28	10.9	184	S	S	S
2023-03-29	10.2	201.2	S	S	S
2023-03-30	15.1	226.5	S	W	SW
2023-03-31	14	234.5	S	W	SW
2023-04-01	10.1	345.1	N	N	N
2023-04-02	10.3	24.3	N	N	NE
2023-04-03	7.6	82.3	N	E	E
2023-04-04	4.5	115	S	E	SE
2023-04-05	6.9	216.5	S	S	SW
2023-04-06	9.6	276.3	N	W	W
2023-04-07	5.7	344.9	N	N	N
2023-04-08	4.4	82.3	N	E	E
2023-04-09	7.1	157.4	S	S	SE
2023-04-10	14.7	233.2	S	W	SW
2023-04-11	13.5	220.3	S	S	SW
2023-04-12	15	224.9	S	S	SW
2023-04-13	14.6	264.6	S	W	W
2023-04-14	7.5	146.5	S	S	SE
2023-04-15	7.1	353.1	N	N	N
2023-04-16	4.8	256.2	S	W	W
2023-04-17	6.2	68.8	N	E	E
2023-04-18	13.3	57.1	N	E	NE
2023-04-19	13	65.9	N	E	NE
2023-04-20	12.2	40.7	N	N	NE
2023-04-21	7.6	55.2	N	E	NE
2023-04-22	5.1	202.3	S	S	S
2023-04-23	8.6	239.7	S	W	SW
2023-04-24	7.2	345.7	N	N	N
2023-04-25	6.3	20.3	N	N	N
2023-04-26	7.1	127.3	S	E	SE
2023-04-27	10	120.9	S	E	SE
2023-04-28	9.1	288	N	W	W
2023-04-29	4.1	115.2	S	E	SE
2023-04-30	6.8	199.5	S	S	S
2023-05-01	7.6	294.1	N	W	NW
2023-05-02	7.7	81.3	N	E	E
2023-05-03	9.6	90.2	S	E	E

2023-05-04	12	97.9	S	E	E
2023-05-05	9.3	209.7	S	S	SW
2023-05-06	7	169.3	S	S	S
2023-05-07	5.6	259.8	S	W	W
2023-05-08	7.9	200	S	S	S
2023-05-09	6.5	261.1	S	W	W
2023-05-10	7.2	272.9	N	W	W
2023-05-11	5.4	281.3	N	W	W
2023-05-12	13	19.3	N	N	N
2023-05-13	9.6	24.8	N	N	NE
2023-05-14	5	284.8	N	W	W
2023-05-15	9.7	350.3	N	N	N
2023-05-16	7.2	325	N	N	NW
2023-05-17	5.8	353.6	N	N	N
2023-05-18	4.2	110.1	S	E	E
2023-05-19	6.2	60	N	E	NE
2023-05-20	10.2	36.3	N	N	NE
2023-05-21	10.3	28.1	N	N	NE
2023-05-22	10.1	11.5	N	N	N
2023-05-23	6.8	26.7	N	N	NE
2023-05-24	6.4	357.6	N	N	N
2023-05-25	7.4	53.5	N	E	NE
2023-05-26	9.9	69.7	N	E	E
2023-05-27	7	61.9	N	E	NE
2023-05-28	9.1	51.8	N	E	NE
2023-05-29	12.2	50.2	N	E	NE
2023-05-30	12.4	48.4	N	E	NE
2023-05-31	12.1	49.2	N	E	NE
2023-06-01	12.1	44.8	N	N	NE
2023-06-02	12.3	43.6	N	N	NE
2023-06-03	10.5	46.1	N	E	NE
2023-06-04	10	45.7	N	E	NE
2023-06-05	10.7	46.9	N	E	NE
2023-06-06	11.1	51.7	N	E	NE
2023-06-07	10.7	61.1	N	E	NE
2023-06-08	11.3	59.4	N	E	NE
2023-06-09	12.8	57.8	N	E	NE
2023-06-10	10.8	78.5	N	E	E
2023-06-11	5	48.5	N	E	NE
2023-06-12	5.1	58	N	E	NE
2023-06-13	9.9	62	N	E	NE
2023-06-14	8.4	54.1	N	E	NE

2023-06-15	7	60.2	N	E	NE
2023-06-16	5.8	68.7	N	E	E
2023-06-17	6.4	93.3	S	E	E
2023-06-18	6.9	148.2	S	S	SE
2023-06-19	8.7	210.1	S	S	SW
2023-06-20	8	190.5	S	S	S
2023-06-21	7.6	237	S	W	SW
2023-06-22	5.5	359.3	N	N	N
2023-06-23	6.7	256.8	S	W	W
2023-06-24	6.3	223.3	S	S	SW
2023-06-25	10.7	205.6	S	S	SW
2023-06-26	11.4	274.8	N	W	W
2023-06-27	8.1	249.7	S	W	W
2023-06-28	8.1	241	S	W	SW
2023-06-29	7.4	327	N	N	NW
2023-06-30	10.1	230.5	S	W	SW
2023-07-01	12.4	274.9	N	W	W
2023-07-02	12.2	265.8	S	W	W
2023-07-03	13.7	254.7	S	W	W
2023-07-04	7.4	247.9	S	W	W
2023-07-05	11.6	271.1	N	W	W
2023-07-06	9.2	224.6	S	S	SW
2023-07-07	7.2	145.9	S	S	SE
2023-07-08	7.3	146.5	S	S	SE
2023-07-09	7.7	218.9	S	S	SW
2023-07-10	10.7	208.9	S	S	SW
2023-07-11	12.2	219.5	S	S	SW
2023-07-12	11.3	249.7	S	W	W
2023-07-13	8.4	239.5	S	W	SW
2023-07-14	8.5	161.1	S	S	S
2023-07-15	16.9	211.9	S	S	SW
2023-07-16	15.6	233.8	S	W	SW
2023-07-17	9.9	250.8	S	W	W
2023-07-18	6.4	235.6	S	W	SW
2023-07-19	8.1	287.7	N	W	W
2023-07-20	5.9	320.2	N	N	NW
2023-07-21	7.6	285.3	N	W	W
2023-07-22	11.3	216	S	S	SW
2023-07-23	12.6	231.1	S	W	SW
2023-07-24	8	351.9	N	N	N
2023-07-25	7.4	303.4	N	W	NW
2023-07-26	7.7	227.1	S	W	SW

2023-07-27	10.8	232.4	S	W	SW
2023-07-28	9.1	239.9	S	W	SW
2023-07-29	11.7	246.7	S	W	SW
2023-07-30	12.4	242	S	W	SW
2023-07-31	12.3	242.1	S	W	SW
2023-08-01	10.9	256.9	S	W	W
2023-08-02	10.5	235.7	S	W	SW
2023-08-03	8.9	319.8	N	N	NW
2023-08-04	7.9	299.9	N	W	NW
2023-08-05	9.2	296.2	N	W	NW
2023-08-06	10.5	308	N	W	NW
2023-08-07	8.9	278.4	N	W	W
2023-08-08	7.2	254.2	S	W	W
2023-08-09	5	264.8	S	W	W
2023-08-10	7	189.7	S	S	S
2023-08-11	10.1	225.2	S	W	SW
2023-08-12	11.3	220.8	S	S	SW
2023-08-13	11.1	223.7	S	S	SW
2023-08-14	10.8	196	S	S	S
2023-08-15	6.5	260.1	S	W	W
2023-08-16	6	54.1	N	E	NE
2023-08-17	10.6	86.1	N	E	E
2023-08-18	10.7	94	S	E	E
2023-08-19	11.8	213.9	S	S	SW
2023-08-20	7.8	232.6	S	W	SW
2023-08-21	8.3	231.5	S	W	SW
2023-08-22	8.4	254.1	S	W	W
2023-08-23	4.5	257.4	S	W	W
2023-08-24	5.1	257.8	S	W	W
2023-08-25	7.8	271.2	N	W	W
2023-08-26	6.6	241.3	S	W	SW
2023-08-27	9.1	285.9	N	W	W
2023-08-28	7	307	N	W	NW
2023-08-29	6.9	244.1	S	W	SW
2023-08-30	9.1	292.9	N	W	NW
2023-08-31	5.1	188.6	S	S	S
2023-09-01	4.3	43.9	N	N	NE
2023-09-02	7.2	61.3	N	E	NE
2023-09-03	3.6	77.7	N	E	E
2023-09-04	7.1	86.4	N	E	E
2023-09-05	7.8	69.7	N	E	E
2023-09-06	3.7	42.1	N	N	NE

2023-09-07	5	73.4	N	E	E
2023-09-08	3.1	260.4	S	W	W
2023-09-09	3.4	239.5	S	W	SW
2023-09-10	5	199.1	S	S	S
2023-09-11	8.6	241.2	S	W	SW
2023-09-12	6.7	297.5	N	W	NW
2023-09-13	7.2	13.3	N	N	N
2023-09-14	5.3	214.9	S	S	SW
2023-09-15	4.3	150.4	S	S	SE
2023-09-16	7.5	53.2	N	E	NE
2023-09-17	9.8	81.1	N	E	E
2023-09-18	11.3	234.9	S	W	SW
2023-09-19	15.4	223.3	S	S	SW
2023-09-20	17.3	208.7	S	S	SW
2023-09-21	5.5	217.2	S	S	SW
2023-09-22	7.4	271.5	N	W	W
2023-09-23	8	250.3	S	W	W
2023-09-24	13.1	183.9	S	S	S
2023-09-25	9.3	218.6	S	S	SW
2023-09-26	8.9	203	S	S	SW
2023-09-27	10.4	176.2	S	S	S
2023-09-28	11.8	212.2	S	S	SW
2023-09-29	8.9	269.6	S	W	W
2023-09-30	7.2	199.9	S	S	S
2023-10-01	8.9	215.3	S	S	SW
2023-10-02	4.3	171.6	S	S	S
2023-10-03	11.8	273.5	N	W	W
2023-10-04	10.2	245.4	S	W	SW
2023-10-05	9.7	231	S	W	SW
2023-10-06	11.6	236.9	S	W	SW
2023-10-07	9.3	235.9	S	W	SW
2023-10-08	5.5	243.5	S	W	SW
2023-10-09	4.8	249.8	S	W	W
2023-10-10	7.5	235.7	S	W	SW
2023-10-11	9.6	230.5	S	W	SW
2023-10-12	5	36.8	N	N	NE
2023-10-13	13.4	234.2	S	W	SW
2023-10-14	9	286.7	N	W	W
2023-10-15	5.9	323.9	N	N	NW
2023-10-16	5.5	60	N	E	NE
2023-10-17	12.9	90	S	E	E
2023-10-18	14.6	97	S	E	E

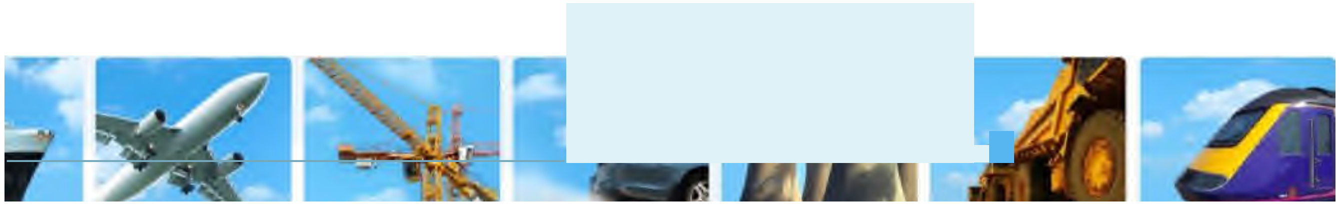
2023-10-19	10.8	173.3	S	S	S
2023-10-20	7.2	196	S	S	S
2023-10-21	6.2	277.5	N	W	W
2023-10-22	5.6	225.5	S	W	SW
2023-10-23	6.8	102.6	S	E	E
2023-10-24	4.5	267	S	W	W
2023-10-25	5.3	29.1	N	N	NE
2023-10-26	5.2	172.7	S	S	S
2023-10-27	4.9	196.2	S	S	S
2023-10-28	7.9	160.5	S	S	S
2023-10-29	8.9	204	S	S	SW
2023-10-30	5.8	195.1	S	S	S
2023-10-31	4.5	210.1	S	S	SW
2023-11-01	11.5	191.1	S	S	S
2023-11-02	16.3	262.3	S	W	W
2023-11-03	10.5	246.7	S	W	SW
2023-11-04	8.3	159.7	S	S	S
2023-11-05	10.9	269.9	S	W	W
2023-11-06	9.7	238.8	S	W	SW
2023-11-07	8.4	246.4	S	W	SW
2023-11-08	8.8	218.5	S	S	SW
2023-11-09	9.2	221.3	S	S	SW
2023-11-10	7.8	276.7	N	W	W
2023-11-11	5.1	280.6	N	W	W
2023-11-12	5.2	123.2	S	E	SE
2023-11-13	16.1	231.5	S	W	SW
2023-11-14	10.9	243	S	W	SW
2023-11-15	10.7	257.2	S	W	W
2023-11-16	5.1	330.4	N	N	NW
2023-11-17	5.6	232.6	S	W	SW
2023-11-18	11.7	206.8	S	S	SW
2023-11-19	15.6	237.8	S	W	SW
2023-11-20	8.6	276.1	N	W	W
2023-11-21	9.8	352.9	N	N	N
2023-11-22	6.8	251.8	S	W	W
2023-11-23	11.9	266.6	S	W	W
2023-11-24	11.5	323.9	N	N	NW
2023-11-25	7.1	300.6	N	W	NW
2023-11-26	3.6	195.8	S	S	S
2023-11-27	9.8	309.2	N	W	NW
2023-11-28	6.8	312.5	N	W	NW
2023-11-29	3.6	336	N	N	NW

2023-11-30	6.3	27.9	N	N	NE
2023-12-01	6.5	8.2	N	N	N
2023-12-02	2.9	287.5	N	W	W
2023-12-03	6.3	158.2	S	S	S
2023-12-04	10.6	111.4	S	E	E
2023-12-05	7.7	345.8	N	N	N
2023-12-06	4.6	104.8	S	E	E
2023-12-07	12.9	148.5	S	S	SE
2023-12-08	8.5	218.8	S	S	SW
2023-12-09	16.9	235.5	S	W	SW
2023-12-10	13.9	236.9	S	W	SW
2023-12-11	11.9	255.4	S	W	W
2023-12-12	7.9	195	S	S	S
2023-12-13	11.8	335.1	N	N	NW
2023-12-14	5.5	261.1	S	W	W
2023-12-15	5.5	241.7	S	W	SW
2023-12-16	11.6	239.3	S	W	SW
2023-12-17	13.8	231.6	S	W	SW
2023-12-18	13.2	227.8	S	W	SW
2023-12-19	9.1	263.2	S	W	W
2023-12-20	13.6	259.6	S	W	W
2023-12-21	20.2	280	N	W	W
2023-12-22	16.9	276	N	W	W
2023-12-23	16.7	259.9	S	W	W
2023-12-24	18.2	248.4	S	W	W
2023-12-25	12.3	245.9	S	W	SW
2023-12-26	7.7	245.8	S	W	SW
2023-12-27	15.3	193.9	S	S	S
2023-12-28	19.1	230	S	W	SW
2023-12-29	13.3	243.7	S	W	SW
2023-12-30	13.5	191.7	S	S	S
2023-12-31	14.8	219.7	S	S	SW

Appendix G: Detailed Assessment & Source Apportionment Report – December 2023 (Air Quality Consultants)

Air Quality Assessment: Dunstable AQMA Air Quality Study

December 2023



Document Control

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Contents

Tables

Figures

1 Introduction

1.1 Central Bedfordshire Council (CBC) currently has three Air Quality Management Area (AQMAs). The focus of this assessment is the South Bedfordshire AQMA (also referred to as the Dunstable AQMA), which was declared on 17 January 2005 for exceedances of the annual mean nitrogen dioxide objective. CBC are exploring the possibility of reducing the boundary of this AQMA which incorporates Dunstable Town Centre, the A505 from the town centre to the junction of Poynters Road/Dunstable Road, the A5 from Union Street to Borough Road, and the B489 West Street from the town centre to St Marys Gate. The location and extent of this AQMA is presented in Figure 1.

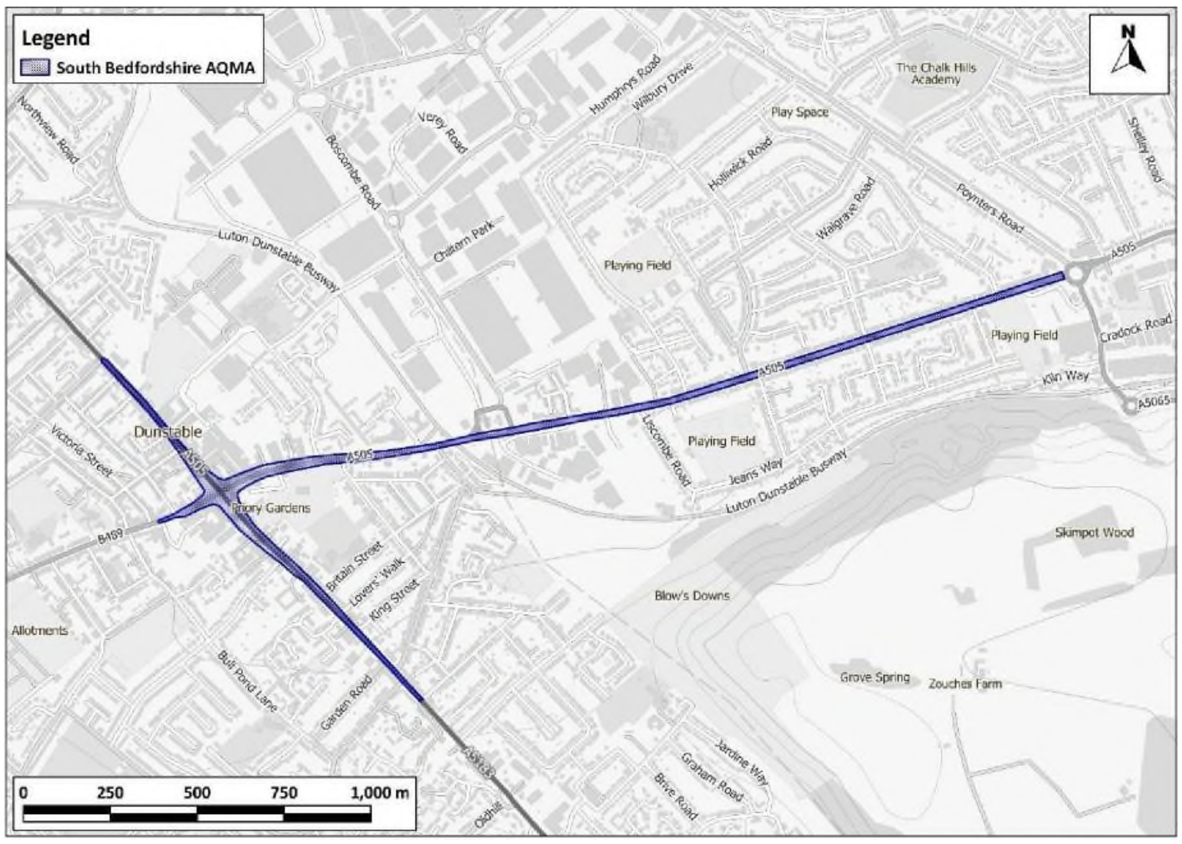


Figure 1: South Bedfordshire AQMA

1.2 CBC previously requested Defra review their monitoring data to determine whether this AQMA could be revoked or the boundary amended (CBC, 2023). On the basis that there were a few monitoring sites which still showed results within 10% of the annual mean nitrogen dioxide objective, it was thought that the AQMA should not be revoked at this time. Instead, it was recommended that a detailed modelling assessment and source apportionment report be undertaken with a view to

reduce the size of the AQMA *"to better reflect the areas which are still showing results as being within 10%"* of the objective. This report sets out the dispersion modelling and source apportionment assessment undertaken for the South Bedfordshire AQMA.

1.3 Detailed modelling of the area of interest has been undertaken for a baseline year of 2019 to identify the areas where nitrogen dioxide concentrations are within 90% of the annual mean objective and therefore inform the extent of the proposed new AQMA. The outputs of the dispersion modelling have then been used to estimate source apportionment contributions from different vehicle types, and different Euro classes.

1.4 This report has been carried out by Air Quality Consultants Ltd (AQC) on behalf of CBC. It has been prepared taking account of the requirements set out in LAQM.TG(22) (Defra, 2022) for amending or revoking AQMA orders. The professional experience of the consultants who have undertaken the review is summarised in Appendix A1.

2 Assessment Approach

2.1 Atmospheric dispersion modelling and a review of existing CBC air quality monitoring data has been undertaken to assess pollutant concentrations within the current South Bedfordshire AQMA. The section below outlines the methodology for the dispersion modelling undertaken.

Modelling Methodology

2.2 Annual mean nitrogen dioxide concentrations have been predicted for roads within 200 m of the existing South Bedfordshire AQMA using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v11.0) (Defra, 2023c). Details of the model inputs and the model verification are provided in Appendix A2. Where assumptions have been made, a realistic worst-case approach has been adopted.

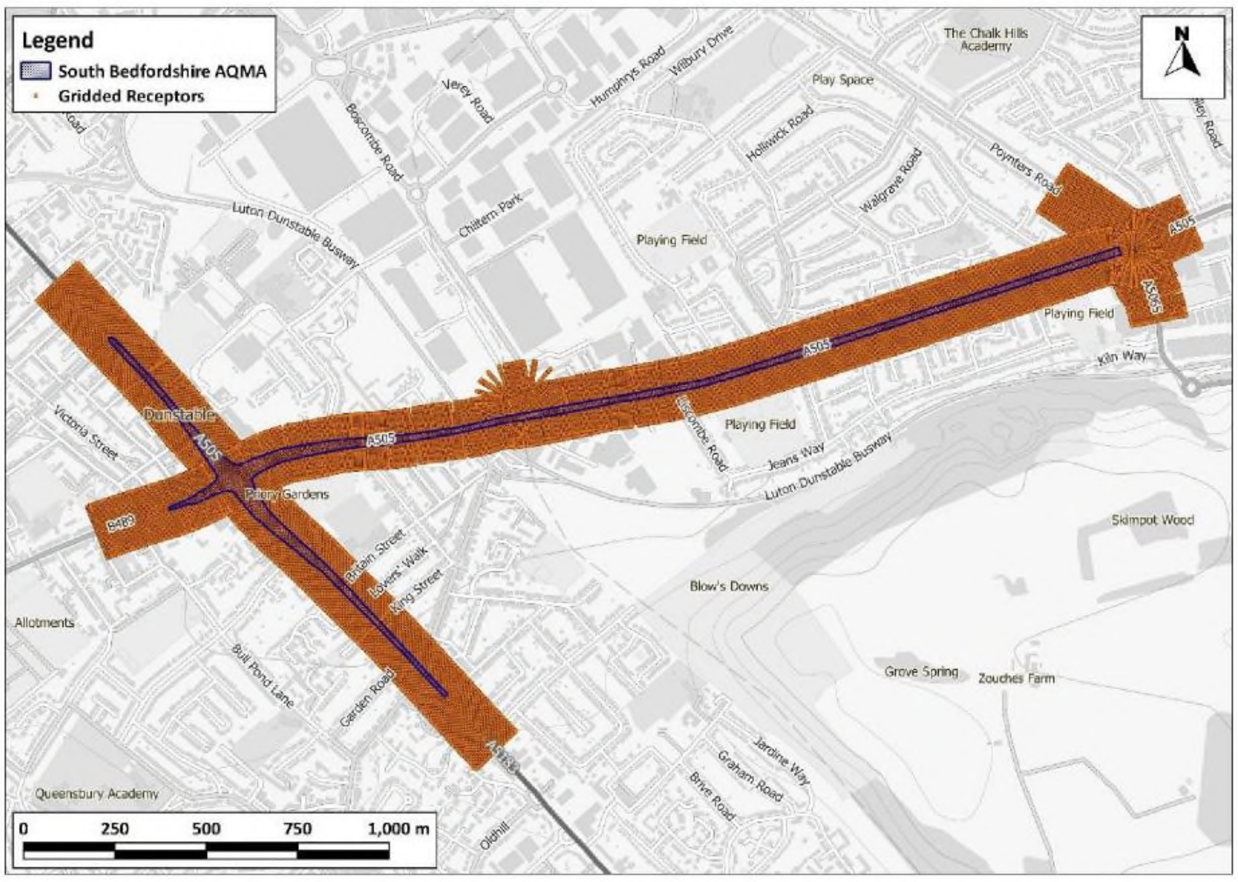


Figure 2: Cartesian Grids of Receptors

2.3 A base year of 2019 has been selected to assess a worst-case; as presented in Section 3,concentrations in the South Bedfordshire AQMA have improved over time and the concentrations measured in 2019 are greater than those monitored in 2022. In 2020 and 2021, activity in the UK was disrupted by the Covid-19 pandemic. As a result, concentrations of traffic-related air pollutants fell appreciably (Defra Air Quality Expert Group, 2020). While the pandemic may cause long-lasting changes to travel activity patterns, it is reasonable to expect that in 2022, patterns had returned to typical levels. The lower concentrations in 2022 may therefore reflect a 'new normal' of lower concentrations throughout the AQMA. However, for the purpose of this assessment, a precautionary approach has been adopted of considering concentrations from 2019, prior to the pandemic when monitored concentrations were greater, **so that any changes proposed to the AQMA in this report are based on conservative, long-term historic trends rather than one year of post-pandemic monitoring data**.

Receptors

2.4 Concentrations have been predicted across a 5 m x 5 m Cartesian grid within 75 m of all modelled roads within the current AQMA (see Figure 2). The receptor grid has been modelled at a height of 1.5 m above ground level.

2.5 Concentrations have also been predicted at discrete sensitive receptors which are close to CBC monitoring sites which were found to be exhibiting unusual localised dispersion characteristics (based on the model verification findings, see Appendix A2 for details).

2.6 These discrete receptor locations are described in Table 1 and shown in Figure 3. In addition, concentrations have been modelled at the diffusion tube monitoring sites located within or close to the South Bedfordshire AQMA in order to verify the model outputs (see Appendix A2 for verification method).

Table 1: Description of Discrete Receptor Locations

Receptor	Type	X coordinate	Y coordinate	Heights Modelled (m) a
Receptor 1	Residential	502798	222073	1.5
Receptor 2	Residential	502809	222076	1.5
Receptor 3	Residential	502819	222078	1.5
Receptor 4	Commercial	501957	221883	1.5 and 4.5
Receptor 5	Commercial	501967	221888	1.5 and 4.5

Receptor 6	Commercial/Residential	501969	221890	1.5 and 4.5
Receptor 7	Commercial/Residential	501979	221895	1.5 and 4.5
Receptor 8	Commercial	501988	221899	1.5 and 4.5
Receptor 9	Medical	501996	221901	1.5 and 4.5
Receptor 10	Commercial/Residential	501674	221773	1.5 and 4.5
Receptor 11	Commercial/Residential	501670	221771	1.5 and 4.5
Receptor 12	Commercial	501663	221769	1.5 and 4.5
Receptor 13	Commercial/Residential	501658	221768	1.5 and 4.5
Receptor 14	Commercial/Residential	501654	221766	1.5 and 4.5
Receptor 15	Residential	501649	221765	1.5 and 4.5
Receptor 16	Residential	501634	221760	1.5 and 4.5

[a] A height of 1.5 m is used to represent ground-floor level exposure. Additional heights of 4.5 m have been modelled for certain receptors to represent first-floor level exposure.

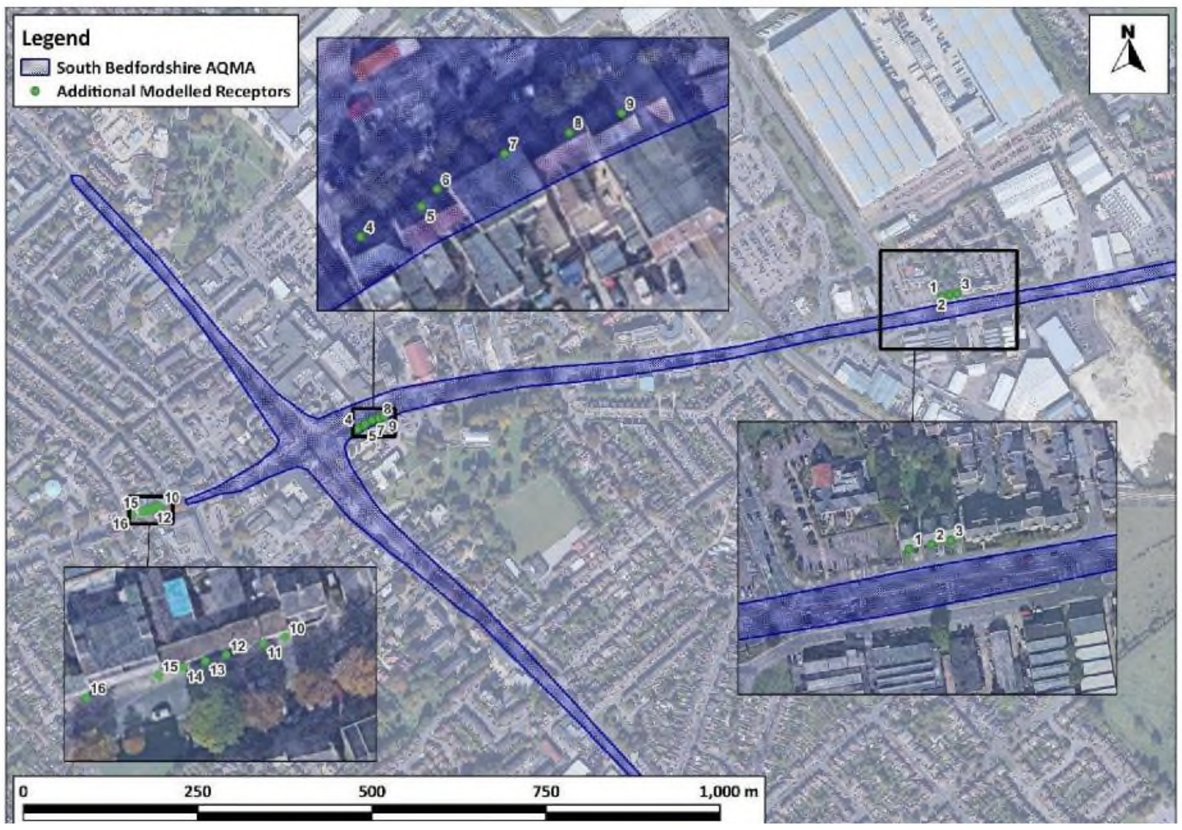


Figure 3: Discrete Receptor Locations

Imagery ©2023 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation Group, Map data © 2023.

Traffic Data

2.7 AADT flows, the proportions of HDVs and vehicle fleet composition, for the roads modelled in this assessment have been determined from the interactive web-based map provided by DfT (2023). For High Street South, data was only available for 2016 and therefore the 2016 AADT flows have been factored forwards to the assessment year of 2019 using growth factors derived using the TEMPro System v7.2 (DfT, 2017). Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits and the proximity to junctions. The traffic data used in this assessment are summarised in Table A2.2. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2020).

Uncertainty

2.8 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

2.9 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A2). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2019) concentrations. LAQM.TG22 (Defra, 2022) provides guidance on the evaluation of model performance. Based on the analysis shown in Table A2.3 in Appendix A2, the model performance is considered to be good.

Assumptions

2.10 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment includes:

- that the Luton Airport meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix A2);
- within the EFT, there are no flows associated with taxis (the DfT does not include a breakdown between cars and taxis and therefore any taxis will be included within the car flows); and
- the traffic flows for Poynters Road are the equivalent to the DfT flows on the A5505.

Sensitivity Testing

2.11 Since 2019, there have been a number of improvements to the junction at West Street/High Street.

These changes primarily include the widening of pavements and reducing the speed limits on the approaches to the junction. An additional scenario has therefore been modelled where the 2019 model was run assuming a 20mph speed limit, rather than 30mph, on the approaches to the junction. The results from this scenario are presented in Appendix A3.

2.12 The results for this scenario are considered worst-case as they have only taken into account the speed limit change and not the pavement widening. The widening of the pavement would have resulted in the road, and therefore vehicle traffic, moving marginally further away from sensitive receptors, which is expected to have resulted in lower pollutant concentrations than modelled.

3 AQMA Assessment

Monitoring Data

3.1 CBC operates one automatic monitoring station within its area; however, this monitor is not located in the South Bedfordshire AQMA. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Gradko International Ltd (using the 20% TEA in water method). These include eight which were deployed within or close to the South Bedfordshire AQMA in 2019. Annual mean results for the years 2016 to 2022 are summarised in Table 2 while the long-term trend across all sites is presented in Figure 4. Exceedances of the objectives are shown in bold. The monitoring locations are shown in Figure 5. The monitoring data have been taken from CBC's 2023 and 2019 Annual Status Reports (CBC, 2023) (CBC, 2019).

3.2 While 2020 and 2021 results have been presented in this Section for completeness, they are not relied upon in any way as they will not be representative of 'typical' air quality conditions due to the considerable impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations.

Table 2: Summary of Annual Mean NO_2 Monitoring (2016-2022) (µg/m^3)

Site No.	Site Type	Location	2016	2017	2018	2019	2020	2021	2022
1	Kerbside	High Street South, Dunstable	**41.5**	35.6	37.2	33.0	25.1	26.9	24.3
18	Kerbside	Argos, High Street North, Dunstable	**40.1**	35.1	37.7	34.3	26.1	27.4	25.3
27	Kerbside	Luton Road, Dunstable (nr Parrot Close)	33.2	29.8	31.8	28.7	20.1	22.7	19.7
33	Kerbside	Church Street, Dunstable	39.5	37.4	34.2	36.7	27.6	27.4	24.2
34	Kerbside	High Street North/Church Street Junction, Dunstable	**48.2**	**40.6**	38.1	36.4	27.4	27.7	23.2
37	Kerbside	Luton Road, Dunstable (o/s no 32)	**54.6**	**48.0**	**44.1**	36.5	30.1	32.0	30.3
50	Kerbside	Luton Road, Dunstable (o/s no 24) nr Boscombe Road	**52.2**	**50.8**	**46.5**	**42.1**	34.7	33.9	30.7
55	Kerbside	West St Dunstable	**44.3**	**41.9**	39.6	**40.8**	30.2	32.2	30.9
UK Air Quality Strategy Objective annual mean limit			40						

a Exceedances of the objectives are shown in bold.

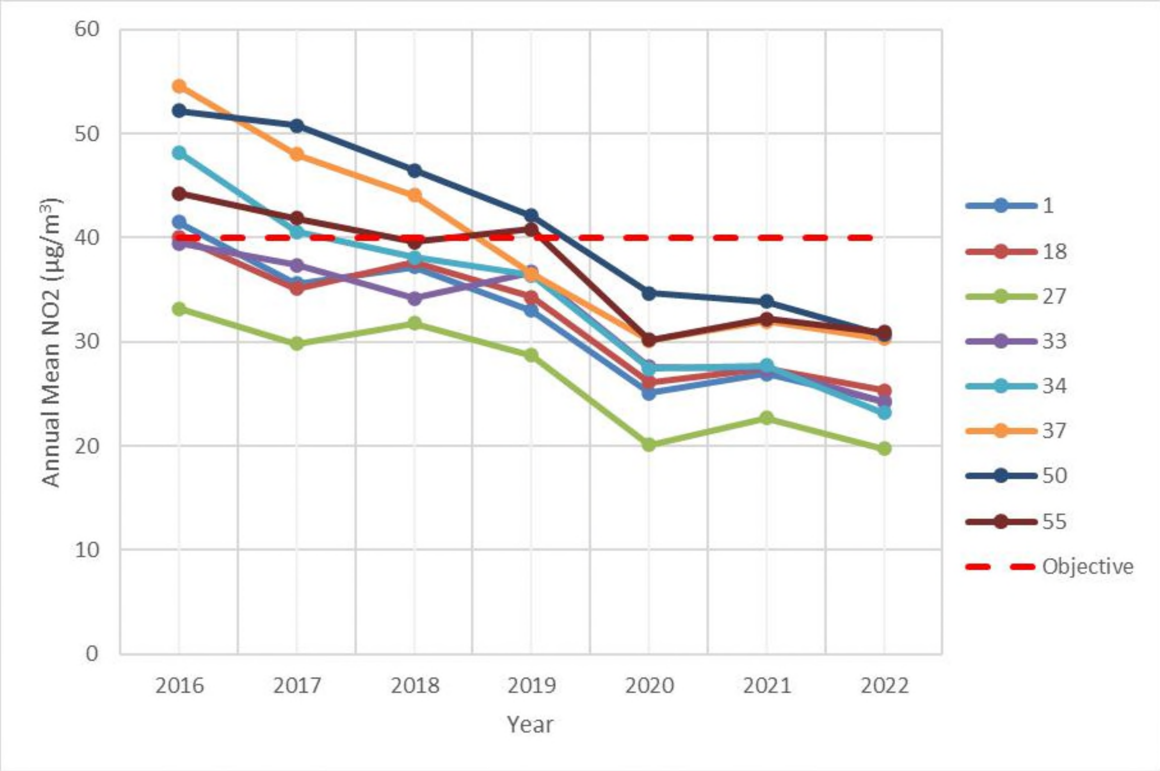
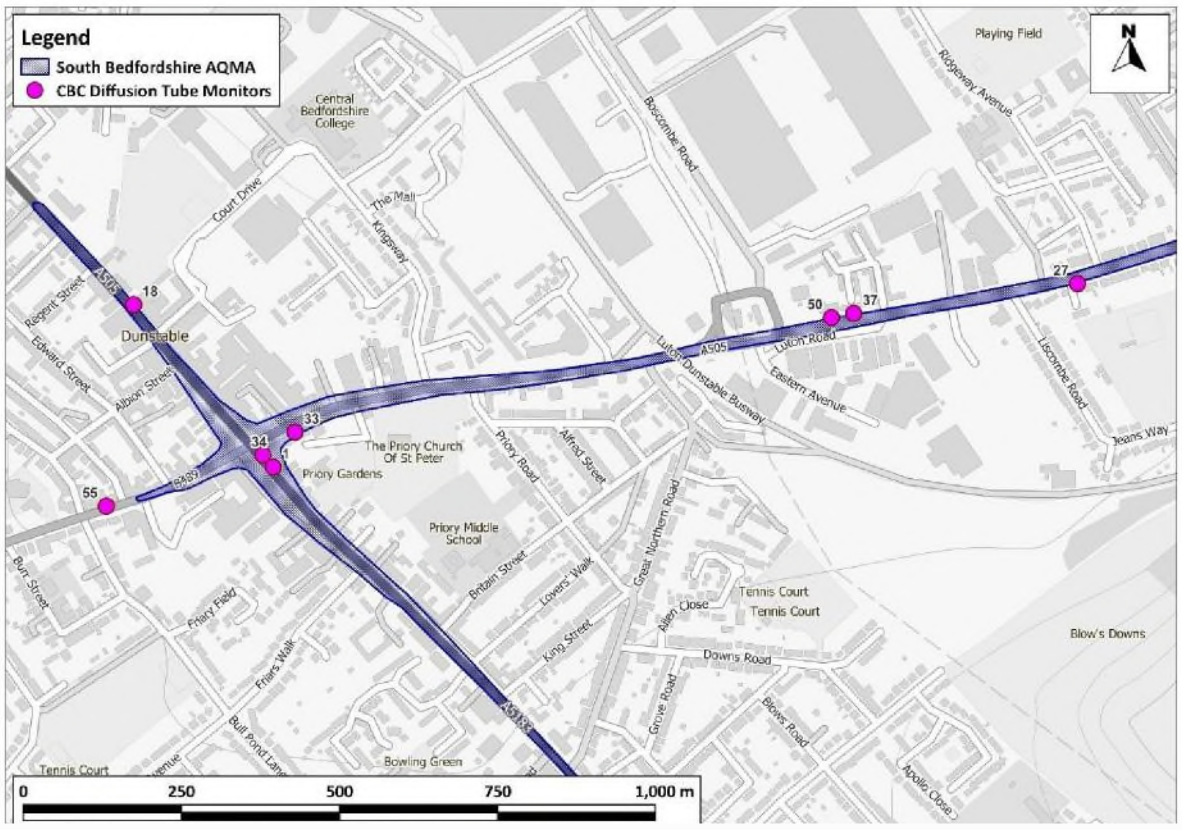


Figure 4: Annual Mean NO_2 Concentrations at Diffusion Tube Monitoring Sites Within or Close to the South Bedfordshire AQMA

Figure 5: Monitoring Locations



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3.3 As shown in Figure 4 and Table 2, there is a downward trend in concentrations of annual mean nitrogen dioxide between 2016 and 2022 across all sites within the South Bedfordshire AQMA. This downward trend has continued even into 2022, reducing further from concentrations in 2020 and 2021 when the Covid-19 pandemic would have resulted in a reduction in traffic flows. At all monitoring sites 2022, annual mean nitrogen dioxide concentrations are less than 90% of the objective, while in 2019, two sites monitored exceedances of the objective and three sites were within 10% of the objective.

3.4 However, it should be noted that all the diffusion tubes within or close to the South Bedfordshire AQMA are at kerbside locations which are not representative of exposure for sensitive receptors.

Dispersion Modelling of the AQMA

3.5 Isopleth maps of the modelled annual mean nitrogen dioxide concentrations in 2019 at ground-floor level across the current South Bedfordshire AQMA are presented in Figure 6 while the concentrations modelled at the discrete receptors are presented in Table 3.

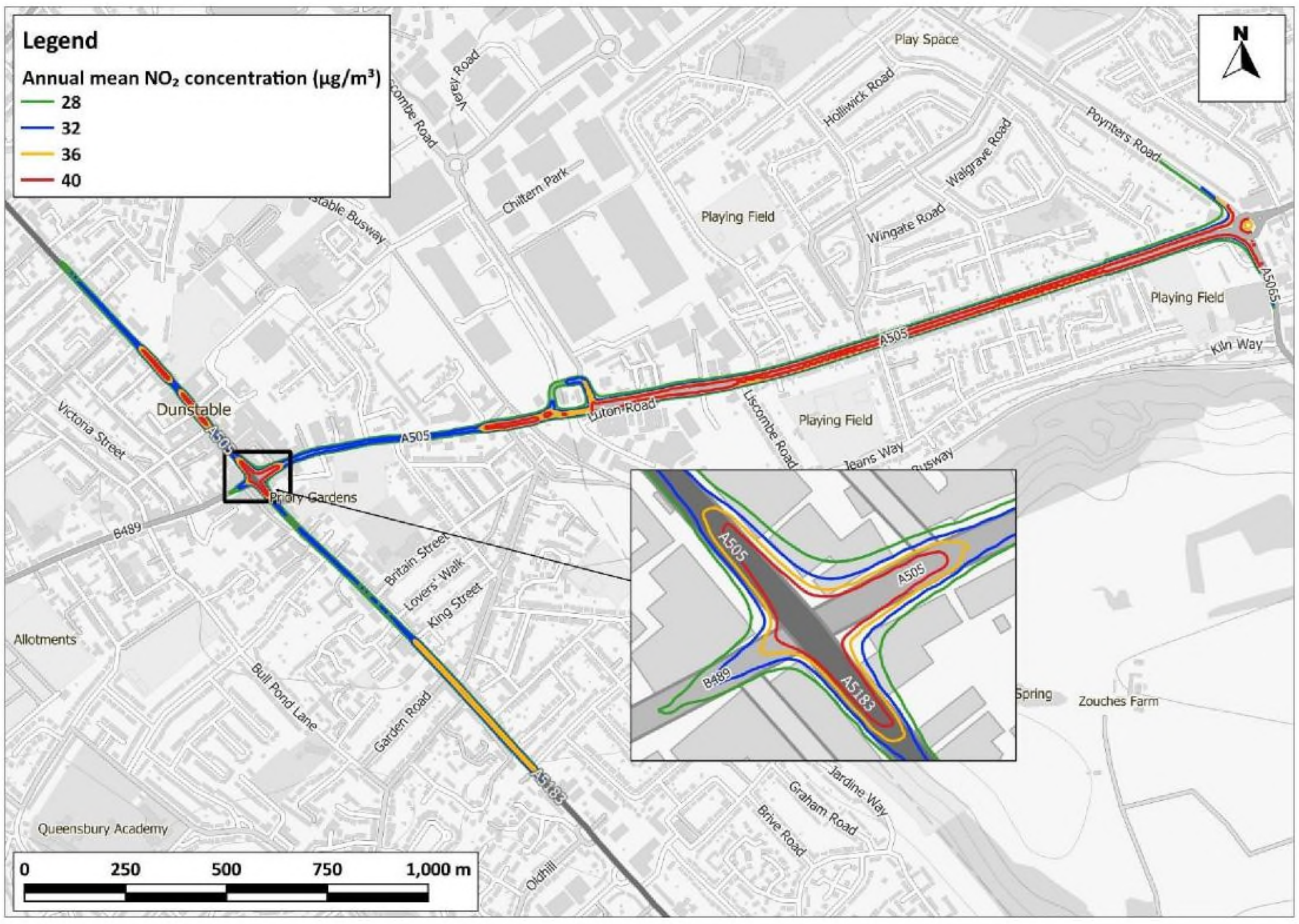


Figure 6: Contour Map of Modelled Annual Mean Nitrogen Dioxide Concentrations in 2019 in South Bedfordshire AQMA

Table 3: Modelled Annual Mean Nitrogen Dioxide Concentrations in 2019 at Discrete Receptors

Receptor	Receptor type	Annual mean NO_2
1	Residential	34.2
2	Residential	33.6
3	Residential	33.2
4_1.5m	Commercial	38.1
5_1.5m	Commercial	35.9
6_1.5m	Commercial	36.8
7_1.5m	Commercial	35.8
8_1.5m	Commercial	33.6
9_1.5m	Medical	32.7
4_4.5m	Commercial	29.4
5_4.5m	Commercial	28.3
6_4.5m	Residential	28.3
7_4.5m	Residential	27.4
8_4.5m	Commercial	26.5
9_4.5m	Medical	26.0
10_1.5m	Commercial	40.0
11_1.5m	Commercial	39.8
12_1.5m	Commercial	39.7
13_1.5m	Commercial	39.6
14_1.5m	Commercial	39.5
15_1.5m	Residential	39.4
16_1.5m	Residential	39.0
10_4.5m	Residential	23.6
11_4.5m	Residential	23.6
12_4.5m	Commercial	23.5
13_4.5m	Residential	23.5
14_4.5m	Residential	23.5
15_4.5m	Residential	23.4
16_4.5m	Residential	23.3

3.6 As demonstrated in Figure 5 and Table 3, all locations where the annual mean objective is predicted to be exceeded are within roads or at kerbside locations, where the annual mean objective would not apply. Across the majority of the current South Bedfordshire AQMA, concentrations are also less than 90% of the objective at locations where there is public exposure. The exception is around the Church Street/West Street/A505 junction and at the façade of ground-level commercial receptors 4 to 7 and on West Street near diffusion tube 55 at the façade of ground-level commercial receptors 10 to 14 and residential receptors 15 and 16.

3.7 At the locations where there is public exposure near the Church Street/West Street/A505 junction (namely the Natwest building and nearby cafe) and at receptors 4 to 7, the annual mean objective would not apply, only the hourly mean objective. Likewise, at the commercial receptors 10 to 14 on West Street, only the hourly mean objective would apply. As monitored concentrations at these locations are less than 60 µg/m^3, there is unlikely to be a risk of exceedances of the 1-hour mean objective. Therefore, the only locations where concentrations are within 90% of the objective at a location of relevant exposure are receptors 15 and 16, which are ground-floor level residential receptors.

AQMA Recommendation

3.8 Based on the modelling undertaken, there are no locations close to or within the current AQMA where the annual mean nitrogen objective would apply where concentrations exceed the objective. There is however one area on West Street, at receptors 15 and 16, where annual mean nitrogen dioxide concentrations were within 10% of the objective in 2019 at a location with relevant exposure. At all receptors, modelled concentrations are less than 60 µg/m^3 and therefore there is unlikely to be a risk of exceedances of the 1-hour mean objective.

3.9 While some monitoring sites measured concentrations within 10% of the objective or exceeded the objective in 2019 (and it was on this basis that the AQMA was not revoked in 2022), these were all at kerbside sides and therefore also do not represent relevant exposure. As demonstrated by the dispersion modelling, concentrations of nitrogen dioxide drop off with increasing distance from the road and as the nearest locations of relevant public exposure to these monitoring sites are set back from the road, concentrations would be below 90% of the objective at the majority of sensitive receptors near monitoring sites.

3.10 On the basis of the dispersion modelling and review of CBC monitoring data undertaken, it is recommended that the boundary of the AQMA is amended, rather than fully revoked at this stage. This is because there is only one area where modelled annual mean nitrogen dioxide concentrations are within 10% of the objective at a location where there is relevant exposure (where the objective would apply). This is at the ground-level residential property near diffusion tube 55. At all other locations close to or within the South Bedfordshire AQMA in Central Bedfordshire, there are no exceedances of the objective or concentrations within 10% of the objective at locations where there is relevant exposure. A proposed boundary for the revised AQMA is presented in Figure 7.

Figure 7: Proposed Revised AQMA Boundary

Imagery ©2023 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation Group, Map data © 2023.

3.11 It may be possible to fully revoke the South Bedfordshire AQMA in a future year if current trends continue – 2022 monitoring at diffusion tube 55 demonstrated concentrations were less than 90% of the objective. It is therefore recommended that additional diffusion tube monitoring is undertaken in the vicinity of diffusion tube 55, for example at the façade of the residential property where concentrations were modelled to be within 10% of the objective, to monitor progress on reducing concentrations in this area.

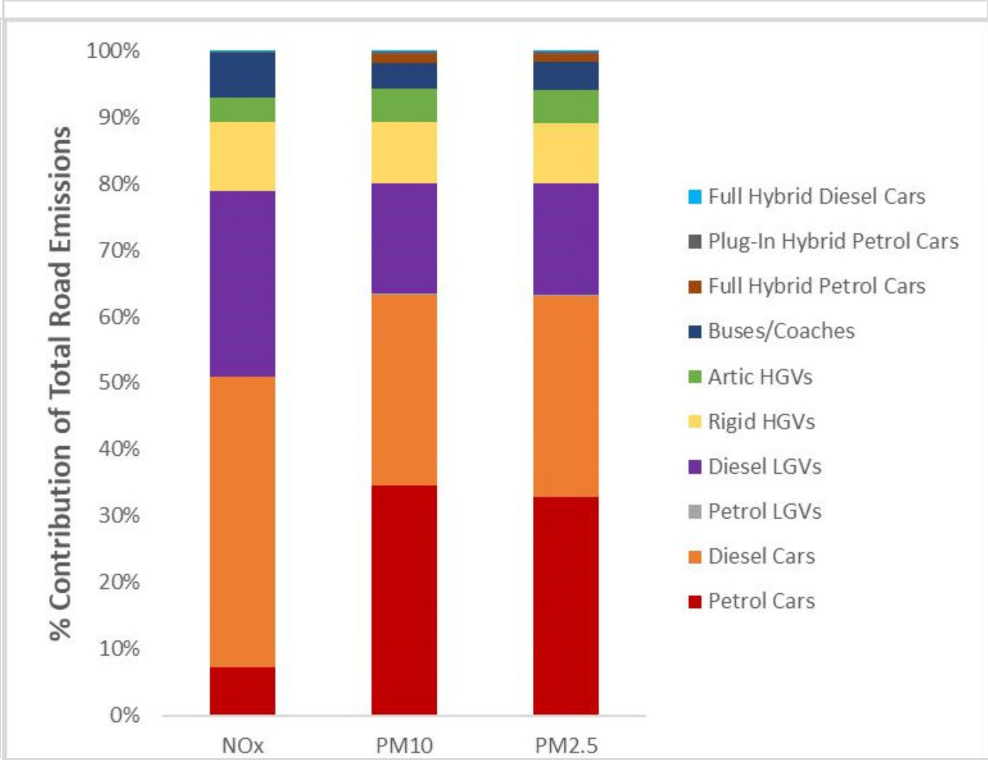
4 Source Apportionment

4.1 Defra's EFT has been used to provide an indication of the proportion of road traffic emissions in the current South Bedfordshire AQMA (as well as any roads modelled from outside the AQMA which are relevant to the study) from each vehicle and Euro class type in 2019. Emissions of particulate matter from each vehicle type have also been included for information.

4.2 Figure 8 and Table 4 show the percentage of emissions by vehicle type. This has been calculated using the total modelled annual emissions for all modelled roads in the AQMA in 2019 and the Source Apportionment option within the EFT. The results indicate that the majority of road NOx emissions in 2019 were produced by Diesel Cars (43.7%), followed by Diesel Light Goods Vehicles (LGVs) (27.7%), Rigid Heavy Goods Vehicles (HGVs) (10.4%), Petrol Cars (7.2%) and Buses/Coaches (6.7%). For particulate matter emissions (PM_{10} and $PM_{2.5}$), the contribution from Petrol Cars is proportionally much higher than for NOx.

Figure 8: Percentage Contribution of Total Road Emissions by Vehicle Type (2019)

Table 4: Percentage Contribution of Total Road Emissions by Vehicle Type (2019)



Vehicle Type	NOx (%)	PM_{10} (%)	$PM_{2.5}$ (%)
Petrol Cars	7.2	34.3	32.7
Diesel Cars	43.7	28.6	30.0
Petrol LGVs	0.0	0.2	0.2
Diesel LGVs	27.7	16.3	16.5
Rigid HGVs	10.4	9.2	9.1
Artic HGVs	3.7	5.0	5.0
Buses/Coaches	6.7	3.9	4.1
Full Hybrid Petrol Cars	0.1	1.3	1.2
Plug-In Hybrid Petrol Cars	0.0	0.4	0.3
Full Hybrid Diesel Cars	0.2	0.2	0.2

4.3 Figure 9 and Table 5 show the percentage contribution of NOx emissions by vehicle Euro class for Light Duty Vehicles (LDVs) while Table 6 and Figure 10 show the contribution for Heavy Duty Vehicles (HDVs; HGVs and Buses/Coaches). The proportions have been calculated based on the annual emissions from all modelled roads using the EFT's Euro Emissions Standards Summary for NOx.

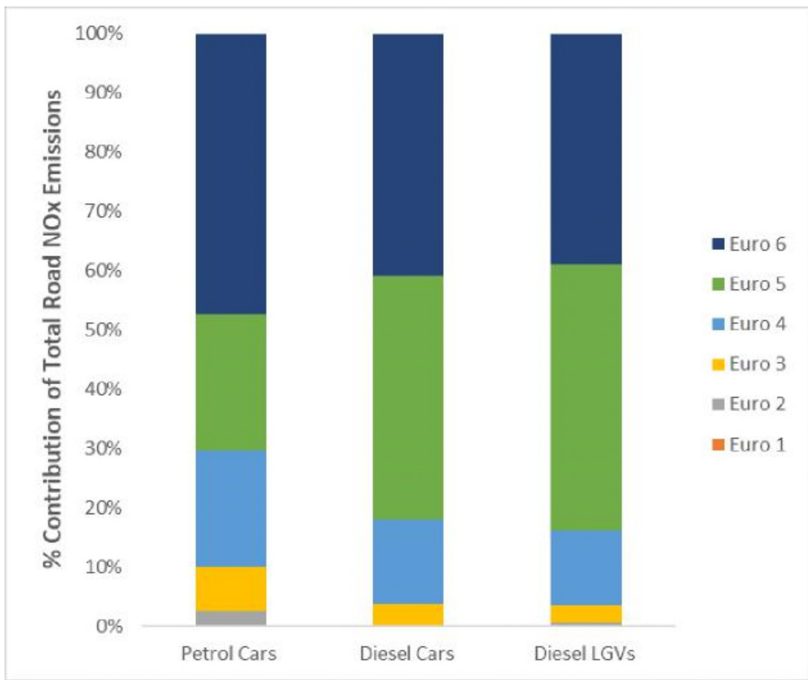


Figure 9: Percentage Contribution of Total Road NOx Emissions from Light Duty Vehicles by Euro Class Type (2019)

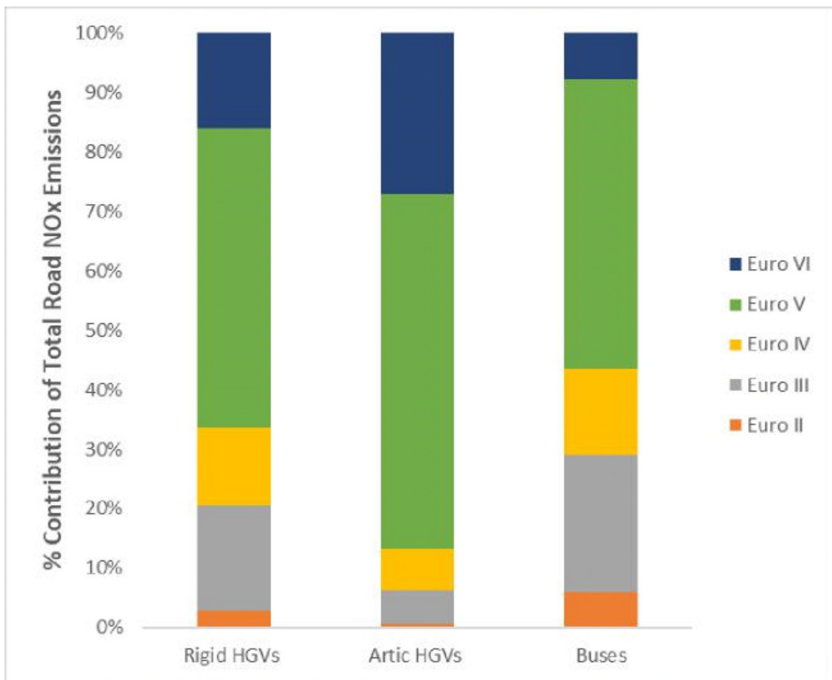


Figure 10: Percentage Contribution of Total Road NOx Emissions from Heavy Duty Vehicles by Euro Class Type (2019)

Table 5: Percentage Contribution of Total Road Emissions from Light Duty Vehicles by Euro Class Type (2019)

Euro Standard	Petrol Cars (%)	Diesel Cars (%)	Diesel LGVs (%)
Euro 2	2.6	0.1	0.6
Euro 3	7.5	3.7	3.0
Euro 4	19.7	14.2	12.6
Euro 5	22.9	41.2	44.8
Euro 6	47.4	40.8	39.0

Table 6: Percentage Contribution of Total Road Emissions from Heavy Duty Vehicles by Euro Class Type (2019)

Vehicle Type	Rigid HGVs	Artic HGVs	Buses
Euro II	2.8	0.5	5.9
Euro III	17.8	5.9	23.1
Euro IV	13.1	6.8	14.6
Euro V	50.3	59.8	48.7
Euro VI	16.0	27.0	7.8

4.4 Figure 9 and Table 5 indicate that the majority of NOx emissions from Petrol Cars in 2019 are from Euro 6 vehicles (47.4%), while for Diesel Cars and LGVs, Euro 5 vehicles emit the highest proportion of NOx (41.2% and 44.8%, respectively). In terms of HDVs, Figure 10 and Table 6 indicate that the majority of NOx emissions from Rigid and Artic HGVs and Buses/Coaches in 2019 are from Euro V vehicles (50.3%, 59.8% and 48.7%, respectively).

4.5 It should be noted that these proportions are calculated based on a series of assumptions (as described in Paragraph 2.10), and are estimated for 2019 using Defra's EFT, based on DfT data, corrected to 2019 where necessary.

5 Conclusions

5.1 Detailed modelling of the roads within the current South Bedfordshire AQMA and a review of CBC monitoring data has demonstrated that the predicted annual mean nitrogen dioxide concentrations in 2019 do not exceed the objective at locations of relevant exposure. However, there was one area on West Street where concentrations were within 10% of the objective. The majority of road NOx emissions within the AQMA in 2019 can be attributed to diesel vehicles; primarily cars, followed by LGVs and rigid HGVs.

5.2 Based on the analysis of the monitoring data within the South Bedfordshire AQMA and the modelling study, it is considered that the boundary of the AQMA can be amended. It may also be possible to completely revoke this AQMA in future years; however it is recommended additional monitoring for nitrogen dioxide is undertaken within any revised AQMA so that progress in reducing concentrations can be monitored.

6 References

CBC (2019) *2019 Air Quality Annual Status Report*. CBC (2023) *2023 Air Quality Annual Status Report*.

Defra (2022) *Local Air Quality Management Technical Guidance (TG22) August 2022* , Available: https://laqm.defra.gov.uk/documents/LAQM-TG16-April-21-v1.pdf.

Defra (2023c) *Local Air Quality Management (LAQM) Support Website*, Available: http://laqm.defra.gov.uk/.

DfT (2017) *TEMPro (Version 7.2) Software*, Available: https://www.gov.uk/government/collections/tempro.

DfT (2020) *DfT Road traffic statistics (TRA03)*, Available: https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra.

DfT (2023) *Road traffic statistics*, Available: http://www.dft.gov.uk/matrix/.

7 Glossary

AADT Annual Average Daily Traffic

ADMS-Roads Atmospheric Dispersion Modelling System model for Roads

AQC Air Quality Consultants

AQMA Air Quality Management Area

Defra Department for Environment, Food and Rural Affairs

DfT Department for Transport

EFT Emission Factor Toolkit

EPUK Environmental Protection UK

EU European Union

EV Electric Vehicle

Exceedance A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure

HDV Heavy Duty Vehicles (> 3.5 tonnes)

HGV Heavy Goods Vehicle

HMSO Her Majesty's Stationery Office

IAQM Institute of Air Quality Management

kph Kilometres Per hour

LAQM Local Air Quality Management

LDV Light Duty Vehicles (<3.5 tonnes)

LGV Light Goods Vehicle

µg/m^3 Microgrammes per cubic metre

NO Nitric oxide

NO_2 Nitrogen dioxide

NOx Nitrogen oxides (taken to be NO_2 + NO)

OEP Office for Environmental Protection

Objectives A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the

standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides

Standards A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal

TEA Triethanolamine – used to absorb nitrogen dioxide

TEMPro Trip End Model Presentation Program

8 Appendices

A1 Professional Experience

Julia Burnell, MEnvSci (Hons) MIEnvSc MIAQM

Miss Burnell is a Senior Consultant with AQC with over seven years' experience in the field of air quality. She has experience of undertaking a range of air quality assessments for power, transportation, and mixed-use development projects both in the UK and internationally. She is also experienced at preparing environmental permit applications for medium combustion plant/specified generator sites and has commissioned and maintained numerous ambient air quality monitoring surveys. Prior to her work with AQC, Julia completed an MEnvSci (Hons) in Environmental Science (four-year integrated master's). She is a Member of both the Institute of Air Quality Management and the Institution of Environmental Sciences.

Andy Collins, BSc (Hons) MIEnvSc MIAQM

Andy is an Associate Director with AQC with more than 17 years' experience across both public and private sectors, specialising in air quality and industrial emissions. Andy joined the company in 2023 and has extensive experience working with operators, regulators & investors, helping clients understand the requirements of current and future environmental regulations affecting their business and operations. Andy has extensive experience covering ambient air quality monitoring and air quality assessment projects, whilst he has overseen environmental permitting projects covering a wide range of regulated installations and operations subject to the Industrial Emissions Directive (IED), as well as Waste Operations, Medium Combustion Plant & Specified Generators processes.

A2 Modelling Methodology

Road Traffic *Model Inputs*

A2.1 Predictions have been carried out using the ADMS-Roads dispersion model (v5). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 11.0) published by Defra (2023c). Model input parameters are summarised in Table A2.1 and, where considered necessary, discussed further below.

Table A2.1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	Yes – 6km x 6km Cartesian grid at 50m resolution
Urban Canopy Flow Used?	No
Advanced Street Canyons Modelled?	No
Noise Barriers Modelled?	No
Meteorological Monitoring Site	Luton Airport
Meteorological Data Year	2019
Dispersion Site Surface Roughness Length (m)	N/A (variable surface roughness file used)
Dispersion Site Minimum MO Length (m)	30
Met Site Surface Roughness Length (m)	0.5
Met Site Minimum MO Length (m)	30
Gradients?	No

A2.2 The traffic data used in this assessment are summarised in Table A2.2. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2020).

Table A2.2: Summary of Traffic Data used in the Assessment

Road Link	AADT	%HDV
B489	11,575	2.6
A5183 (A505 to Great Northern Road)	14,488	7.5
A5183 (Great Northern Road to Beech Road)	20,431	6.6
A505 (A5120 to A505)	17,405	7.6
A505 (A4012 to A505	17,733	5.6
A505 (French's Avenue to A5120)	16,701	8.4
A505 (A5 to Station Road)	17,956	4.5
A505 (Station Road to A5065)	28,856	4.8
A5065	25,461	1.6
A505 (A5065 to M1)	24,683	6.2
A5505	12,556	7.4

A2.3 Figure A2.1 shows the road network included within the model, along with the speed at which each link was modelled.

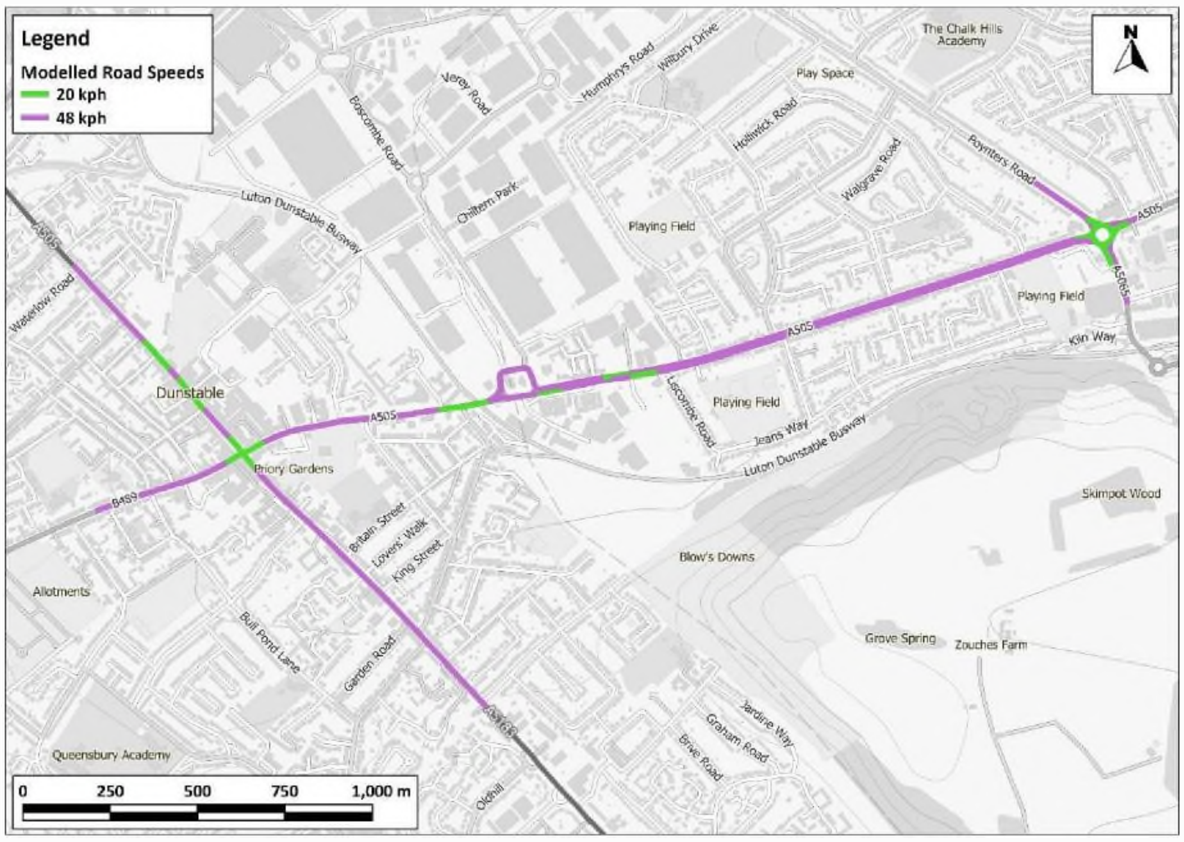
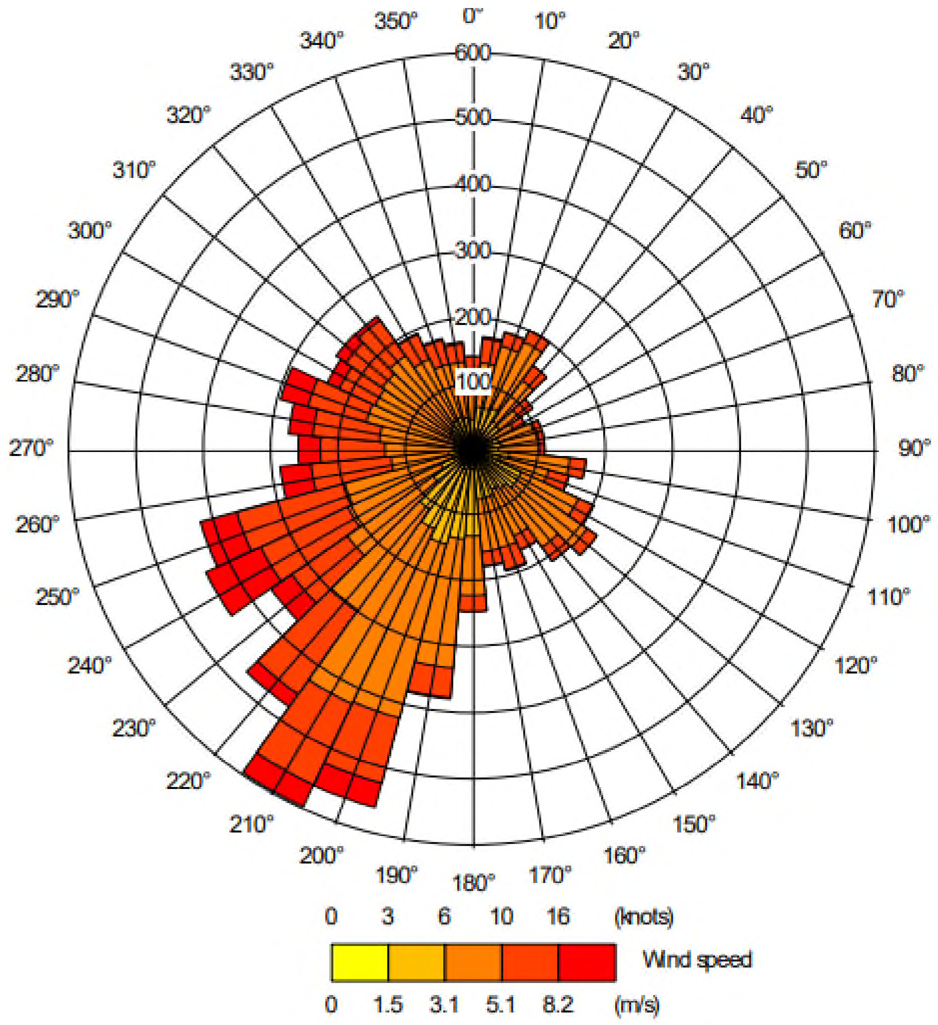


Figure A2.1: Modelled Road Network & Speed

A2.4 Hourly sequential meteorological data in sectors of 10 degrees from Luton Airport for 2019 have been used in the model. The Luton Airport meteorological monitoring station is located approximately 8 km to the east of the AQMA. Both the application site and the Luton Airport meteorological monitoring station are located in the east-central England where they will be influenced by the effects of inland meteorology over urban topography. The topography of the model domain is similar to that around the meteorological monitoring station and measurements from this site are considered to provide the most robust basis to predict meteorology within the model domain. A wind rose for the site for the year 2019 is provided in Figure A2.2. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

Figure A2.2 Wind Rose



Model Verification

A2.5 Evidence collected over many years has shown that, in most urban areas, dispersion modelling relying upon Defra's EFT has tended to systematically under-predict roadside nitrogen dioxide concentrations. To account for this, it is necessary to adjust the model against local measurements. The model has been run to predict annual mean nitrogen dioxide concentrations during 2019 at the CBC diffusion tube monitoring sites located within or close to the AQMA.

Nitrogen Dioxide

A2.6 Most nitrogen dioxide (NO_2) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NOx = NO + NO_2).

A2.7 The model output of road-NOx (i.e. the component of total NOx coming from road traffic) has been compared with the 'measured' road-NOx. Measured road-NOx has been calculated from the measured NO_2 concentrations and the predicted background NO_2 concentration using the NOx from NO_2 calculator (Version 8.1) available on the Defra LAQM Support website (Defra, 2023c).

A2.8 The unadjusted model has under predicted the road-NOx contribution; this is a common experience with this and most other road traffic emissions dispersion models. In the model, road-NOx contributions at diffusion tubes 33, 50 and 55 were being under predicted to a greater extent than at the other monitoring sites. Four separate adjustment factors have therefore been determined, representing different geographical areas, as the slope of the best-fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (Figure A2.3). By calculating four separate adjustment factors, the model performance is improved as it is able to better account for the localised dispersion characteristics.

A2.9 A calculated adjustment factor of 3.360 has been applied to the modelled road-NOx concentration for the gridded receptor to provide adjusted modelled road-NOx concentrations. For the discrete sensitive receptors, the following adjustments have been used:

- for receptors 1-3, a calculated adjustment factor of 4.939 has been applied to the modelled road-NOx concentrations to represent localised conditions around monitor 50;
- for receptors 4-9 an adjustment factor of 7.643 has been applied to the modelled road-NOx concentrations to represent localised conditions around monitor 33 (behind the row of trees on Church Street);
- for receptors 10-16, an adjustment factor of 10.017 has been applied to the modelled road-NOx concentrations to represent localised conditions around monitor 55 (stretch of road with single yellow lines on West Street).

A2.10 Details of how these factors have been calculated is presented below.

Adjustment for Gridded Receptors

A2.11 The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NOx concentrations with the predicted background NO_2 concentration within the NOx to NO_2 calculator. Figure A2.4 compares final adjusted modelled total NO_2 at each of the monitoring sites to measured total NO_2, and shows a close agreement.

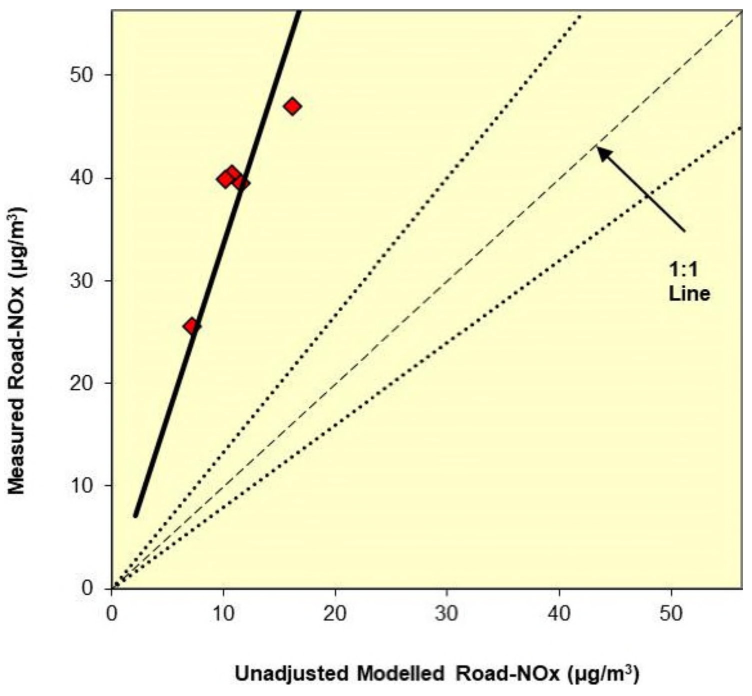


Figure A2.3: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations For All Monitors Except 33, 50 and 55. The dashed lines show ± 25%.

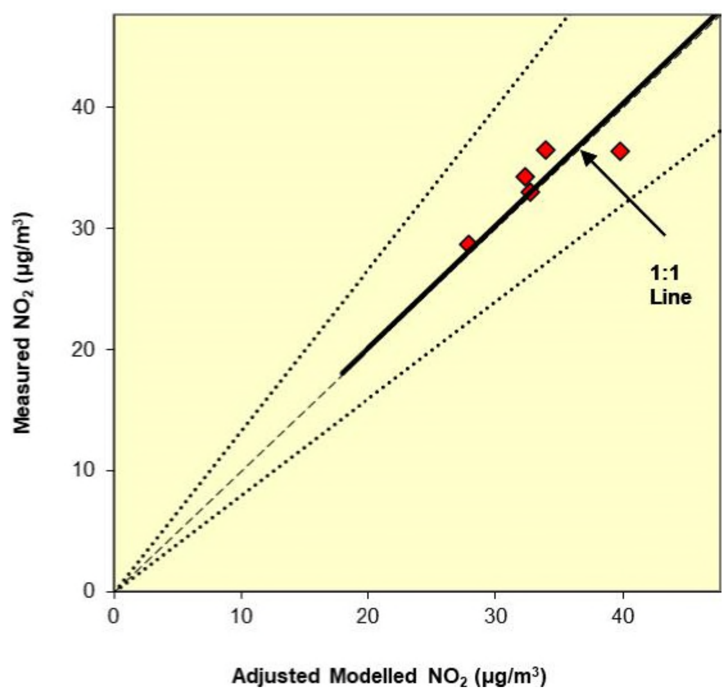


Figure A2.4: Comparison of Measured Total NO_2 to Final Adjusted Modelled Total NO_2 Concentrations For All Monitors Except 33, 50 and 55. The dashed lines show ± 25%.

2.11.1 Table A2.3 shows the statistical parameters relating to the performance of the model, as well as the 'ideal' values (Defra, 2022). The values calculated for the model demonstrate that it is performing well.

Table A2.3: Statistical Model Performance

Statistical Parameter	Model-Specific Value	'Ideal' Value
Correlation Coefficient [a]	0.84	**1**
Root Mean Square Error (RMSE) [b]	2.12	**0**
Fractional Bias [c]	0.01	**0**

a Used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship.

b Used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared (i.e. µg/m³). TG22 (Defra, 2022) outlines that, ideally, a RMSE value within 10% of the air quality objective (4µg/m³) would be derived. If RMSE values are higher than 25% of the objective (10 µg/m³) it is recommended that the model is revisited.

c Used to identify if the model shows a systematic tendency to over or under predict. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.

Adjustment for Discrete Receptors

A2.12 Separate adjustment factors have been calculated for monitoring sites 33, 50 and 55. This is because the model was found to be under-predicting concentrations at these locations to a greater extent than at the other monitoring sites due to localised conditions.

A2.13 The data used to calculate each adjustment factor are provided in Table A2.4 below:

Table A2.4: Calculation of Adjustment Factors for Monitoring

	Monitoring site 33	Monitoring site 50	Monitoring site 55
Measured NO_2	36.7	42.1	40.8
Background NO_2	13.0	16.7	13.0
'Measured' road-NOx (using NOx from NO_2 calculator)	47.6	52.5	57.0
Modelled road-NOx	6.3	10.6	5.7
Road-NOx adjustment factor	7.64	4.94	10.02

PM_{10} and $PM_{2.5}$

A2.14 The approach described above for NOx and nitrogen dioxide determines the road increment of concentrations by subtracting the predicted local background from the roadside measurements. This works well for NOx because the differences between roadside and background concentrations typically represent a large proportion of the total measured value. The same is not true for PM_{10} and $PM_{2.5}$ concentrations, which are dominated by non-road emissions, even at the roadside. In practice, the influence of a local road on concentrations can often be smaller than the uncertainty in the mapped background concentration. As an example of this, 31% of all roadside and kerbside sites in London which measured $PM_{2.5}$ in 2019 with >75% data capture, recorded an annual mean concentration lower than the equivalent Defra mapped background value. Using measured background concentrations does not provide any significant benefit, owing largely to the spatial resolution of available measurements, but also because of measurement uncertainty. For example, hourly-mean $PM_{2.5}$ concentrations measured at roadside sites are often lower than those measured at nearby urban background sites, while concentrations at urban background sites are often lower than those measured at rural sites.

A2.15 For these reasons, it is not appropriate to calculate the annual mean road-increment to PM_{10} and $PM_{2.5}$ concentrations by subtracting either the mapped background or a local measured background concentration. This, in turn, means that the approach to model adjustment which is described for NOx and NO_2 is not appropriate for PM_{10} and $PM_{2.5}$. Historically, many studies have derived a model adjustment factor for NOx and applied this to PM_{10} and $PM_{2.5}$. This is also not appropriate, since there is no reason to expect the same bias in emissions of NOx, PM_{10} and $PM_{2.5}$.

A2.16 While there is very strong evidence that EFT-based models have consistently under-predicted road-NOx concentrations in urban areas, there is no equivalent evidence for PM_{10} and $PM_{2.5}$. There is currently no strong basis for applying any adjustment to the model outputs. Predicted concentrations of PM_{10} and $PM_{2.5}$ have thus not been adjusted.

Post-processing

A2.17 The model predicts road-NOx concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO_2, has been processed through the NOx to NO_2 calculator available on the Defra LAQM Support website (Defra, 2023c). The traffic mix within the calculator has been set to “All other urban UK traffic”, which is considered suitable for the study area. The calculator predicts the component of NO_2 based on the adjusted road-NOx and the background NO_2.

A3 20mph Model Scenario

A3.1 This section presents the results from the model sensitivity undertaken where the speeds approaching the junction at West Street/High Street were reduced to 20mph from 30mph. The results from this scenario are presented in below.

Isopleth maps of the modelled annual mean nitrogen dioxide concentrations in 2019 at ground-floor level across the current South Bedfordshire AQMA for the 20mph scenario are presented in Figure A3.1.

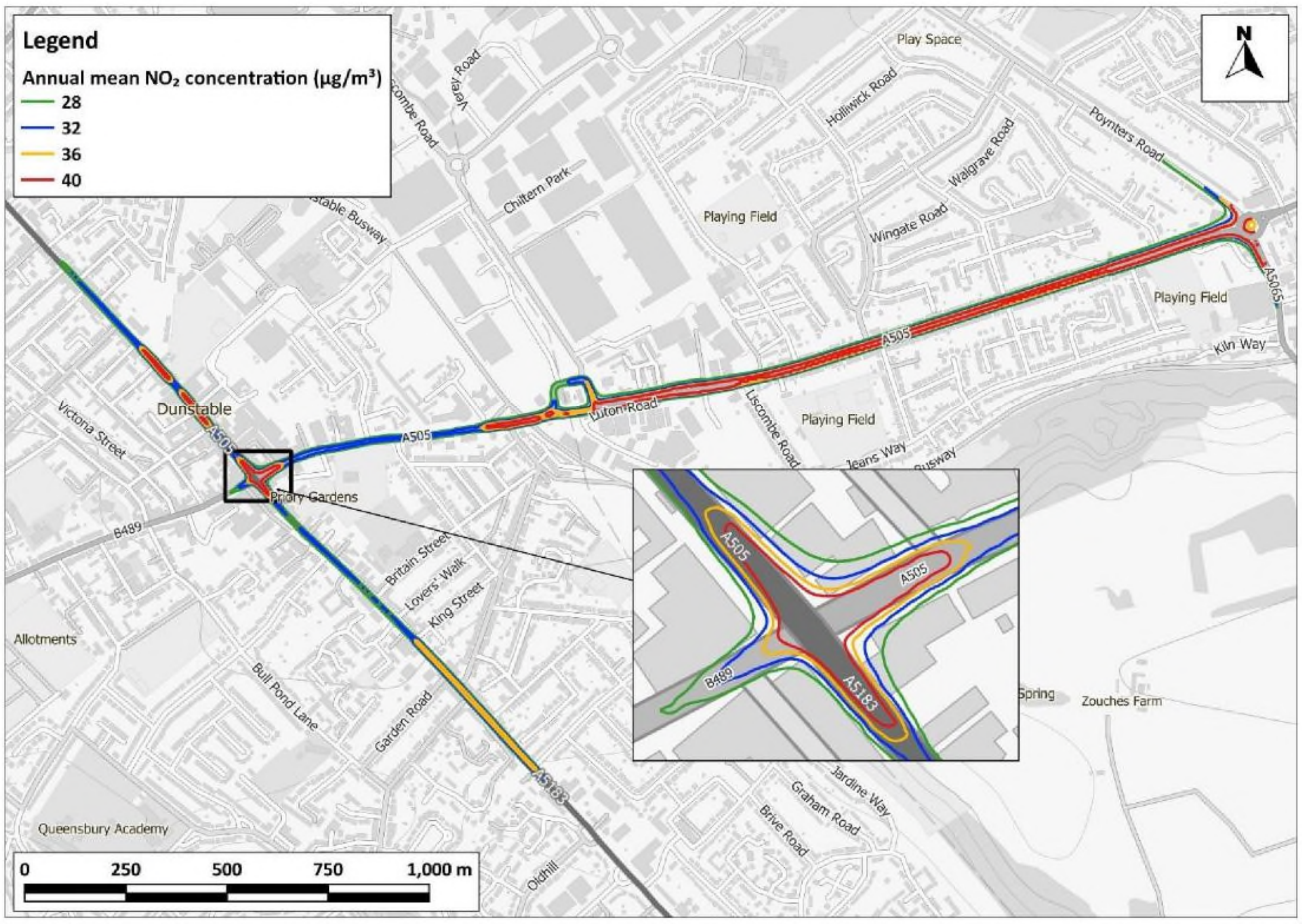


Figure A3.1: Contour Map of Modelled Annual Mean Nitrogen Dioxide Concentrations in 2019 in South Bedfordshire AQMA for 20mph Scenario

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values’
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
$µg/m^3$	Microgrammes per cubic metre

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.
- Annual Status Report 2023 V3. Central Bedfordshire Council. November 2023
- Sustainability Plan 2020-2023 V2 Sept 2020. Central Bedfordshire Council. September 2020
- Progress Report *(on the Sustainability Plan 2020-2023 V2 Sept 2020)* For the period up to January 2023. Central Bedfordshire Council.
- Electric Vehicle Charging: Guidance for New Development Supplementary Planning Document (SPD) (PDF). Central Bedfordshire Council. December 2022
- Enhanced Partnership Plan & Scheme 2022-2027.docx. Central Bedfordshire Council. updated 9 December 2022
- Central Bedfordshire Council's Bus Service Improvement Plan (October 2022). Central Bedfordshire Council. revised October 2022
- LTN 1/20 Cycle Infrastructure Design. Department for Transport. July 2020
- Local Plan Central Bedfordshire Council. Adopted July 2021
- On street Parking Management Plan. Central Bedfordshire Council. Published December 2022
- 2022 data (latest data available for DO1) - Public Health Outcomes Framework - Data - OHID (phe.org.uk)
- Visual Crossing. Weather data downloaded May 2024
- WebTris Traffic data - available from National Highways downloaded May 2024
- https://roadtraffic.dft.gov.uk/manualcountpoints DfT traffic count data for Dunstable Roads downloaded May 2024

National Bias Adjustment Factor taken from Spreadsheet Version Number 03/24 (downloaded 26/03/2024) to be applied to the 2023 dataset. Available from National Bias Adjustment Factors | LAQM (defra.gov.uk)

- Nitrogen dioxide (NO2) - GOV.UK (www.gov.uk) National NO_2 statistics