



Milton Keynes Council

Local Air Quality Management

Revocation of the Air Quality Management Area (Milton Keynes Council) (No 1) Order 2008

March 2021

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CONTENTS

- 1 SUMMARY 2**
- 2 INTRODUCTION 3**
 - 2.1 Background - Air Quality Management.....3
- 3 MONITORING OF AIR QUALITY IN OLNEY 5**
 - 3.1 Automatic Monitoring5
 - 3.2 Diffusion Tube Monitoring5
 - 3.3 Nitrogen Dioxide Monitoring Data6
- 4 CONCLUSIONS 12**
- APPENDIX A – BIAS ADJUSTMENT..... 13**
- REFERENCES..... 17**

List of Tables

- Table 1 Details of Automatic Monitoring Stations 7
- Table 2 Details of Non-Automatic Monitoring Sites in Olney..... 8
- Table 3 Annual Mean NO₂ Monitoring Results 9

List of Figures

- Figure 1 Olney Air Quality Management Area 4
- Figure 2 Olney Air Quality Monitoring Station..... 5
- Figure 3 Trends in Annual Mean NO₂ Concentrations – Automatic Stations 10
- Figure 4 Trends in Annual Mean NO₂ Concentrations - Olney Diffusion Tube Data. 11
- Figure 5 Co-location Study at Roadbox 2, High Street South, Olney 14
- Figure 6 Co-location Study at Roadbox 1, Wolverton Road, Newport Pagnell 15
- Figure 7 Co-location Study at Civic Offices Central Milton Keynes 16

1 SUMMARY

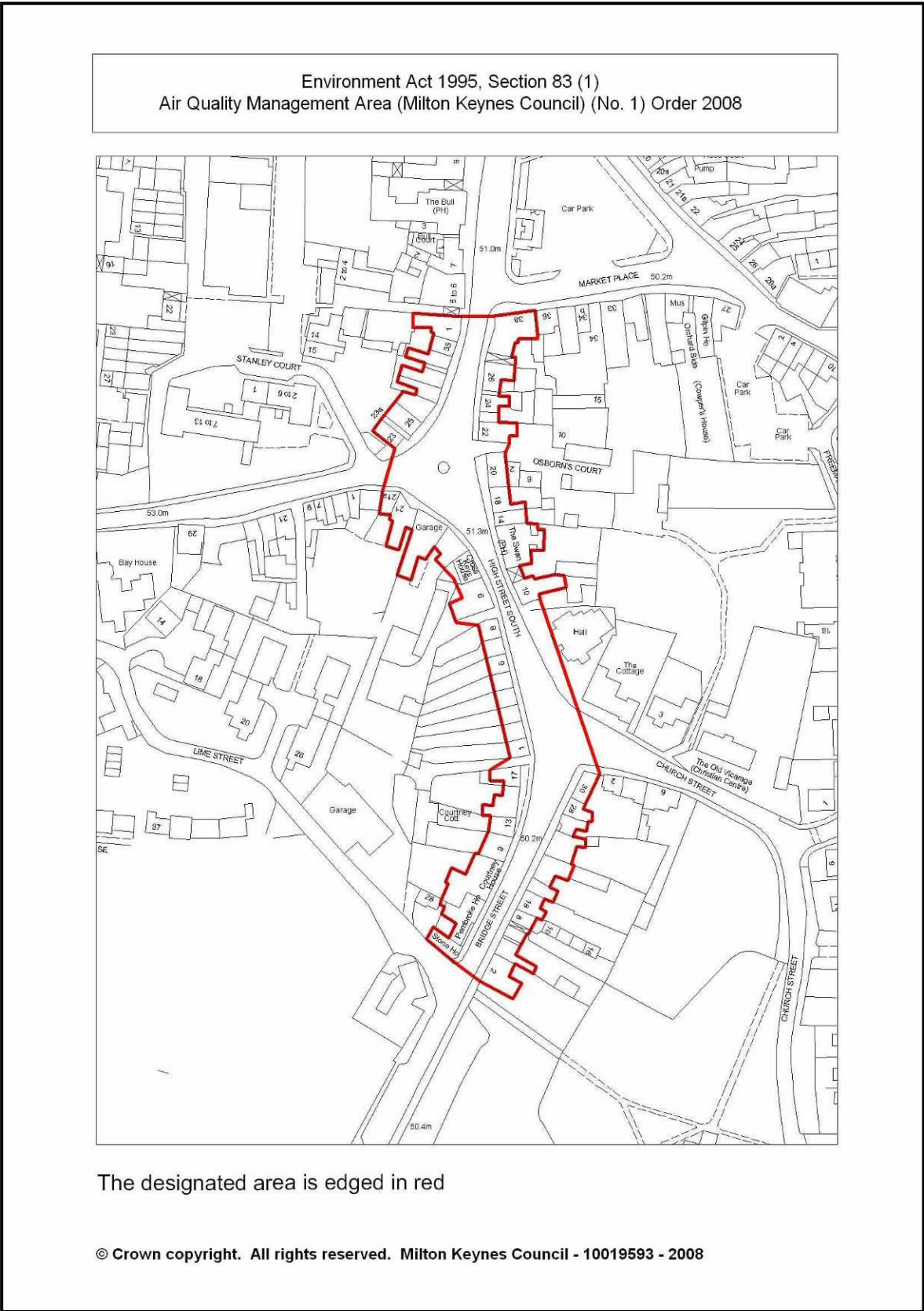
- 1.1 The annual mean air quality objective (AQO) for nitrogen dioxide (NO₂) is 40 µg/m³. In 2008 a small exceedence of this objective was identified at the façades of residential properties in Olney. Following a Detailed Assessment, an Air Quality Management Area (AQMA) was designated in part of Olney in December 2008 (**Figure 1**).
- 1.2 The annual mean objective has not been exceeded within the AQMA since 2014 and there is a downward trend in NO₂ levels, which is also reflected at the automatic air quality stations in Newport Pagnell and Central Milton Keynes.
- 1.3 Automatic monitoring at the current location on High Street South commenced in 2009 and is supplemented by 10 diffusion tube sites, 7 within the AQMA.
- 1.4 The measured annual mean concentration at the Olney automatic station, which is sited 2 metres from the roadside, was 17.8 µg/m³ in 2020. The highest diffusion tube result at a building façade was 25.4 µg/m³ recorded at 10 High Street South, Olney.
- 1.5 Revoking the AQMA has been considered for a few years and referred to in Annual Status Reports reviewed by Defra. New analysers were installed in all the automatic monitoring stations in February 2019 and so revocation was delayed until new data became available. Results now confirm that there is a downward trend at all monitoring locations and the future risk of exceeding the AQO is remote.
- 1.6 Although the Covid-19 pandemic will have affected emissions in 2020 there is very little possibility that future NO₂ levels will exceed the annual mean objective. National projections also show continued reductions in emissions, consequently, the AQMA will be revoked. A copy of the order is attached to this report.

2 INTRODUCTION

2.1 Background - Air Quality Management

- 2.1.1 A Detailed Assessment of nitrogen dioxide levels in Olney was published in August 2008. The Report identified small exceedences of the annual mean nitrogen dioxide air quality objective at the façades of residential properties (relevant locations in terms of public exposure), in Bridge Street and High Street South. This area forms a small street canyon where pollutants do not readily disperse. An Air Quality Management Area (AQMA) was designated by Order under Section 83 of the Environment Act 1995 on 1st December 2008 (see **Figure 1**).
- 2.1.2 The extent of the AQMA is represented by the red line in **Figure 1** and includes 64 addresses. The source of the pollution is mostly derived from road traffic on the A509.
- 2.1.3 An Action Plan was prepared in November 2012 containing measures designed to improve air quality within the AQMA.
- 2.1.4 Milton Keynes Council air quality reports can be downloaded from the website: <https://www.milton-keynes.gov.uk/environmental-health-and-trading-standards/pollution/local-air-quality-management>

Figure 1 Olney Air Quality Management Area



3 MONITORING OF AIR QUALITY IN OLNEY

3.1 Automatic Monitoring

3.1.1 Nitrogen dioxide is monitored automatically in Olney using a chemiluminescent analyser housed within an air conditioned “roadbox” type of enclosure.

3.1.2 The roadbox monitoring station was installed in March 2009, located 2 metres from the roadside in front of the Church Hall on High Street South (**Figure 2**).

3.1.3 **Table 1** provides details of the council’s three air quality monitoring stations.

Figure 2 Olney Air Quality Monitoring Station



3.2 Diffusion Tube Monitoring

3.2.1 Nitrogen dioxide is extensively monitored in Olney using diffusion tubes attached to the façades of buildings and lamp posts.

3.2.2 There are currently 10 diffusion tube monitoring sites in Olney, seven of which are within the AQMA. Tubes are deployed in triplicate and are co-located on the automatic monitoring station. The tubes are mainly sited on the façades of buildings to measure exposure where people live.

3.2.3 Details of diffusion tube locations can be found in **Table 2**.

3.3 Nitrogen Dioxide Monitoring Data

- 3.3.1 Automatic monitoring data from MK Council's three monitoring stations and from the 10 diffusion tube locations in Olney are summarised in **Table 3**.
- 3.3.2 In February 2019 the analysers in all monitoring stations were replaced with new ones supplied by Air Monitors (now ACOEM). There were issues with the new analysers, relating to initial set up and calibration, as discussed in the Annual Status Report 2020. This resulted in higher than expected results in 2019, now rectified. Results for 2020 are back on track.
- 3.3.3 There is a downward trend for the annual mean NO₂ concentration at all monitoring locations (**Figure 3**). In Olney the automatic monitoring station mean has fallen from 27.0 µg/m³ in 2012 to 17.8 µg/m³ in 2020.
- 3.3.4 Diffusion tubes are co-located on the automatic monitoring stations. Bias adjustment factors are calculated using the Excel spreadsheet provided by the National Physical Laboratory (NPL). In **Table 3** results have been bias adjusted using the co-location factor calculated using the Olney automatic station site. As a comparison, results are also shown using a combined factor derived from all three co-location studies. The combined factor gives slightly higher results.
- 3.3.5 Bias adjustment calculations are shown in **Appendix A**.
- 3.3.6 Diffusion tubes located at 10, High Street South (C1,C2,C3) recorded an annual mean of 42.8 µg/m³ in 2012 reducing to 25.4 µg/m³ in 2020 (28.8 µg/m³ using the combined factor).
- 3.3.7 The trend in annual mean NO₂ concentration at diffusion tube locations is represented in **Figure 4** and clearly shows the downward trend, significantly below the air quality objective.

Table 1 Details of Automatic Monitoring Stations

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
Fixed	Civic Offices, CMK	Urban Centre	485070	239131	NO ₂ ; PM ₁₀ ; PM _{2.5} ; O ₃	No	FIDAS 200E; Chemiluminescence; UV absorption	113 (to residential)	4.8	3.2
Roadbox 1	Wolverton Road, Newport Pagnell	Roadside	486290	243344	NO ₂	No	Chemiluminescence	25 (to residential)	3.4	1.5
Roadbox 2	High Street South, Olney	Roadside	488922	251157	NO ₂	Yes	Chemiluminescence	11 (to residential)	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 2 Details of Non-Automatic Monitoring Sites in Olney

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube co-located with a Continuous Analyser?	Height (m)
C1 C2 C3	10 High St South, (Cowper School House)	Roadside	488914	251173	NO ₂	Yes	0	2.0	No	2.3
D1 D2 D3	9 High St South, (Olney Wine Bar)	Roadside	488904	251177	NO ₂	Yes	0	1.7	No	2.2
E1 E2 E3	20 High Street	Roadside	488926	251455	NO ₂	No	3.3	7.6	No	2.2
F1 F2 F3	17 High Street (Opp. No.20 High St)	Roadside	488905	251456	NO ₂	No	0	7.2	No	2.1
G1 G2 G3	Corner of Coneygere and Palmers Road	Suburban	489108	251213	NO ₂	No	10.4	1.7	No	2.2
FF1 FF2 FF3	Cross Keys Office, High St South	Roadside	488898	251186	NO ₂	Yes	0.2	1.6	No	2.0
HH1 HH2 HH3	33 High Street South (Art Mart)	Roadside	488891	251248	NO ₂	Yes	0.6	2.0	No	2.1
JJ1 JJ2 JJ3	Roadbox 2, High Street South	Roadside	488922	251157	NO ₂	Yes	10.1	2.0	Yes	2.1
KK1 KK2 KK3	18/20 Bridge Street	Roadside	488917	251068	NO ₂	Yes	0.4	2.2	No	2.2
LL1 LL2 LL3	Courtney House, Bridge Street	Roadside	488909	251077	NO ₂	Yes	0.4	1.7	No	2.1

Notes:

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

(2) N/A if not applicable.

Table 3 Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	NO ₂ Annual Mean Concentration (µg/m ³)									
			2012	2013	2014	2015	2016	2017	2018	2019	2020 ⁽¹⁾	2020 ⁽²⁾
Fixed	Urban Centre	Automatic	21.9	20.9	19.0	18.8	18.1	17.0	16.2	23.5	16.4	16.4
Roadbox 1	Roadside	Automatic	36.1	33.2	29.6	27.0	32.8	30.5	25.6	27.1	24.2	24.2
Roadbox 2	Roadside	Automatic	27.0	26.7	27.0	22.3	22.8	22.4	19.9	23.9	17.8	17.8
C1 C2 C3	Roadside	Diffusion Tube	42.8	44.0	40.5	32.9	36.9	33.4	33.9	36.4	25.4	28.8
D1 D2 D3	Roadside	Diffusion Tube	39.6	36.6	34.1	29.5	32.3	31.7	30.2	30.9	22.1	25.0
E1 E2 E3	Roadside	Diffusion Tube	25.8	24.3	21.9	21.6	23.5	21.4	21.3	21.3	15.5	17.6
F1 F2 F3	Roadside	Diffusion Tube	27.8	25.4	26.7	23.6	24.9	25.0	23.1	25.1	17.0	19.3
G1 G2 G3	Suburban	Diffusion Tube	14.5	13.2	12.8	10.5	11.5	11.5	10.8	12.3	7.9	9.0
FF1 FF2 FF3	Roadside	Diffusion Tube	41.0	36.2	37.3	32.9	34.0	34.5	30.6	34.6	24.5	27.9
HH1 HH2 HH3	Roadside	Diffusion Tube	37.9	32.6	32.0	28.5	30.5	30.9	26.6	29.1	20.6	23.4
JJ1 JJ2 JJ3	Roadside	Diffusion Tube	27.1	26.4	26.2	22.7	24.5	25.2	23.5	24.8	17.8	20.2
KK1 KK2 KK3	Roadside	Diffusion Tube	42.4	40.2	41.3	34.2	36.3	36.1	32.9	35.8	25.5	29.0
LL1 LL2 LL3	Roadside	Diffusion Tube	40.1	33.6	34.6	31.6	33.5	32.1	28.1	30.6	22.4	25.4

Diffusion tube data has been bias corrected: (1) using co-location factor for Roadbox 2 = 0.74, and (2) using combined co-location factor from 3 stations = 0.85

Figure 3 Trends in Annual Mean NO₂ Concentrations – Automatic Stations

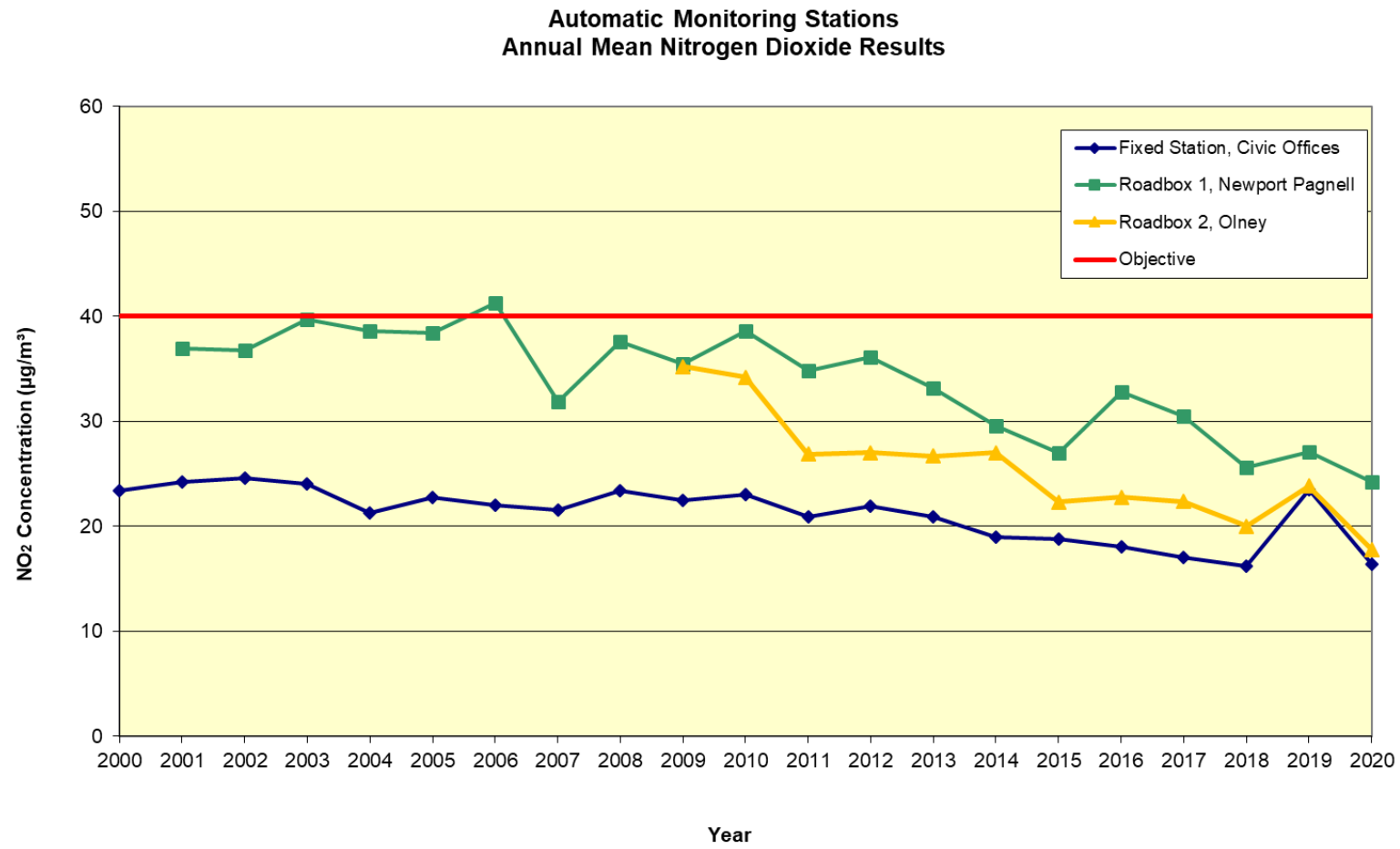
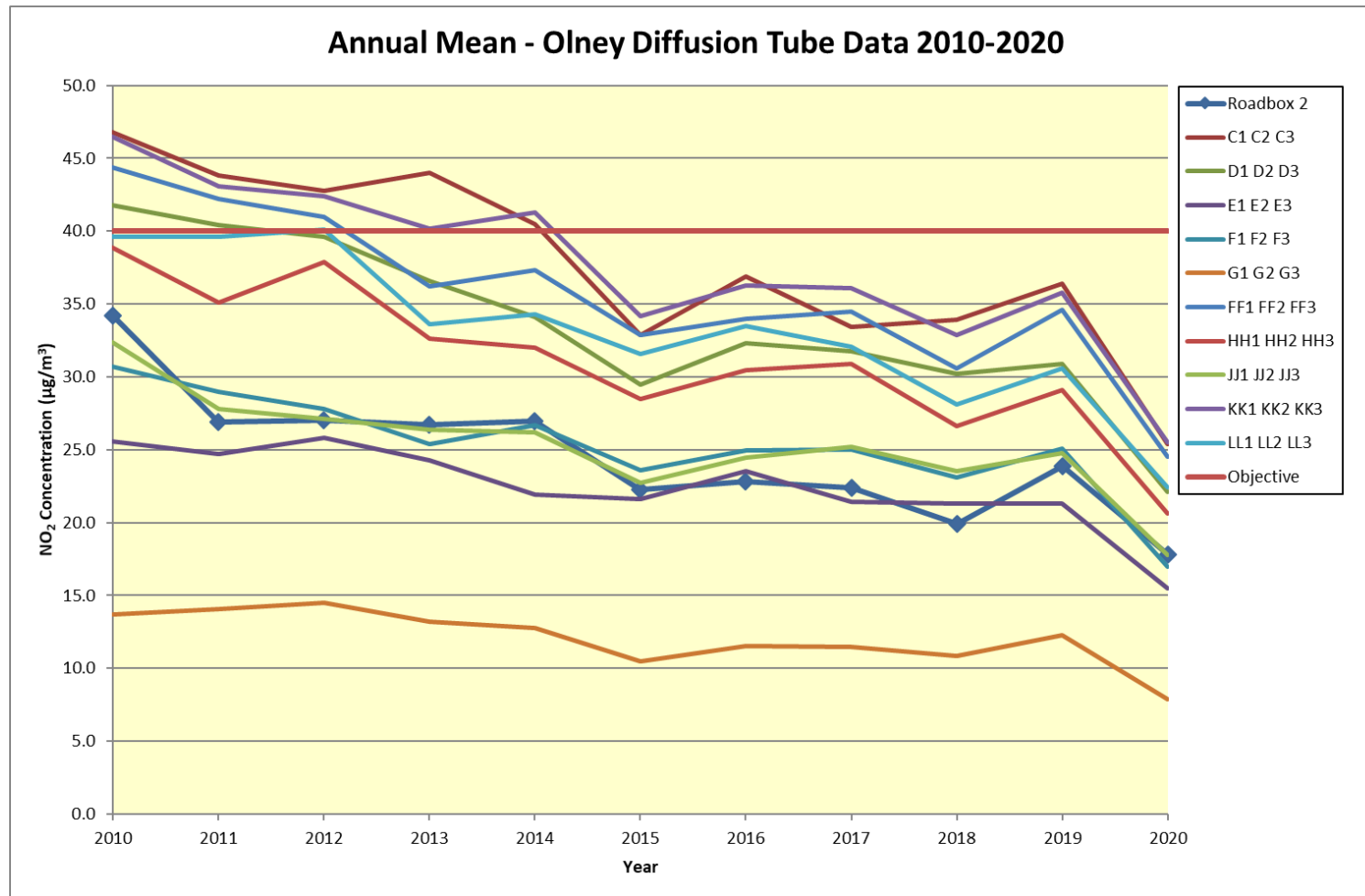


Figure 4 Trends in Annual Mean NO₂ Concentrations - Olney Diffusion Tube Data



4 CONCLUSIONS

- 4.1 Extensive monitoring of NO₂ levels in Olney has demonstrated that the annual mean objective is comfortably achieved at all locations and consequently the AQMA will be revoked.
- 4.2 The downward trend in NO₂ concentration is expected to continue in future years as cleaner vehicles replace older less efficient ones.
- 4.3 There are no plans to relocate the automatic monitoring station in 2021, however, the number of diffusion tube sites will be reviewed.

APPENDIX A – BIAS ADJUSTMENT

Diffusion Tube Bias Adjustment Factors

Nitrogen dioxide diffusion tubes are prepared 'in-house' by Milton Keynes Council using 20% triethanolamine (TEA) in water and are analysed following the procedures set out in the AEA Practical Guidance document produced by the Defra Working Group on Harmonisation of NO₂ Diffusion Tubes that was released early in 2008. The Council participates in the proficiency testing scheme, AIR PT, provided by LGC Standards for quality assurance of diffusion tube analysis and the monthly NO₂ Network Field Intercomparison Exercise managed by the National Physical Laboratory (NPL).

Factors from Local Co-location Studies

Local co-location studies are carried out at all the automatic monitoring stations. Tubes are sited in triplicate near the air intake. In 2020, 3 co-location studies were used to determine the bias adjustment factor; Civic Offices Central Milton Keynes, Olney High Street South and Wolverton Road, Newport Pagnell.

At the time of writing, the bias adjustment factor was not available for the co-location study at Marylebone Road in London or for the National bias adjustment spreadsheet provided by NPL. However, the same spreadsheet was used to calculate bias from local co-location studies as shown in in **Figures 5, 6 and 7** below.

The bias adjustment for Olney was calculated to be **0.74** and the combined factor for all 3 studies was **0.85**.

Figure 5 Co-location Study at Roadbox 2, High Street South, Olney

Checking Precision and Accuracy of Triplicate Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	08/01/2020	05/02/2020	45.8	34.6	32.0	37	7.3	19	18.1
2	05/02/2020	04/03/2020	22.3	22.7	23.8	23	0.8	3	1.9
3	04/03/2020	01/04/2020	20.0	21.5	23.5	22	1.8	8	4.4
4	01/04/2020	29/04/2020	18.2	17.9	18.5	18	0.3	2	0.8
5	29/04/2020	03/06/2020	12.1	15.6	16.8	15	2.5	17	6.1
6	03/06/2020	01/07/2020	20.1	21.1	22.8	21	1.4	6	3.4
7	01/07/2020	29/07/2020	15.2	15.8	18.1	16	1.5	9	3.7
8	29/07/2020	02/09/2020	22.8	21.6	23.8	23	1.1	5	2.7
9	02/09/2020	30/09/2020	26.7	25.6	26.2	26	0.6	2	1.4
10	30/09/2020	04/11/2020	26.4	25.5	30.4	27	2.6	10	6.6
11	04/11/2020	02/12/2020	26.2	29.1	29.8	28	1.9	7	4.7
12	02/12/2020	06/01/2021	29.5	30.4	32.5	31	1.5	5	3.8
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
25.658	95.01	Good	Good
19.359	94.34	Good	Good
16.873	95.24	Good	Good
12.564	96.13	Good	Good
12	96.19	Good	Good
12	90.48	Good	Good
12	93.45	Good	Good
16	90	Good	Good
17	93.45	Good	Good
20	94.64	Good	Good
25.227	95.09	Good	Good
23.96	96.31	Good	Good

Overall survey --> **Good precision** **Good Overall DC**

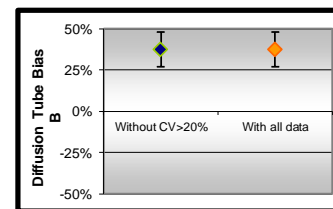
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Roadbox 2
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Precision	12 out of 12 periods have a CV smaller than 20%
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Accuracy (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.74 (0.68 - 0.8)
Bias B	36% (25% - 47%)
Diffusion Tubes Mean:	24 μgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	18 μgm^{-3}
Data Capture for periods used:	94%
Adjusted Tubes Mean:	18 (16 - 19) μgm^{-3}

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.74 (0.68 - 0.8)
Bias B	36% (25% - 47%)
Diffusion Tubes Mean:	24 μgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	18 μgm^{-3}
Data Capture for periods used:	94%
Adjusted Tubes Mean:	18 (16 - 19) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Figure 6 Co-location Study at Roadbox 1, Wolverton Road, Newport Pagnell

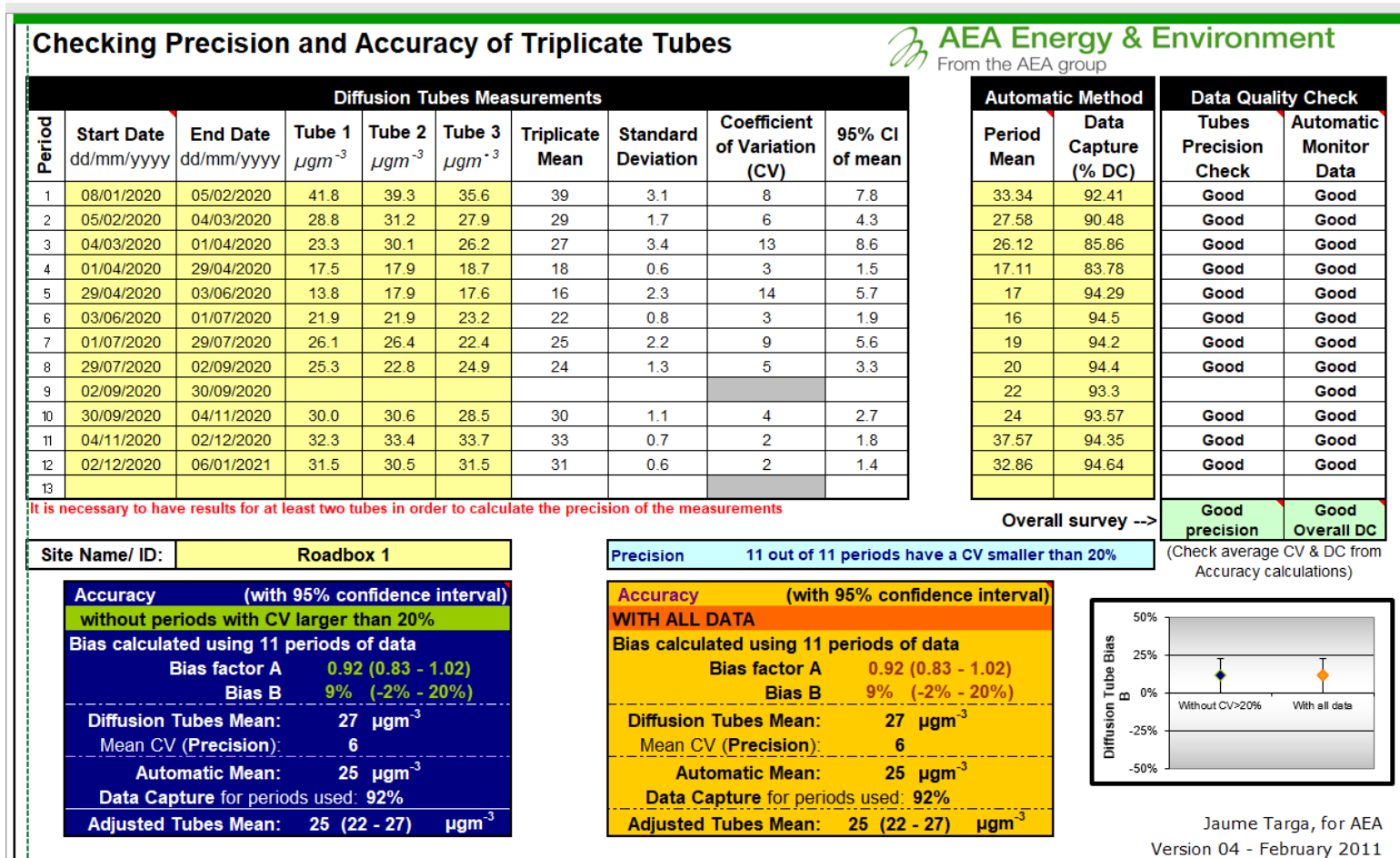
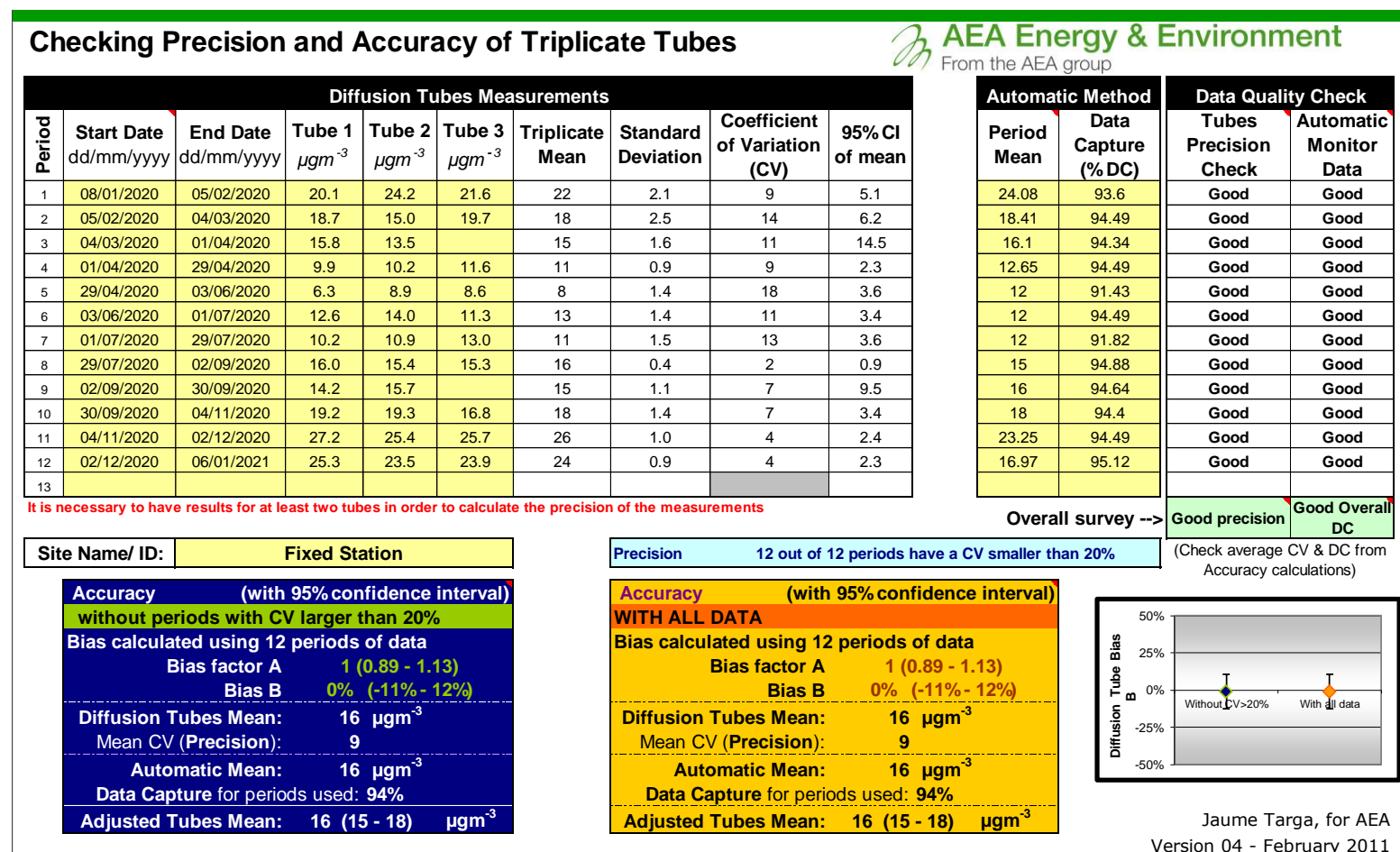


Figure 7 Co-location Study at Civic Offices Central Milton Keynes



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