Mallard Pass
Solar Farm

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Environmental Statement Volume 2 Appendix 15.1: Other Environmental Topics - Air Quality Monitoring Data

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15.0 Air Quality – Passive Diffusion Tube Monitoring Appendix

Introduction

15.1.1. Hoare Lea have been appointed to undertake passive diffusion tube monitoring at six locations in the vicinity of the Order Limits to determine site-specific baseline annual mean NO_2 concentrations.

15.1.2. This appendix sets out the approach for the Air Quality Monitoring of the area surrounding the Order Limits and the results obtained during the monitoring period.

Methodology

15.1.3. Site-specific monitoring of baseline NO_2 concentrations was undertaken using passive diffusion tubes in triplicate over a 6-month period, with concentrations reported as an annualised mean.

15.1.4. Diffusion tubes were supplied and analysed by Gradko International, which participates in the National Diffusion Tube Inter-laboratory scheme. Gradko International is a UKAS accredited laboratory, which ensures conformance with the requirements of ISO/IEC 17025. All diffusion tubes used in the monitoring study were prepared using 20% triethanolamine (TEA) absorbent in water with NO_2 concentrations determined through spectrophotometrical analysis.

15.1.5. The monitoring and assessment has been undertaken with reference to the following documents:

- Local Air Quality Management and Technical Guidance (TG22) (2022);
- Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users Report to Defra and the Devolved Administrations. ED48673043. Issue 1a, Feb 2008; and

- The Defra LAQM webpages on diffusion tubes.

15.1.6. Baseline air quality monitoring has been undertaken in line with the National Diffusion Tube Monitoring Network calendar, as stipulated by Defra and in accordance with diffusion tube guidance. Monitoring was undertaken using passive diffusion tubes over a 6-month period between 2nd March 2022 and the 31st August 2022. Exposure dates respective of each sampling period are presented in Table 1.

Table 1 – Diffusion Tube Exposure Dates

Monitoring Period	Monitoring Period – Start Date	Monitoring Period – End Date
March 2022	02/03/2022	30/03/2022
April 2022	30/03/2022	04/05/2022
May 2022	04/05/2022	08/06/2022
June 2022	08/06/2022	06/07/2022
July 2022	06/07/2022	03/08/2022
August 2022	03/08/2022	31/08/2022

15.1.7. Six diffusion tube monitoring locations were selected within the vicinity of the Order Limits:

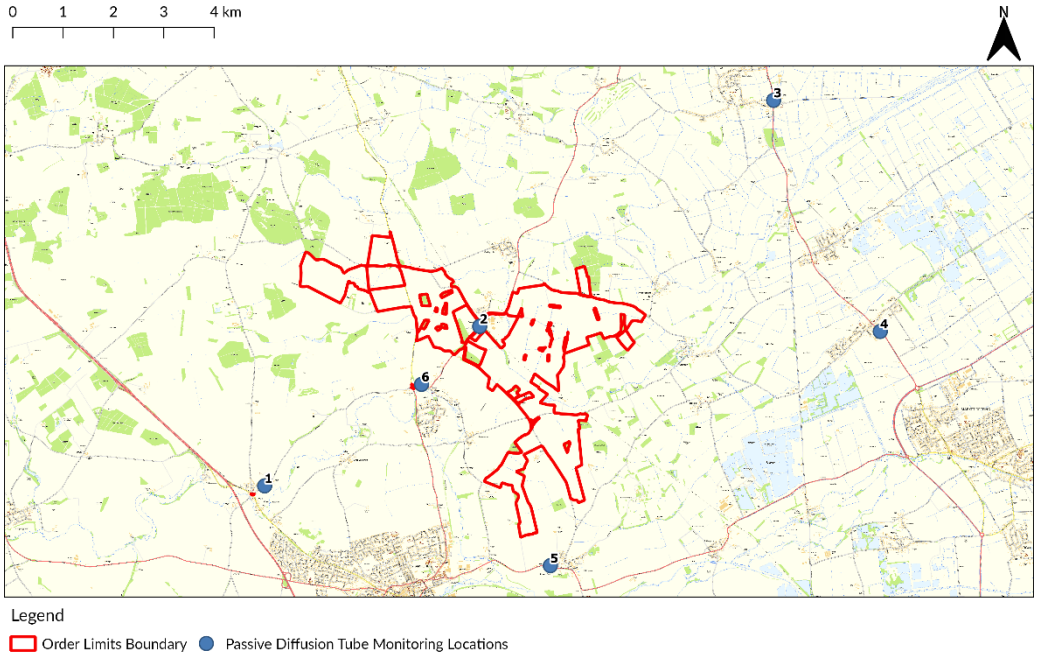
- Ryhall Road
- Stamford Road (A6121)
- 8 Main Road
- 26 Peterborough Road
- 37 Main Road
- Mill Road

Table 2 provides the exact locations of each diffusion tube monitoring location. Figure 1 displays the locations relative to the Order Limits.

Table 2 – Passive Diffusion Tube Monitoring Locations

Diffusion Tube ID	Monitoring Location Name	National Grid Reference (NGR)		Approximate Height Above Ground (m)	Approximate Distance to Road (m)
		X	Y		
1	Ryhall Road	500218	309282	1.7	2.6
2	Stamford Road	504504	312451	1.7	2.1
3	Main Road	510343	316933	1.6	3.2
4	Peterborough Road	512548	312252	1.7	3.0
5	Main Road	505908	307709	1.8	1.5
6	Mill Street	503349	311302	1.6	3.8

Figure 1 – Passive Diffusion Tube Monitoring Locations



15.1.8. Monitoring locations were selected in accordance with the methodology outlined in the Defra guidance 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users'.

15.1.9. As the data capture represents less than 75% of the year, annualization is required to estimate annual mean NO_2 concentrations. This was calculated using the 'Diffusion Tube Data Processing Tool v2.0' provided by LAQM.

Monitoring Results

15.1.10. Table 3 presents a summary of raw monitoring results for 6-month period.

15.1.11. Results for the August 2022 monitoring period are not available due to the diffusion tubes being lost in shipping to Gradko.

Table 3 – Raw Diffusion Tube Monitoring Results

Diffusion Tube Location	Diffusion Tube ID	NO_2 Concentration ($\mu g/m^3$)					
		March	April	May	June	July	August
Ryhall Road	1a	[a]	10.2	11.9	9.9	11.7	[b]
	1b	[a]	11.3	12.5	11.8	11.8	[b]
	1c	[a]	10.4	12.9	11.7	11.1	[b]
Stamford Road	2a	19.16	11.2	12.5	12.0	13.3	[b]
	2b	19.42	11.5	13.8	11.5	12.4	[b]
	2c	19.38	11.4	12.8	11.9	12.6	[b]
Main Road	3a	26.78	20.4	19.0	18.3	18.9	[b]
	3b	28.54	20.3	18.6	16.1	15.6	[b]
	3c	27.45	20.9	18.2	16.9	18.3	[b]

Peterborough Road	4a	24.35	12.9	[a]	8.2	11.2	[b]
	4b	23.88	13.2	[a]	9.0	11.1	[b]
	4c	22.18	13.0	[a]	8.9	10.7	[b]
Main Road	5a	21.75	12.2	15.4	13.2	13.5	[b]
	5b	21.00	13.3	15.1	13.3	13.8	[b]
	5c	21.43	13.9	15.1	13.1	13.8	[b]
Mill Street	6a	19.59	13.9	15.6	14.0	16.5	[b]
	6b	20.30	14.4	17.3	13.6	15.4	[b]
	6c	21.23	13.4	16.0	12.7	15.0	[b]

Note: [a] – diffusion tubes vandalised / [b] – diffusion tubes lost due to Royal Mail strikes

15.1.12. The raw NO_2 concentrations presented in Table 15.3 are mean monthly concentrations for March to August 2022 and are not directly comparable with annual mean NO_2 Air Quality Objective (AQO). In line with the methodology within the LAQM.TG(22); the results have been adjusted for the roadside NO_2 projection factors for 2021/22 and the period mean concentrations will be annualised based upon period:annual mean ratios across a single calendar year.

15.1.13. As per the requirements of LAQM.TG(22) 'background' AURN sites (of either 'suburban', 'urban' or 'rural' classification) with a minimum data capture of 85% and within representative locations, ideally 50 miles of the Order Limits have been selected. Due to a lack of representative AURN sites in the vicinity of the Order Limits, it has been necessary to select AURN sites at a greater distance than 50 miles, including:

- Wicken Fen
- Northampton Spring Park

- Leamington Spa
- Burton-on-Trent Horninglow

15.1.14. Table 4 shows the annualised and bias adjusted mean for the passive diffusion tube monitoring locations. They are also shown as a percentage of the annual mean NO_2 AQO of 40 µg/m^3.

Table 4 – Annualised and Bias Adjusted Annual Mean NO_2 Concentrations

Diffusion Tube ID	Monitoring Location Name	Raw Period Mean Concentration (µg/m^3)	Roadside NO_2 Projected Annual Mean Concentration (µg/m^3)	Bias Corrected Annual Mean Concentration (µg/m^3)	Percentage of Annual Mean NO_2 AQO (%)
1	Ryhall Road	11.4	12.1	13.9	34.8
2	Stamford Road	13.7	14.5	15.2	38.0
3	Main Road	20.3	21.5	22.6	56.5
4	Peterborough Road	14.1	14.9	15.9	39.8
5	Main Road	15.3	16.2	17.1	42.8
6	Mill Street	15.9	16.9	17.7	44.3

Notes:

- Adjusted using a roadside NO_2 projection factors of 1.05948 for 2021/2022 available from Defra.
- Annualised using a factor of 1.3726 for diffusion tube 1.
- Annualised using a factor of 1.2512 for diffusion tubes 2-6.
- Bias adjusted using a factor of 0.84 from the National Diffusion Tube Bias Spreadsheet value for Gradko 20% TEA in water.

15.1.15. Table 4 illustrates that the annualised and bias adjusted annual mean NO_2 concentrations at all 6 the diffusion tube monitoring locations do not exceed the annual mean NO_2 AQO. A maximum concentration of 22.6 $\mu g/m^3$ was recorded at diffusion tube monitoring location 3 which represents 56.5% of the annual mean NO_2 AQO.

Conclusions

15.1.16. Hoare Lea have undertaken passive diffusion tube monitoring at six locations in the vicinity of the Order Limits to determine site-specific baseline annual mean NO_2 concentrations.

15.1.17. Passive diffusion tube monitoring has been undertaken between March 2022 and August 2022.

15.1.18. Annualised and bias adjusted NO_2 concentrations have been calculated for the available data in line with LAQM.TG(22) guidance.

15.1.19. Results show that NO_2 concentrations at all 6 the diffusion tube monitoring locations do not exceed the annual mean NO_2 AQO.

References

Defra (2012) Technical and Supporting Guidance

Defra (2016) Technical and Supporting Guidance, Defra

Defra (2022) Diffusion Tube Data Processing Tool v2.0 (March 2022)

Defra (2021) Diffusion Tube Bias Adjustment Factors Spreadsheet. Spreadsheet Version Number 06/21.

Defra (2022). Local Air Quality Management Technical Guidance (LAQM.TG12)

Defra (2008) Diffusion tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users, Section 3.2 p. 8.

Defra (2022) Roadside NO_2 Projection Factors