



DCO Submission

Environmental Statement

Chapter 4: Air Quality and Odour

Appendix 4.2: Air Quality No2 Diffusion Tube Monitoring Survey

Document 6.4B

On behalf of

Oxfordshire Railfreight Limited

Prepared by Phlorum
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Appendix 4.2: Air Quality Nitrogen Dioxide Diffusion Tube Monitoring Survey

Monitoring Programme

In 2021 and 2025, Site-specific nitrogen dioxide (NO₂) diffusion tube monitoring surveys were undertaken by BWB Consulting Limited.

The first NO₂ diffusion tube monitoring programme was deployed on 29th September 2021 for a period of six months, with monitoring decommissioned on 30th March 2022 ('2021 survey').

An additional three months of monitoring was undertaken for the period between March 2025 and June 2025 ('2025 survey') to further inform baseline conditions in the vicinity of the Application Site and study area.

The annualisation and bias adjustment data for the 2021 survey and the more recent 2025 survey are discussed separately in this Appendix.

Monitoring Locations

Monitoring was undertaken at nine locations within the vicinity of the Application Site. Diffusion tubes MS 1, MS 2 and MS 3 represent a triplicate diffusion tube site.

Diffusion tubes were located in close proximity to the primary road network surrounding the Application Site to determine baseline pollutant concentrations in the vicinity of the Application Site. In addition, two monitoring locations were located adjacent to minor roads, away from any of the predominant pollutant sources in the study area, to determine background pollutant concentrations in the vicinity of the Application Site.

The diffusion tube monitoring locations are detailed in Table 4.2.1 and are illustrated in Figure 4.1 of the main ES chapter.

Table 4.2.1: Diffusion Tube Locations

Diffusion Tube	Grid Reference X	Grid Reference Y	Height (m)	Monitoring Type
Ardley 1	454296.9	227486.7	2.2	Roadside
Ardley 2	454026.3	227454.6	2.3	Roadside
UH 1	451729.0	225722.3	2.3	Background
Bicester 1	456320.2	222768.4	2.2	Roadside
MS 1	453393.4	223559.7	2.8	Roadside
MS 2			2.8	Roadside
MS 3			2.8	Roadside
MS 4	453247.1	223561.1	2.3	Background
Weston 1	453357.2	218710.7	2.3	Roadside
Ardley 3	454269.4	227369.9	2.2	Roadside
UH 2	451729.0	225722.3	2.2	Roadside

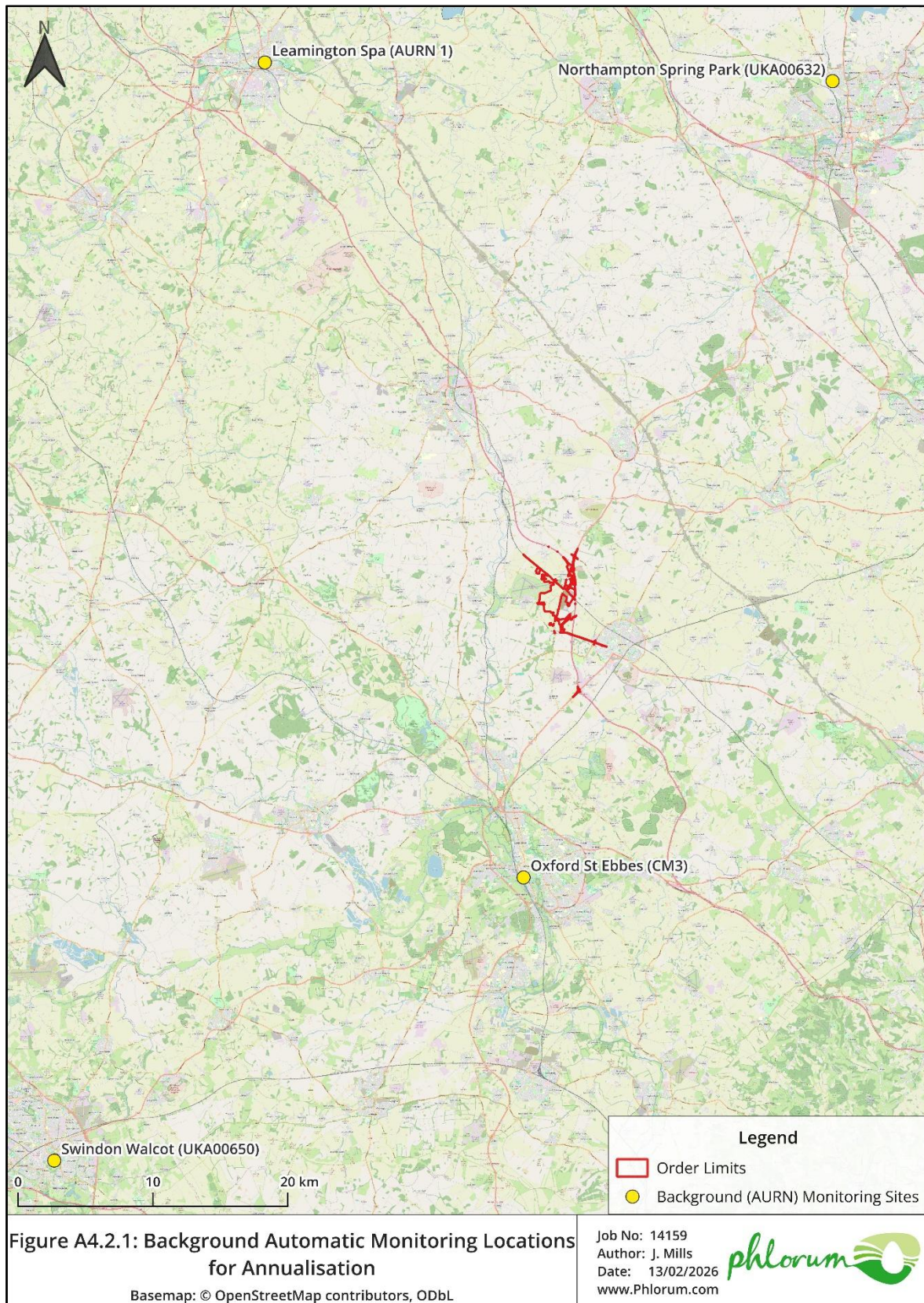
Monitoring Data Annualisation (2021 Survey)

Annualisation of the NO₂ monitoring data obtained from both surveys was undertaken in accordance with guidance provided by Defra in the Local Air Quality Management Technical Guidance (LAQM.TG22)¹.

In accordance with the Defra guidance, four existing background continuous analyser monitoring locations were identified within 50 miles of the Application Site for use in the annualisation process. The continuous analysers utilised were the Northampton, Leamington Spa, Swindon Alcot and Oxford St Ebbes analysers, as detailed in Figure 4.2.1.

¹ Department for Environment Food & Rural Affairs (2022). Local Air Quality Management Technical Guidance (TG22).

Figure 4.2.1: Background Automatic Monitoring Stations for Annualisation



The NO₂ diffusion tube monitoring programme for the first survey was undertaken between September 2021 and March 2022. The 2021 annual NO₂ mean concentration and a period NO₂ mean concentration for October 2021 to March 2022 were utilised within the annualisation process for each continuous analyser, to derive an average ratio that was applied to the period mean NO₂ concentrations monitored by the diffusion tubes in the vicinity of the Application Site.

The monitored monthly NO₂ concentrations in the vicinity of the Application Site and the derived period means are detailed in Table 4.2.2.

Table 4.2.2: Monitored Monthly NO₂ Concentrations (2021 Survey)

Diffusion Tube	Monitored Monthly Average NO ₂ Concentration (µg.m ⁻³)						Calculated Period Mean
	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	
Ardley 1	22.2	26.5	22.1	31.3	19.4	25.0	24.4
Ardley 2	11.8	12.7	11.8	17.2	10.0	15.9	13.2
UH 1	7.2	-	11.2	16.4	8.1	13.0	11.2
Bicester 1	20.2	21.5	-	26.8	16.2	23.1	21.6
MS 1	13.2	14.6	13.1	17.4	10.7	16.9	14.3
MS 2	13.4	15.1	14.2	17.5	11.2	18.3	15.0
MS3	13.1	15.1	14.6	17.8	10.5	18.4	14.9
MS 4	8.3	10.3	10.5	15.6	7.7	14.2	11.1
Weston 1	14.0	17.0	13.3	19.8	11.9	19.3	15.9
Ardley 3	23.3	21.8	20.2	26.0	15.0	26.3	22.1
UH 2	11.6	14.9	13.0	18.5	11.4	17.8	14.5

The annualisation process is detailed in Table 4.2.3.

Table 4.2.3: Derivation of Annualisation (2021 Survey)

AURN Background Monitors	Monitored Average NO ₂ Concentration (µg.m ⁻³)		Ratio	Annualisation Factor
	Annual Mean	Period Mean		
Northampton	10.1	12.8	0.8	0.77
Leamington	2.4	4.8	0.5	
Swindon Alcot	10.4	8.1	1.3	
Oxford St Ebbes	4.1	8.0	0.5	

The annualisation factor was applied to the monitored period mean at the diffusion tubes. Bias adjustment was undertaken using the national bias adjustment factor for 2021 of 0.84, as detailed in Table 4.2.4.

Table 4.2.4: Derivation of Bias Adjusted Annual Mean NO₂ Concentrations (2021 Survey)

Diffusion Tube	Monitored Average NO ₂ Concentration (µg.m ⁻³)			Annual Mean NO ₂ Objective (µg.m ⁻³)
	Period Mean	Annual Mean	Bias Adjusted Annual Mean	
Ardley 1	24.4	18.8	15.8	40
Ardley 2	13.2	10.2	8.5	
UH 1	11.2	8.6	7.2	
Bicester 1	21.6	16.6	13.9	
MS 1	14.3	11.0	9.2	
MS 2	15.0	11.5	9.7	
MS3	14.9	11.5	9.6	
MS 4	11.1	8.5	7.2	
Weston 1	15.9	12.2	10.2	
Ardley 3	22.1	17.0	14.3	
UH 2	14.5	11.2	9.4	

Monitoring Data Annualisation (2025 Survey)

The NO₂ diffusion tube monitoring programme for the second survey was undertaken between March 2025 and May 2025. The 2024 annual NO₂ mean concentration and a period NO₂ mean concentration for March 2024 to May 2024 were utilised within the annualisation process for each continuous analyser, to derive an average ratio that was applied to the period mean NO₂ concentrations monitored by the diffusion tubes in the vicinity of the Application Site.

The monitored monthly NO₂ concentrations in the vicinity of the Application Site and the derived period means are detailed in Table 4.2.5.

Table 4.2.5: Monitored Monthly NO₂ Concentrations (2025 Survey)

Diffusion Tube	Monitored Monthly Average NO ₂ Concentration (µg.m ⁻³)			
	Mar 2025	Apr 2025	May 2025	Calculated Period Mean
Ardley 1	17.8	17.7	13.6	16.4
Ardley 2	16.0	11.6	7.2	11.6
UH 1	17.8	9.9	6.0	11.2
Bicester 1	22.1	17.0	15.2	18.1
MS 1/2/3	16.4	13.2	11.1	13.6
MS 4	12.5	11.1	5.8	9.8
Weston 1	19.8	12.8	8.6	13.7
Ardley 3	12.2	20.0	15.1	15.7
UH 2	18.3	17.6	9.6	15.2

The annualisation process is detailed in Table 4.2.6.

Table 4.2.6: Derivation of Annualisation (2025 Survey)

AURN Background Monitors	Monitored Average NO ₂ Concentration (µg.m ⁻³)		Ratio	Annualisation Factor
	Annual Mean	Period Mean		
Northampton	9.2	7.9	1.16	1.15
Leamington	12.7	10.5	1.20	
Swindon Alcot	7.6	6.8	1.11	
Oxford St Ebbes	9.0	8.2	1.11	

The annualisation factor was applied to the monitored period mean at the diffusion tubes. Bias adjustment was undertaken using the national bias adjustment factor for 2024 of 0.84, as detailed in Table 4.2.7.

Table 4.2.7: Derivation of Bias Adjusted Annual Mean NO₂ Concentrations (2025 Survey)

Diffusion Tube	Monitored Average NO ₂ Concentration (µg.m ⁻³)			Annual Mean NO ₂ Objective (µg.m ⁻³)
	Period Mean	Annual Mean	Bias Adjusted Annual Mean	
Ardley 1	16.4	18.8	15.8	40
Ardley 2	11.6	13.3	11.2	
UH 1	11.2	12.9	10.8	
Bicester 1	18.1	20.8	17.4	
MS 1/2/3	13.6	15.6	13.1	
MS 4	9.8	11.2	9.4	
Weston 1	13.7	15.7	13.2	
Ardley 3	15.7	18.1	15.2	
UH 2	15.2	17.4	14.6	

Conclusion

Monitored annual mean NO₂ concentrations in the vicinity of the Application Site were below the annual mean NO₂ objective of 40µg.m⁻³ at all monitoring locations for both survey periods. Details regarding the use of the results of the NO₂ monitoring programme within the air quality assessment and associated background and model verification process are provided in the main ES Chapter and Appendix 4.4.



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