Heathrow

EASTERLY ALTERNATION INFRASTRUCTURE PROJECT

Environmental Impact Assessment
Environmental Statement, Volume III
Appendix 6.4: Air Quality Longford Monitoring Survey

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1. Introduction

1.1.1 This Appendix presents the methodology and results of a nitrogen dioxide (NO_2) diffusion tube monitoring survey, that was undertaken between July 2023 and June 2024 at 11 sites in Longford. The results are summarised in **Chapter 6: Air Quality**.

2. Monitoring methodology

2.1 Monitoring locations

2.1.1 A twelve-month NO_2 diffusion tube monitoring survey was undertaken between July 2023 and June 2024 at 11 sites, in alignment with the Department for Environment, Food and Rural Affairs (Defra) NO_2 diffusion tube monitoring calendar[1]. At each location, a duplicate monitoring site was installed. The locations of the diffusion tubes are shown in **Figure 6.4.1** (**Appendix 6.3: Air Quality Figures**) and described in **Table 6.4.1**, alongside their respective heights and distances from the kerb of the nearest road.

Table 6.4.1 Description of diffusion tube locations

Site ID	Site type [a]	Number of diffusion tubes	Height (m)	Approximate distance from kerb (m)
L1	Airport	3	2.4	11.6
L2	Roadside	2	2.0	15.2
L3	Roadside	2	2.1	16.9
L4	Roadside	2	2.3	2.0
L5	Kerbside	1	2.3	0.7
L6	Roadside	2	1.9	9.4
L7	Airport	2	2.0	18.9
L8	Roadside	2	2.2	4.5
L9	Roadside	2	2.3	2.6
L10	Airport	2	2.2	16.0
L11	Airport	2	3.7	34.3

[a] Defined based on guidance provided by Defra[2].

[1] Department for Environment, Food and Rural Affairs, (2024). *Air Quality Web Pages* [online]. Available at: https://laqm.defra.gov.uk/air-quality-assessment/ (Accessed 16 October 2024)
[2] Department for Environment, Food and Rural Affairs, (2022). *Review & Assessment: Technical Guidance LAQM.TG22 August 2022 Version* [online]. Available at: https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf (Accessed 16 October 2024)

2.2 Methodology

2.2.1 Monitoring has been carried out using diffusion tubes, prepared and analysed by Gradko International Limited using a 20:80 mixture of triethanolamine (TEA) and water.

Post-processing

2.2.2 The raw monthly monitoring results and raw average are not directly representative of annual mean concentrations without undergoing an appropriate data correction involving time-weighted averaging, annualisation and bias adjustment.

Time weighting

2.2.3 The concentration of NO_2 absorbed by each diffusion tube is dependent on the time period the diffusion tube was exposed to the air. The raw results have therefore been weighted according to the number of days in the specific period of time during which each diffusion tube was exposed. This allows accurate analysis of period mean results from diffusion tubes which were exposed for varying time periods.

Annualisation

2.2.4 The measured NO_2 concentrations have been adjusted to represent an annual mean at one site (L7) as the data capture was below 75% of a calendar year. The approach followed is that recommended by Defra in Box 7.9 of its LAQM.TG(22) guidance[2].

2.2.5 The method involves the use of data from a number of nearby automatic background NO_2 monitoring stations to calculate a ratio between the annual mean NO_2 concentration and the period mean NO_2 concentration. The annual mean is the 2023 annual average, and the period mean is the period over which diffusion tube data was available. This overall factor has then been applied to the time-weighted period mean diffusion tube monitoring results in order to provide an equivalent 2023 annual mean concentration this monitoring site.

2.2.6 The calculation of the annualisation factor is provided in **Table 6.4.2** below.

2.2.7 At other sites, the presented results represent the twelve-month period mean for July 2023–June 2024.

Bias adjustment

2.2.8 The NO_2 concentrations have been bias adjusted using a factor of 0.85, obtained from Defra's national bias adjustment spreadsheet[1]. The bias adjustment factor was calculated based on 33 national studies of Gradko 20:80 TEA in water diffusion tubes co-located with an automatic analyser in 2022.

2.2.9 The factor indicates that, prior to adjustment, Gradko 20:80 TEA in water diffusion tubes typically overestimate NO_2 concentrations by 17.6% (1 / 0.85).

3. Monitoring results

3.1.1 The processed annual mean NO_2 results from each of the diffusion tubes are presented in **Table 6.4.2** below. Also presented are the results for the T55 Heathrow Green Gates automatic monitor, with which the L1 diffusion tube site is co-located.

Table 6.4.2 NO_2 Diffusion tube data ($\mu g/m^3$)

Site ID	Monthly Mean												% Data Capture	Weighted Mean [c]	Bias Adjusted Mean (factor = 0.85)
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12			
L1 [a]	16.8	20.2	25.6	26.6	23.9	16.6	23.3	20.8	23.3	16.4	18.0	16.0	100	20.7	17.6
L2 [b]	16.5	18.9	24.4	25.2	23.3	17.1	21.8	20.6	22.5	14.8	17.3	15.7	100	19.9	16.9
L3 [b]	16.6	19.3	24.4	25.8	24.3	17.0	21.5	20.0	21.7	15.0	16.4	16.1	100	19.9	16.9
L4 [b]	27.9	30.4	36.1	35.5	32.6	25.3	28.8	29.2	32.9	23.7	24.5	27.7	95.8	29.6	25.1
L5	29.1	30.0	N/A	35.3	32.8	26.9	29.7	29.0	30.0	24.3	23.8	25.8	100	28.8	24.5
L6 [b]	20.7	23.2	28.6	27.9	25.2	19.4	23.5	22.9	24.1	16.9	20.6	19.3	100	22.8	19.4
L7 [b]	18.5	20.5	24.8	25.1	25.4	N/A	N/A	N/A	N/A	N/A	18.2	16.3	54.2	20.9	20.6 [d]
L8 [b]	26.1	26.8	33.6	34.2	32.9	24.5	28.1	25.5	28.8	21.5	N/A	N/A	70.8	28.2	24.0
L9 [b]	30.5	31.1	36.8	36.4	34.7	26.6	30.5	29.6	27.3	24.7	25.1	27.1	95.8	29.8	25.3
L10 [b]	N/A	N/A	32.6	32.3	27.9	23.6	25.5	27.2	27.0	21.8	21.2	22.8	83.3	26.2	22.3
L11 [b]	N/A	N/A	34.4	33.8	29.4	25.8	25.7	29.7	28.3	21.9	18.7	21.2	79.2	26.9	22.8
T55 [e]	13.7	19.0	24.1	24.1	22.2	13.7	24.0	19.7	21.8	13.4	18.8	15.4	71.3	19.3	-

[a] Average of triplicate diffusion tube site.

[b] Average of duplicate diffusion tube site.

[c] Prior to bias adjustment.

[d] Annualised using a factor of 1.156.

[e] T55 Heathrow Green Gates automatic monitor.