
APPENDIX 5.1: AIR QUALITY MONITORING TECHNICAL NOTE

TECHNICAL NOTE

Project:	North & East MMDR				
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P01	16/05/2018	Carl Ramskill	Elisha Coutts	Marlene Segre

1 Introduction

- 1.1 AECOM carried out scheme-specific air quality monitoring for the North & East Melton Mowbray Distributor Road (referred to as the Scheme herein) on behalf of Leicestershire County Council from July 2017 to January 2018. This monitoring programme involves the use of nitrogen dioxide (NO₂) diffusion tubes which were changed on a monthly basis.
- 1.2 This NO₂ monitoring survey has been undertaken to inform whether air quality is likely to be a significant risk to the development of the Scheme.
- 1.3 The monitoring results have been compared against the annual mean NO₂ Air Quality Strategy (AQS) objective of 40µg/m³ to determine the potential risk of air quality issues affecting the deliverability of the Scheme.
- 1.4 Air quality monitoring sites were strategically located on accessible and suitable structures such as street furniture, whilst the annual mean NO₂ AQS objective is only applicable at locations representative of relevant long term exposure (such as residences, schools and hospitals). Whilst designing the monitoring survey, the selected sites have been chosen to be as representative as possible of exposure locations, and professional judgement has been applied to determine the indicative risk of exceedance.
- 1.5 This monitoring report displays the NO₂ data for July 2017 to January 2018. The data have been adjusted to represent an annual average for 2016, as this is the baseline year for the air quality assessment for the proposed Scheme. This provides an indication of baseline air quality in the Scheme study area that is representative of current air quality conditions.

2 2. Monitoring Results Summary

- 2.1 Measurement data was collected at 8 locations. Each location had triplicate diffusion tubes.
- 2.2 Figure 1 illustrates the location of the monitoring sites - further information relating to each of the monitoring sites is presented in Table 1 and Appendix A.

Table 1. AECOM NO₂ Monitoring Location Details

Site ID	X Co-ordinate	Y Co-ordinate	Site Description	Site Classification
AECOM_DT1	474263	320956	Winchester Drive	Intermediate
AECOM_DT2	475202	321078	Scalford Road	Roadside
AECOM_DT3	476409	320088	A607 Thorpe Road	Roadside
AECOM_DT4	477016	320134	A607 Thorpe Road	Roadside
AECOM_DT5	476202	317497	Burton Road	Roadside
AECOM_DT6	476791	316866	Melton Road	Roadside
AECOM_DT7	476087	319142	Saxby Road	Roadside
AECOM_DT8	477366	319297	Saxby Road	Roadside

2.3 The raw air quality monitoring results for July 2017 to January 2018 are presented in Table 2 for each of the triplicate tubes. The bias-adjusted average results for each triplicate tube are presented in Table 3 and adjusted annual average for each measurement location in Table 5.

Table 2. Six Month NO₂ Diffusion Tube Monitoring Results (July 2017 to January 2018)

Site ID	NO ₂ Concentration (µg/m ³)						
	Month 1 (Jul - Aug)	Month 2 (Aug - Sep)	Month 3 (Sep - Oct)	Month 4 (Oct - Nov)	Month 5 (Nov - Dec)	Month 6 (Dec - Jan)	Average
AECOM_DT1_A	13.6	16.2	16.8	21.4	25.4	22.3	19.3
AECOM_DT1_B	12.4	15.7	17.1	22.6	23.9	26.4	19.7
AECOM_DT1_C	12.9	15.9	17.5	21.2	26.9	25.2	19.9
AECOM_DT2_A	16.2	20.2	22.3	25.5	30.0	27.2	23.6
AECOM_DT2_B	16.5	20.7	22.7	24.8	29.6	27.3	23.6
AECOM_DT2_C	16.4	20.0	23.3	28.4	28.3	25.3	23.6
AECOM_DT3_A	22.8	24.4	24.9	32.9	29.9	30.0	27.5
AECOM_DT3_B	21.3	24.7	27.3	34.7	26.1	34.4	28.1
AECOM_DT3_C	21.3	25.3	25.6	33.4	34.9	33.7	29.0
AECOM_DT4_A	18.8	24.3	25.0	28.5	29.7	25.5	25.3
AECOM_DT4_B	18.3	25.2	26.4	27.3	28.9	26.5	25.4

Site ID	NO ₂ Concentration (µg/m ³)						
	Month 1 (Jul - Aug)	Month 2 (Aug - Sep)	Month 3 (Sep - Oct)	Month 4 (Oct - Nov)	Month 5 (Nov - Dec)	Month 6 (Dec - Jan)	Average
AECOM_DT4_C	19.0	23.7	24.8	28.3	28.6	17.6	23.7
AECOM_DT5_A	12.9	17.1	18.4	22.8	24.2	24.5	20.0
AECOM_DT5_B	13.2	15.6	18.5	22.0	26.2	24.5	20.0
AECOM_DT5_C	14.1	16.6	18.5	22.1	26.1	20.3	19.6
AECOM_DT6_A	26.5	30.5	32.0	*	43.0	30.6	32.5
AECOM_DT6_B	26.4	30.5	32.3	33.1	*	31.5	30.8
AECOM_DT6_C	25.3	29.8	*	36.2	41.2	32.0	32.9
AECOM_DT7_A	26.2	29.4	30.5	31.6	36.2	34.3	31.4
AECOM_DT7_B	24.7	31.4	30.3	31.6	34.2	31.9	30.7
AECOM_DT7_C	25.1	31.1	30.3	33.1	36.9	33.5	31.7
AECOM_DT8_A	11.1	15.5	17.2	17.8	26.3	27.5	19.2
AECOM_DT8_B	11.6	15.9	17.5	18.8	25.3	27.3	19.4
AECOM_DT8_C	10.5	15.6	16.5	17.3	26.6	25.5	18.7

*Tube was missing in this month.

- 2.4 An updated bias adjustment spreadsheet for 2016 was published by Defra in March 2017. The spreadsheet was used to obtain a bias adjustment factor for the laboratory used, namely Staffordshire Scientific Services, using 20% TEA in water results for 2016 with the 'overall bias adjustment factor' option selected. This provided a bias adjustment factor of 0.91 which was applied to the averaged concentrations in Table 2.
- 2.5 The bias adjusted mean concentrations are provided in Table 3 for the monitoring period July 2017 to January 2018 for each diffusion tube.

Table 3. Bias Adjusted Annual Mean NO₂ Results for Each Diffusion Tube

Site ID	Bias Adjusted 6 Month Average Concentration (µg/m ³)
AECOM_DT1_A	17.5
AECOM_DT1_B	17.9
AECOM_DT1_C	18.1
AECOM_DT2_A	21.4
AECOM_DT2_B	21.5
AECOM_DT2_C	21.5
AECOM_DT3_A	25.0
AECOM_DT3_B	25.6

Site ID	Bias Adjusted 6 Month Average Concentration ($\mu\text{g}/\text{m}^3$)
AECOM_DT3_C	26.4
AECOM_DT4_A	23.0
AECOM_DT4_B	23.1
AECOM_DT4_C	21.5
AECOM_DT5_A	18.2
AECOM_DT5_B	18.2
AECOM_DT5_C	17.9
AECOM_DT6_A	29.6
AECOM_DT6_B	28.0
AECOM_DT6_C	29.9
AECOM_DT7_A	28.5
AECOM_DT7_B	27.9
AECOM_DT7_C	28.8
AECOM_DT8_A	17.5
AECOM_DT8_B	17.7
AECOM_DT8_C	17.0

2.6 As the monitoring was not undertaken for a full year, the average results for each triplicate site have been annualised to obtain an annual mean for the year 2016 as this is the baseline year for the air quality assessment. Annualisation factors were determined for nearby rural/background measurement sites, and an average was taken of these for an overall annualisation factor of 1.07. Monitoring locations used to determine this annualisation factor are shown in Table 4.

Table 4. Continuous Monitoring Locations Used For Annualisation

Monitoring Location	Annualisation Factor
Market Harborough	1.09
Nottingham Centre	1.04
Leicester University	1.06
Average	1.07

2.7 The adjusted annual mean concentrations of NO_2 for each location are illustrated in Table 5.

Table 5. Adjusted Annual Average NO_2 Results for Each Monitoring Location

Site ID	Bias Adjusted and Annualised 2016 Average Concentration ($\mu\text{g}/\text{m}^3$)
AECOM_DT1	19.1
AECOM_DT2	23.0
AECOM_DT3	27.5
AECOM_DT4	24.1
AECOM_DT5	19.3
AECOM_DT6	31.2
AECOM_DT7	30.4
AECOM_DT8	18.6

- 2.8 Based on 6 months monitoring from July 2017 to January 2018, adjusted annual average concentrations did not exceed the NO_2 annual mean air quality objective value of $40 \mu\text{g}/\text{m}^3$ at any site.
- 2.9 For these 6 months, none of the monitoring sites had a representative annual average NO_2 concentration within 10 % of the objective value (i.e. between 36 and $40 \mu\text{g}/\text{m}^3$).

3 Conclusions

- 3.1 Measurement data has been collected over a 6 month period, and annualised to represent a full calendar year. The data collected shows all measurement sites below the objective value.
- 3.2 This measurement data will be utilised within the air quality assessment of the proposed Scheme.

Appendix A **Air Quality Monitoring Locations**

Site Details	Diffusion Tube ID	AECOM DT_1
	Site Name	Winchester Drive
	Grid Reference	474263, 320956
	Site Description	Fixed to a lamp post on Winchester Drive approximately 15 m west of Nottingham Road.
	Observations	
	Sampler	NO ₂ Diffusion Tube
	Commissioned	20/07/2017
	Decommissioned	10/01/2018



		
		

Site Details	Diffusion Tube ID	AECOM_DT2
	Site Name	Scaford Road
	Grid Reference	475202, 321078
	Site Description	Fixed to a lamp post on Scaford Road just off the corner of Brockington Road.
	Observations	
	Sampler	NO ₂ Diffusion Tube
	Commissioned	20/07/2017
	Decommissioned	10/01/2018





Site Details	Diffusion Tube ID	AECOM_DT3
	Site Name	Thorpe Road
	Grid Reference	476409, 320088
	Site Description	Fixed to a lamp post on Thorpe Road just off the corner of Bowley Avenue.
	Observations	Temporary traffic lights nearby during first month
	Sampler	NO ₂ Diffusion Tube
	Commissioned	20/07/2017
	Decommissioned	10/01/2018





Site Details	Diffusion Tube ID	AECOM_DT4
	Site Name	Thorpe Road
	Grid Reference	477016, 320134
	Site Description	Fixed to a lamp post on Thorpe Road opposite Lag Lane.
	Observations	
	Sampler	NO ₂ Diffusion Tube
	Commissioned	20/07/2017
	Decommissioned	10/01/2018





Site Details	Diffusion Tube ID	AECOM_DT5
	Site Name	Burton Road
	Grid Reference	476202, 317497
	Site Description	Fixed to a lamp post on Burton Road near Kirby Road.
	Observations	
	Sampler	NO ₂ Diffusion Tube
	Commissioned	20/07/2017
	Decommissioned	10/01/2018

Site Details	Diffusion Tube ID	AECOM_DT6
	Site Name	Melton Road
	Grid Reference	476791, 316866
	Site Description	Fixed to a lamp post on Melton Road, near New Road and opposite Child Close.
		Observations
Sampler		NO ₂ Diffusion Tube
Commissioned		20/07/2017
Decommissioned		10/01/2018

 A photograph showing a wet asphalt street on an overcast day. On the left side of the street, there is a brick wall topped with a dark metal railing. A utility pole stands in front of the wall. In the background, a yellow sign for 'Orfy-Co' is visible, listing services like 'Paints', 'Epoxy', 'Garage', 'Stains', and 'Sealants'. A person in a yellow safety vest is walking on the sidewalk in the distance.		
 A photograph of a wet street from a different angle. A utility pole is in the foreground on the right. A red car is parked on the side of the road, partially obscured by a brick wall and a metal railing. The street is wet and reflects the overcast sky. Trees and bushes are visible in the background.		

Site Details	Diffusion Tube ID	AECOM_DT7
	Site Name	Saxby Road
	Grid Reference	476087, 319142
	Site Description	Fixed to a lamp post on Saxby Road.
	Observations	
	Sampler	NO ₂ Diffusion Tube
	Commissioned	20/07/2017
	Decommissioned	10/01/2018

Site Details	Diffusion Tube ID	AECOM_DT8
	Site Name	Saxby Road
	Grid Reference	477366, 319297
	Site Description	Fixed to a lamp post on Saxby Road, outside of residential area.
		Observations
Sampler		NO ₂ Diffusion Tube
Commissioned		20/07/2017
Decommissioned		10/01/2018



LEGEND

● AECOM Monitoring Sites

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Client:
Leicestershire County Council

Project:
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AECOM NO₂ Monitoring Locations

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Design:	CR	Drawn:	CR
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A3