

Appendix 7.1 - Air Quality Dispersion Modelling Inputs
Riverpark Road, Newton Heath, Manchester

Client: Kellen Homes and Great Places Housing Group
Reference: 7719



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1.1 Introduction

- 1.1.1 The Proposed Development has the potential to cause air quality impacts as a result of exhaust emissions associated with vehicles travelling to and from the Site during the operational phase, as well as expose future residents to any existing air quality issues. In order to assess nitrogen dioxide (NO₂), particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀) and particulate matter with an aerodynamic diameter of less than 2.5µm (PM_{2.5}) concentrations at sensitive locations, detailed dispersion modelling was undertaken in accordance with the following methodology.

1.2 Dispersion Model

- 1.2.1 Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0.1.3). ADMS-Roads is developed by Cambridge Environmental Research (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and the Department for Environment Food and Rural Affairs (DEFRA).

- 1.2.2 The model required input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street width;
- Meteorological data;
- Roughness length (z₀); and,
- Monin-Obukhov length.

- 1.2.3 The following Sections detail the relevant inputs utilised in the assessment.

1.3 Assessment Area

- 1.3.1 Ambient concentrations were predicted over National Grid Reference (NGR): 386200, 397320 to 397320, 400580. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package.
- 1.3.2 Reference should be made to **Figure 7.2.6** in **Appendix 7.2** for a map of the assessment area.

1.4 Traffic Flow Data

- 1.4.1 Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition as Heavy Duty Vehicle (HDV) proportion, was provided by Curtins, the Transport Consultants for the project.
- 1.4.2 Baseline traffic data was not available for a number of links included within the modelling extents. As such, data for these roads was obtained from the Department for Transport (DfT)¹. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network, as well as selected minor roads, in Great Britain for the years 1999 to 2023. It should be noted that the DfT web tool is referenced in DEFRA guidance² as being a suitable source of data for air quality assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the Site.
- 1.4.3 The baseline traffic data was converted to the site opening year utilising a factor obtained from TEMPro (version 8.0). This software package has been developed by the DfT to calculate future traffic growth throughout the UK.
- 1.4.4 It should be noted that the modelling was based on 594 apartments and 183 dwellings. The scheme has since been revised and reduced to circa 500 units. However, the assessment has been completed based on trips from the larger scheme in order to provide a worst-case appraisal.

¹ <https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints>.

² Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

1.4.5 Road widths and vehicle speeds were estimated from aerial photography and UK highway design standards. A summary of the traffic flow data is provided in Table 7.1.1.

Table 7.1.1 Traffic Data

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2023	2026 DM	2026 DS			
L1	A6010 northbound (NB), south of A635 junction, Slow Phase (SP)	13,928	14,447	14,556	3.39	10.6	20
L2	A6010 southbound (SB), south of A635 junction	13,928	14,447	14,556	3.39	8.8	45
L3	A6010 NB, slip road to A635 Ashton Old Road, SP	2,786	2,889	2,889	3.39	4.2	20
L4	A635 Ashton Old Road, westbound (WB)	13,042	13,528	13,637	4.17	7.2	45
L5	A635 Ashton Old Road, between Whitehurst Drive and Brennock Close	26,084	27,057	27,275	4.17	11.9	45
L6	A635 Ashton Old Road, between Brennock Close and Rylance Street, WB, SP	13,042	13,528	13,637	4.17	6.5	20
L7	A635 Ashton Old Road, east of Stainforth Street, EB	13,042	13,528	13,637	4.17	6.6	35
L8	A635 Ashton Old Road, west of Stainforth Street, SP	13,042	13,528	13,637	4.17	9.5	20
L9	A635 Ashton Old Road, between Rylance Street and Lime Bank Street	26,084	27,057	27,275	4.17	11.7	45
L10	A635 Ashton Old Road, east of Lime Bank Street, SP	26,084	27,057	27,275	4.17	12.3	20
L11	A635 Ashton Old Road, west of Lime Bank Street, SP	26,084	27,057	27,275	4.17	17.0	20
L12	A635 Ashton Old Road, EB, SP	13,042	13,528	13,637	4.17	10.4	20
L13	A635 Ashton Old Road, EB, east of junction, SP	13,042	13,528	13,528	4.17	10.5	20
L14	A635 Ashton Old Road, EB, west of junction	10,123	10,500	10,500	3.84	7.2	45
L15	A635 Ashton Old Road, EB, between A6010 junction and Turing Close	10,123	10,500	10,609	3.84	6.9	45

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2023	2026 DM	2026 DS			
L16	A635 Ashton Old Road, WB, east of junction, SP	10,123	10,500	10,609	3.84	10.6	20
L17	A635 Ashton Old Road, WB, towards A6010, SP	4,049	4,200	4,200	3.84	6.3	20
L18	A635 Ashton Old Road, west of Store Street	20,245	21,000	21,218	3.84	11.2	45
L19	A635 Ashton Old Road, west of Cornwall Street, SP	20,245	21,000	21,218	3.84	12.7	20
L20	A6010 Alan Turing Way, slip road to A635 Ashton Old Road, SP	4,291	4,343	4,452	3.27	6.1	20
L21	A6010 Alan Turing Way, towards A6010 south of junction, SB, SP	21,454	21,713	21,931	3.27	7.8	20
L22	A635 Ashton Old Road, slip road to A6010 Alan Turing Way, SP	2,608	2,706	2,815	4.17	5.9	20
L23	A6010 Alan Turing Way, towards A6010 south of junction, NB	21,454	21,713	21,931	3.27	8.4	45
L24	A6010 Alan Turing Way, NB, south of Wilson Street	21,454	21,713	22,040	3.27	6.9	45
L25	A6010 Alan Turing Way, NB, south of Wilson Street, SP	21,454	21,713	22,040	3.27	11.5	20
L26	A6010 Alan Turing Way, NB, north of Wilson Street	21,454	21,713	22,040	3.27	6.6	45
L27	A6010 Alan Turing Way, SB, south of Wilson Street	21,454	21,713	22,040	3.27	6.6	45
L28	A6010 Alan Turing Way, SB, north of Wilson Street, SP	21,454	21,713	22,040	3.27	11.3	20
L29	A6010 Alan Turing Way, SB, south of A662 Ashton New Road Junction	21,454	21,713	22,040	3.27	6.8	45
L30	A662 Ashton New Road, approach to A662 SB, SP	2,512	2,542	2,542	5.48	4.6	20
L31	A662 Ashton New Road, westbound (WB), SP	12,561	12,712	12,712	5.48	9.3	20
L32	A662 Ashton New Road, eastbound (EB)	12,561	12,712	12,712	5.48	8.4	45

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2023	2026 DM	2026 DS			
L33	A662 Ashton New Road, SP	25,121	25,424	25,424	5.48	12.6	20
L34	A662 Ashton New Road	25,121	25,424	25,593	5.48	11.2	45
L35	A6010 Alan Turing Way, approach to A662 Ashton New Road, SP	4,291	4,343	4,343	3.27	5.9	20
L36	A662 Ashton New Road, WB	12,821	12,976	13,010	3.58	8.7	45
L37	A662 Ashton New Road, west of junction	25,643	25,952	26,021	3.58	11.0	45
L38	A662 Ashton New Road, SP	25,643	25,952	26,021	3.58	7.6	20
L39	A662 Ashton New Road, EB, SP	12,821	12,976	13,010	3.58	9.0	20
L40	A662 Ashton New Road, EB, between slip roads	12,821	12,976	12,976	3.58	10.6	35
L41	A6010 Alan Turing Way, NB, south of slip road	18,923	19,151	19,478	3.23	8.4	45
L42	A662 Ashton New Road, slip road to A6010 Alan Turing Way, SP	2,564	2,595	2,630	3.58	6.1	20
L43	A6010 Alan Turing Way, slip road to A662 Ashton New Road, EB, SP	3,785	3,830	3,830	3.23	6.1	20
L44	A6010 Alan Turing Way, approach to A662 junction, SB, SP	18,923	19,151	19,512	3.23	8.2	20
L45	A6010 Alan Turing Way, NB, north of A622 junction	18,923	19,151	19,512	3.23	7.0	45
L46	A6010 Alan Turing Way, NB, SP, south of Briscoe Lane	18,923	19,151	19,512	3.23	7.0	20
L47	A6010 Alan Turing Way, NB, SP, north of Briscoe Lane	14,813	14,992	15,223	4.49	6.7	20
L48	A6010 Hulme Hall Lane, NB, south of Queens Road	14,813	14,992	15,223	4.49	7.3	45
L49	A6010 Hulme Hall Lane, NB, south of Queens Road, SP	14,813	14,992	15,223	4.49	12.5	20
L50	A62 Oldham Road, SP	13,797	14,312	14,543	8.18	14.1	20
L51	A62 Oldham Road	13,797	14,312	14,543	8.18	13.6	45

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2023	2026 DM	2026 DS			
L52	A6010 Queens Road, north of A62 Oldham Road	7,799	8,090	8,321	3.22	10.7	45
L53	A6010 Queens Road, NB, north of right turn slip road	7,799	8,090	8,206	3.22	5.6	45
L54	A6010 Queens Road	16,020	16,618	16,849	3.15	9.2	45
L55	A6010 Queens Road, SB, north of right turn slip road	8,221	8,528	8,643	3.09	6.5	45
L56	A6010 Queens Road, right turn slip road, SP	780	809	925	3.22	6.4	20
L57	A6010 Queens Road, south of right turn slip road, SP	8,221	8,528	8,759	3.09	9.8	20
L58	A62 Oldham Road, between Queens Road, SP	23,488	24,364	24,364	4.59	13.6	20
L59	A62 Oldham Road, east of Queens Road, SP	23,488	24,364	24,364	4.59	13.4	20
L60	A62 Oldham Road, east of Queens Road	23,488	24,364	24,364	4.59	13.1	45
L61	A62 Oldham Road, north of Grimshaw Lane, SP	23,488	24,364	24,364	4.59	16.3	20
L62	A62 Oldham Road, east of Grimshaw Lane	23,488	24,364	24,364	4.59	14.5	45
L63	A62 Oldham Road, west of Ten Acres Lane, SP, EB	11,744	12,182	12,182	4.59	12.2	20
L64	Ten Acres Lane to A62 Oldham Road, EB	7,099	7,184	7,334	1.52	15.5	35
L65	A62 Oldham Road, WB, west of Ten Acres Lane, SP	11,744	12,182	12,182	4.59	8.8	20
L66	A62 Oldham Road, EB, east of Ten Acres Lane, SP	11,744	12,182	12,332	4.59	13.4	20
L67	A62 Oldham Road, EB, east of Ten Acres Lane	11,744	12,182	12,332	4.59	9.9	45
L68	A62 Oldham Road	23,488	24,364	24,664	4.59	13.6	45
L69	A62 Oldham Road, WB, east of Ten Acres Lane, SP	11,744	12,182	12,332	4.59	14.8	20

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2023	2026 DM	2026 DS			
L70	A6010 Queens Road, SB, south of A62 Oldham Road	14,813	14,992	15,223	4.49	11.2	45
L71	A6010 Queens Road, SB, slip road to NB, SP	2,963	2,998	2,998	4.49	8.3	20
L72	A6010 Hulme Hall Lane, SB, SP	14,813	14,992	15,223	4.49	6.2	20
L73	A6010 Alan Turing Way, SB, SP, north of Gibbon Street	18,923	19,151	19,512	3.23	8.9	20
L74	A6010 Alan Turing Way, SB, south of Gibbon Street	18,923	19,151	19,512	3.23	6.5	45
L75	A6010 Alan Turing Way, SB, south of Gibbon Street, SP	18,923	19,151	19,512	3.23	12.6	20
L76	Briscoe Lane, approach to A6010 Alan Turing Way, NB	10,971	11,104	12,289	2.46	8.2	45
L77	Briscoe Lane, SP	21,943	22,207	23,393	2.46	12.2	20
L78	Briscoe Lane, west of River Park Road	21,943	22,207	23,393	2.46	9.5	30
L79	Briscoe Lane, east of River Park Road	20,271	20,516	20,944	2.49	9.2	30
L80	Briscoe Lane, east of River Park Road, SP	20,271	20,516	20,944	2.49	8.1	20
L81	Ten Acres Lane, north of Briscoe Lane, SP	14,197	14,368	14,668	1.52	7.5	20
L82	Ten Acres Lane, south of Oldham Road, SP	14,197	14,368	14,668	1.52	13.3	20
L83	Briscoe Lane, east of Ten Acres Lane, SP	15,010	15,190	15,435	2.58	8.0	20
L84	Briscoe Lane, east of Ten Acres Lane	15,010	15,190	15,435	2.58	8.0	30
L85	Ten Acres Lane, south of Briscoe Lane, SP	10,001	10,122	10,309	0.90	10.1	20
L86	Ten Acres Lane, north of Riverpark Road	10,001	10,122	10,309	0.90	7.5	20
L87	Bank Street	11,926	12,069	12,239	1.36	6.7	30
L88	Bank Street, SP	11,926	12,069	12,239	1.36	8.6	20

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2023	2026 DM	2026 DS			
L89	Riverpark Road, SP	2,436	2,465	2,822	2.59	17.3	20
L90	Riverpark Road between site access 1 and 6	2,436	2,465	4,080	2.59	9.4	30
L91	Riverpark Road, north of access 1, SP	2,436	2,465	4,080	2.59	15.8	20

- 1.4.6 Reference should be made to **Figure 7.2.6** in **Appendix 7.2** for a graphical representation of the road link locations.

1.5 **Emission Factors**

- 1.5.1 Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 12.1). This has been produced by DEFRA and incorporates COPERT 5.6 vehicle emission factors and fleet information. Emission factors for 2023 were utilised for the verification model.
- 1.5.2 There is current uncertainty over NO₂ concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2023 emission factors were utilised in preference to the development opening year in the DM and DS models order to provide robust outputs. As predictions for 2023 were verified, it is considered the results are a robust indication of worst-case concentrations for the future year.

1.6 **Meteorological Data**

- 1.6.1 Meteorological data used in the assessment was taken from Manchester Airport meteorological station over the period 1st January 2023 to 31st December 2023 (inclusive). Manchester Airport meteorological station is located at NGR: 381792, 384116 which is approximately 14.8km south-west of the development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

- 1.6.2 All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to **Figure 7.2.7** in **Appendix 7.2** for a wind rose of the utilised meteorological data.

1.7 **Roughness Length**

- 1.7.1 The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 0.5m was used to describe the modelling extents. This is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'parkland, open suburbia'.
- 1.7.2 A z_0 of 0.2m to describe the meteorological site. This is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'agricultural areas (min)'.

1.8 **Monin-Obukhov Length**

- 1.8.1 The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe the modelling extents and meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

1.9 **Background Concentrations**

- 1.9.1 Annual mean NO₂, PM₁₀ and PM_{2.5} background concentrations used in the assessment were obtained from the DEFRA mapping study for the grid square containing the CAP_MANC_133, 134 and 135 monitors, NGR: 385500, 397500. These are shown in Table 7.1.2.

Table 7.1.2 Background Pollutant Concentrations - Modelling Extents

Pollutant	Predicted 2023 Background Concentration (µg/m ³)
NO ₂	16.72
PM ₁₀	13.90
PM _{2.5}	7.97

1.9.2 The values were chosen to represent concentrations throughout the dispersion modelling extents without the contribution from road vehicles as they were higher than the DEFRA backgrounds for the grid squares containing the site, as shown in **Chapter 7, Table 7.11**.

1.9.3 Similarly to emission factors, background concentrations from 2023 were utilised throughout the assessment in preference to the development opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the Proposed Development.

1.10 NO_x to NO₂ Conversion

1.10.1 Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 9.1) provided by DEFRA, which is the method detailed within DEFRA guidance 'Local Air Quality Management Technical Guidance (TG22)'³.

1.11 Model Verification

1.11.1 It is necessary to compare the modelled results versus monitored results at relevant locations to enable the adjustment of model outputs and minimise the inherent uncertainties associated with dispersion modelling. The predicted results from a dispersion model may differ from measured concentrations for a number of reasons, including:

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;
- Variations in meteorological conditions;
- Overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

1.11.2 Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

1.11.3 For the purpose of the assessment, model verification was undertaken for 2023 using traffic data, meteorological data and monitoring results from this year.

³ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

- 1.11.4 Monitoring of NO₂ concentrations was undertaken at five monitors in the vicinity of roads included within the modelling extents during 2023. The results were obtained and the road contributions to total NO_x concentrations calculated following the methodology contained within DEFRA guidance⁴. The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table 7.1.3.

Table 7.1.3 NO_x Verification - Monitoring Results

Monitoring Site		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
MA28NO	Ashton Old Road	26.90	14.33
MA95BNO	Ashton Old Road	31.50	26.24
CAP_MANC_133	A635 Fairfield Street	35.29	36.92
CAP_MANC_134	A635 Fairfield Street	37.41	43.28
CAP_MANC_135	A635 Fairfield Street	38.43	46.46

- 1.11.5 The annual mean road NO_x concentrations predicted from the dispersion model and the calculated 2023 road NO_x monitoring results are summarised in Table 7.1.4.

Table 7.1.4 NO_x Verification - Modelling Results

Monitoring Site		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
MA28NO	Ashton Old Road	14.33	8.93
MA95BNO	Ashton Old Road	26.24	15.31
CAP_MANC_133	A635 Fairfield Street	36.92	15.51
CAP_MANC_134	A635 Fairfield Street	43.28	11.43
CAP_MANC_135	A635 Fairfield Street	46.46	17.28

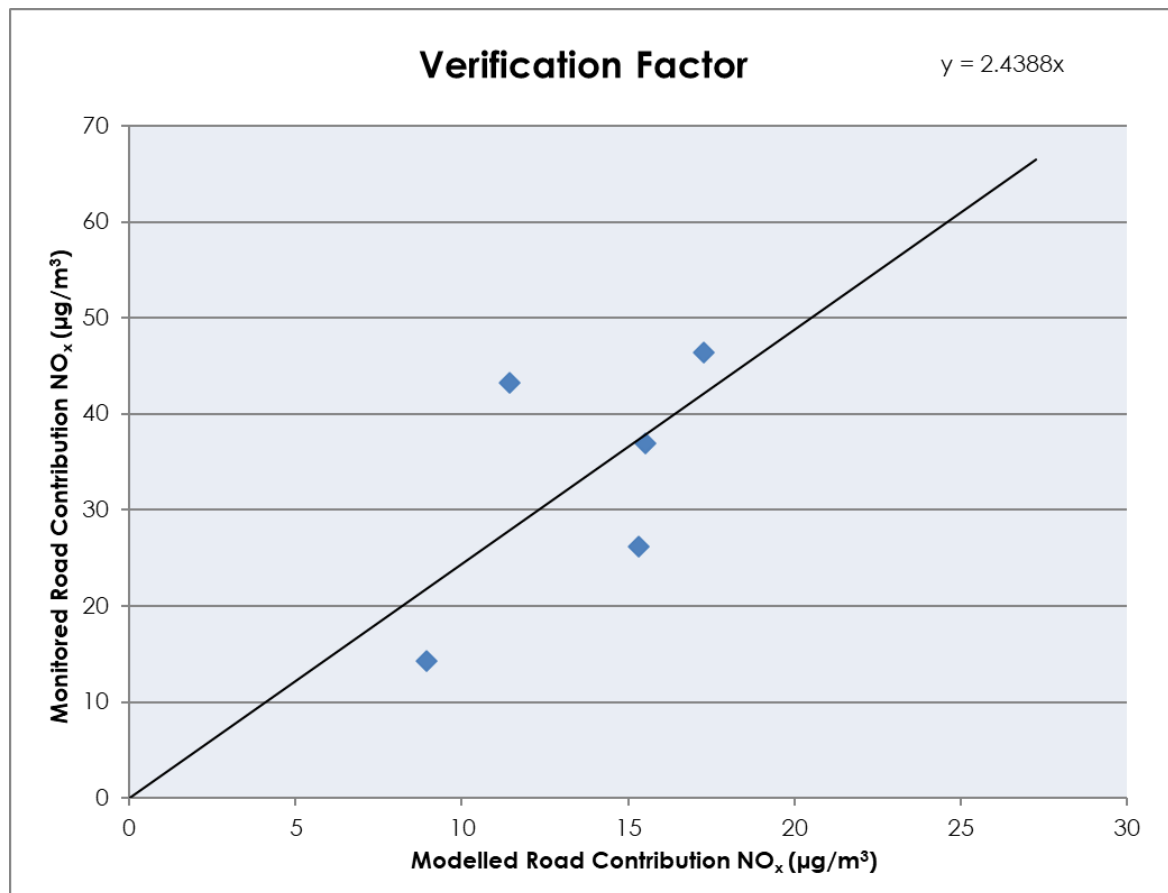
- 1.11.6 The monitored and modelled road NO_x concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated a

⁴ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

verification factor of 2.4388 was required to be applied to all road NO_x modelling results, as shown in Graph 1.

1.11.7 Monitoring of PM₁₀ and PM_{2.5} concentrations is not undertaken within the assessment extents. The NO₂ verification factor was therefore used to adjust model predictions of these species in lieu of more accurate data in accordance with DEFRA guidance⁵.

Graph 1 Verification Factor



⁵ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.