



## APPENDIX II ADMS-ROADS ASSESSMENT INPUT DATA



## **ADMS ROADS INPUTS**

The proposed development has the potential to expose future site users to elevated pollutant levels, as well as cause impacts to sensitive locations. In order to assess NO<sub>2</sub> and PM<sub>10</sub> concentrations across the site, detailed dispersion modelling was undertaken in accordance with the following methodology.

### **Input Data**

The dispersion model requires 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; and
- ▶ Monin-Obukhov length.

Assessment inputs are described in the following subsections.

### **Dispersion Model**

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 4.0.1.0). ADMS-Roads is developed by Cambridge Environmental Research Consultants (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 London.

### **Assessment Area**

Ambient concentrations were predicted over the area NGR: 518940, 178110 to 519350, 178520 at the following heights:

- ▶ 2.25m - Ground Floor;
- ▶ 6.10m - First Floor;
- ▶ 9.20m - Second Floor;
- ▶ 12.40m - Third Floor;
- ▶ 15.50m - Fourth Floor; and
- ▶ 56.50m -Seventeenth Floor.

Results were subsequently used to produce contour plots within the Surfer software package.

Reference should be made to Figure 20 within Appendix I for a graphical representation of the assessment grid extents.



## Traffic Flow Data

Traffic data for use in the assessment, including committed development flows and flows associated with the proposals, was provided by Peter Brett Associates LLP, the appointed Transport Consultant for the project.

The provided data did not include a number of roads within the surrounding road network. As such, 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition, was obtained from the London Atmospheric Emissions Inventory (LAEI). The updated version of the LAEI (2013) was released by the Greater London Authority (GLA) in 2016 and provides information on emissions from all sources of air pollutants in the Greater London area.

Growth factors provided by the Trip End Model Presentation Program (TEMPO) software package were utilised to allow for conversion from the obtained 2013 traffic flow year to 2016, which was used for model verification, and to 2023, which was used to represent the development opening year.

Road widths were estimated from aerial photography and UK highway design standards. Reference should be made to Figure 20 within Appendix I for a graphical representation of the road link locations. A summary of the traffic data used in the verification scenarios is provided in Table AII.1

**Table AII.1      2016 Traffic Data**

Road Link		Elevation of Road (m)	Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
L1	Capital Interchange Way	0.0	6.9	1,462	11.91	40.0
L1a	Capital Interchange Way	0.0	6.9	1,462	11.91	40.0
L1b	Capital Interchange Way - A4 Jct	0.0	9.9	1,462	11.91	15.0
L1c	Capital Interchange Way - A205 Slip off	0.0	4.9	731	11.91	15.0
L1d	Capital Interchange Way - A205 Slip on	0.0	4.4	731	11.91	15.0
L2	A205 (S Circular Rd)	0.0	11.4	26,311	6.78	30.0
L2a	A205 (S Circular Rd) - A205/A315 Jct Slip off	0.0	7.8	13,156	6.78	25.0
L2b	A205 (S Circular Rd) - A205/A315 Jct Slip on	0.0	10.4	13,156	6.78	15.0
L3	A205 (S Circular Rd) - Eastbound	0.0	7.3	13,156	6.78	30.0
L3a	A205 (S Circular Rd) - Eastbound - Slow Down	0.0	7.6	13,156	6.78	15.0
L3b	A205 (S Circular Rd) - Eastbound	0.0	6.8	13,156	6.78	30.0



Road Link		Elevation of Road (m)	Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
L3c	A205 (S Circular Rd) - Eastbound - Chiswick Roundabout Jct	0.0	9.5	13,156	6.78	15.0
L4	A205 (S Circular Rd) - Westbound	0.00	7.1	13,156	6.78	30.0
L4a	A205 (S Circular Rd) - Westbound - A300 Jct	0.00	7.3	13,156	6.78	15.0
L4b	A205 (S Circular Rd) - Westbound	0.00	7.3	13,156	6.78	30.0
L4c	A205 (S Circular Rd) - Westbound - Chiswick Roundabout Jct	0.00	6.1	13,156	6.78	15.0
L5	A315 (Kew Bridge Rd)	0.00	11.1	21,344	7.08	40.0
L5a	A315 (Kew Bridge Rd) - A205/A315 Jct Slip off	0.00	5.2	10,672	7.08	25.0
L5b	A315 (Kew Bridge Rd) - A205/A315 Jct Slip on	0.00	9.1	10,672	7.08	15.0
L6	A315 (High St)	0.00	8.1	21,344	7.08	40.0
L6a	A315 (High St) - Westbound	0.00	6.3	10,672	7.08	40.0
L6b	A315 (High St) - Eastbound	0.00	6.6	10,672	7.08	40.0
L6c	A315 (High St) - W of B455	0.00	8.0	21,032	5.70	40.0
L6d	A315 (High St) - W of A3002	0.00	7.8	19,300	9.14	40.0
L7	A315 (London Rd)	0.00	9.9	18,764	6.54	40.0
L8	A205 (S Circular Rd)	0.00	10.5	36,788	6.25	40.0
L8a	A205 (S Circular Rd) - A205/A315 Jct Slip off	0.00	9.0	18,451	6.65	25.0
L8b	A205 (S Circular Rd) - A205/A315 Jct Slip on	0.00	5.3	18,459	6.69	15.0
L9	A205/315 Jct	0.00	6.5	6,578	6.78	15.0
L9a	A205/315 Jct	0.00	6.4	6,578	6.78	15.0
L10	A205/315 Jct	0.00	4.2	9,230	6.69	15.0
L10a	A205/315 Jct	0.00	6.5	9,230	6.69	15.0
L11	A205/315 Jct	0.00	4.9	5,336	7.08	15.0



Road Link		Elevation of Road (m)	Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
L11a	A205/315 Jct	0.00	6.5	5,336	7.08	15.0
L12	A3000 (Wellesley Rd) - A205 Jct	0.00	6.7	8,029	1.63	15.0
L12a	A3000 (Wellesley Rd)	0.00	8.6	8,029	1.63	30.0
L13	A315 (Chiswick High Rd)	0.00	10.9	15,779	9.91	30.0
L13a	A315 (Chiswick High Rd) - Chiswick Roundabout Slip off	0.00	6.1	7,890	9.92	25.0
L13b	A315 (Chiswick High Rd) - Chiswick Roundabout Slip on	0.00	9.4	7,890	9.92	15.0
L14	A4 (Cedars Rd/Great West Rd) - Westbound	9.50	8.8	47,057	3.76	50.0
L14a	A4 (Great West Rd) - Westbound - S of Jct 1 - Slip off	4.75	7.6	5,283	3.76	30.0
L14b	A4 (Great West Rd) - Westbound - S of Jct 1 - Slip off	0.00	7.7	5,283	3.76	15.0
L15	A4 (Cedars Rd/Great West Rd) - Eastbound	9.50	8.9	47,057	3.76	50.0
L15a	A4 (Great West Rd) - Eastbound - S of Jct 1 - Slip on	4.75	4.9	5,283	3.76	30.0
L15b	A4 (Great West Rd) - Eastbound - S of Jct 1 - Slip on	0.00	7.8	5,283	3.76	15.0
L16	M4 - Westbound	9.50	7.4	41,774	4.35	50.0
L16a	M4 - Westbound - Jct 2	9.50	15.7	41,774	4.35	50.0
L16b	M4 - Westbound - W of Jct 2	9.50	7.1	43,858	4.31	65.0
L17	M4 - Eastbound	9.50	7.3	41,774	4.35	50.0
L17a	M4 - Eastbound - Jct 2	9.50	16.7	41,774	4.35	50.0
L17b	M4 - Eastbound - W of Jct	9.50	7.1	43,858	4.31	65.0
L18	A4 (Great West Rd) - Westbound - N of Jct 1	0.00	9.4	20,979	4.66	40.0
L18a	A4 (Great West Rd) - Westbound - N of Jct 1 - Chiswick Roundabout Jct	0.00	7.3	20,979	4.66	25.0
L18b	A4 (Great West Rd) - Westbound - W of Jct 2	0.00	9.4	19,147	7.33	50.0
L18c	A4 (Great West Rd) - Westbound - B452 Jct	0.00	9.4	19,147	7.33	15.0



Road Link		Elevation of Road (m)	Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
L18d	A4 (Great West Rd) - Westbound - W of B452	0.00	9.4	19,147	7.33	40.0
L18e	A4 (Great West Rd) - Westbound - A3002 Jct	0.00	9.3	19,147	7.33	15.0
L18f	A4 (Great West Rd) - Westbound - W of A3002	0.00	9.2	25,245	3.06	50.0
L19	A4 (Great West Rd) - Eastbound - N of Jct 1	0.00	8.8	20,979	4.66	40.0
L19a	A4 (Great West Rd) - Eastbound - N of Jct 1 - Chiswick Roundabout Jct	0.00	11.0	20,979	4.66	15.0
L19b	A4 (Great West Rd) - Eastbound - W of Jct 2	0.00	9.1	19,147	7.33	50.0
L19c	A4 (Great West Rd) - Eastbound - B452 Jct	0.00	11.5	19,147	7.33	15.0
L19d	A4 (Great West Rd) - Eastbound - W of B452	0.00	9.9	19,147	7.33	40.0
L19e	A4 (Great West Rd) - Eastbound - A3002 Jct	0.00	9.5	19,147	7.33	15.0
L19f	A4 (Great West Rd) - Eastbound - W of A3002	0.00	9.5	25,245	3.06	50.0
L20	A406 (N Circular Rd)	0.00	11.5	44,152	5.54	40.0
L20a	A406 (N Circular Rd) - Slip off Chiswick Roundabout	0.00	5.9	22,553	7.54	25.0
L20b	A406 (N Circular Rd) - Slip on Chiswick Roundabout	0.00	8.3	22,140	5.81	15.0
L21	B455 (Ealing Road) - S of M4	0.00	8.0	10,625	7.02	30.0
L21a	B455 (Ealing Road) - N of M4	0.00	7.7	14,307	6.11	30.0
L22	A3002 ( Half Acre)	0.00	7.4	9,135	11.61	30.0
L22a	A3002 ( Boston Manor Rd) - S of A4	0.00	6.6	8,866	8.92	30.0
L22b	A3002 ( Boston Manor Rd) - S of A4 - A4 Jct	0.00	14.8	8,866	8.92	15.0
L22c	A3002 ( Boston Manor Rd) - N of A4 - A4 Jct	0.00	13.9	18,191	5.53	15.0
L22d	A3002 ( Boston Manor Rd) - N of A4	0.00	11.0	18,191	5.53	30.0
L23	B452 ( Windmill Rd) - S of A4	0.00	6.7	2,682	12.98	30.0
L23a	B452 ( Windmill Rd) - S of A4 - A4 Jct	0.00	7.0	2,682	12.98	15.0
L23b	B452 ( Windmill Rd) - N of A4 - A4 Jct	0.00	7.1	8,875	6.81	15.0



Road Link		Elevation of Road (m)	Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
L23c	B452 ( Windmill Rd) - N of A4	0.00	6.8	8,875	6.81	30.0
R1	Chiswick Roundabout	0.00	10.4	8,367	15.05	20.0
R1a	Chiswick Roundabout	0.00	10.4	14,902	7.79	20.0
R1b	Chiswick Roundabout	0.00	10.4	14,902	7.79	20.0
R1c	Chiswick Roundabout	0.00	10.4	14,903	7.80	20.0
R1d	Chiswick Roundabout	0.00	10.4	7,826	9.19	20.0
L24	Strand-On-The-Green	0.00	10.8	9,415	5.46	25.0
L25	Lionel Rd S	0.00	6.0	1,347	3.67	25.0

The elevation of the road, road width and mean vehicle speed shown in Table All.1 remained the same for 2023. A summary of the 2023 traffic data is shown in Table All.2.

**Table All.2 2023 Traffic Data**

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L1	Capital Interchange Way	2,226	7.91	2,312	7.91
L1a	Capital Interchange Way	2,701	6.52	2,738	6.52
L1b	Capital Interchange Way - A4 Jct	2,226	7.91	2,312	7.91
L1c	Capital Interchange Way - A205 Slip off	1,351	6.52	1,369	6.52
L1d	Capital Interchange Way - A205 Slip on	1,351	6.52	1,369	6.52
L2	A205 (S Circular Rd)	30,049	6.51	30,086	6.51
L2a	A205 (S Circular Rd) - A205/A315 Jct Slip off	15,025	6.51	15,043	6.51
L2b	A205 (S Circular Rd) - A205/A315 Jct Slip on	15,025	6.51	15,043	6.51
L3	A205 (S Circular Rd) - Eastbound	15,025	6.51	15,043	6.51
L3a	A205 (S Circular Rd) - Eastbound - Slow Down	15,025	6.51	15,043	6.51



Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L3b	A205 (S Circular Rd) - Eastbound	15,025	6.51	15,043	6.51
L3c	A205 (S Circular Rd) - Eastbound - Chiswick Roundabout Jct	15,025	6.51	15,043	6.51
L4	A205 (S Circular Rd) - Westbound	15,025	6.51	15,043	6.51
L4a	A205 (S Circular Rd) - Westbound - A300 Jct	15,025	6.51	15,043	6.51
L4b	A205 (S Circular Rd) - Westbound	15,025	6.51	15,043	6.51
L4c	A205 (S Circular Rd) - Westbound - Chiswick Roundabout Jct	15,025	6.51	15,043	6.51
L5	A315 (Kew Bridge Rd)	22,758	7.08	22,767	7.08
L5a	A315 (Kew Bridge Rd) - A205/A315 Jct Slip off	11,379	7.08	11,384	7.08
L5b	A315 (Kew Bridge Rd) - A205/A315 Jct Slip on	11,379	7.08	11,384	7.08
L6	A315 (High St)	22,758	7.08	22,767	7.08
L6a	A315 (High St) - Westbound	11,379	7.08	11,384	7.08
L6b	A315 (High St) - Eastbound	11,379	7.08	11,384	7.08
L6c	A315 (High St) - W of B455	22,426	5.70	22,435	5.70
L6d	A315 (High St) - W of A3002	20,579	9.14	20,588	9.14
L7	A315 (London Rd)	20,007	6.54	20,016	6.54
L8	A205 (S Circular Rd)	39,225	6.25	39,229	6.25
L8a	A205 (S Circular Rd) - A205/A315 Jct Slip off	19,673	6.65	19,675	6.65
L8b	A205 (S Circular Rd) - A205/A315 Jct Slip on	19,682	6.69	19,684	6.69
L9	A205/315 Jct	7,207	6.78	7,216	6.78
L9a	A205/315 Jct	7,207	6.78	7,216	6.78
L10	A205/315 Jct	9,841	6.69	9,842	6.69
L10a	A205/315 Jct	9,841	6.69	9,842	6.69
L11	A205/315 Jct	5,690	7.08	5,692	7.08
L11a	A205/315 Jct	5,690	7.08	5,692	7.08





Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L12	A3000 (Wellesley Rd) - A205 Jct	8,561	1.63	8,561	1.63
L12a	A3000 (Wellesley Rd)	8,561	1.63	8,561	1.63
L13	A315 (Chiswick High Rd)	16,824	9.91	16,835	9.91
L13a	A315 (Chiswick High Rd) - Chiswick Roundabout Slip off	8,412	9.92	8,418	9.92
L13b	A315 (Chiswick High Rd) - Chiswick Roundabout Slip on	8,412	9.92	8,418	9.92
L14	A4 (Cedars Rd/Great West Rd) - Westbound	50,472	3.73	50,481	3.73
L14a	A4 (Great West Rd) - Westbound - S of Jct 1 - Slip off	5,931	3.57	5,940	3.57
L14b	A4 (Great West Rd) - Westbound - S of Jct 1 - Slip off	5,931	3.57	5,940	3.57
L15	A4 (Cedars Rd/Great West Rd) - Eastbound	50,472	3.73	50,481	3.73
L15a	A4 (Great West Rd) - Eastbound - S of Jct 1 - Slip on	5,931	3.57	5,940	3.57
L15b	A4 (Great West Rd) - Eastbound - S of Jct 1 - Slip on	5,931	3.57	5,940	3.57
L16	M4 - Westbound	44,541	4.35	44,604	4.35
L16a	M4 - Westbound - Jct 2	44,541	4.35	44,604	4.35
L16b	M4 - Westbound - W of Jct 2	46,763	4.31	46,826	4.31
L17	M4 - Eastbound	44,541	4.35	44,541	4.35
L17a	M4 - Eastbound - Jct 2	44,541	4.35	44,541	4.35
L17b	M4 - Eastbound - W of Jct	46,763	4.31	46,763	4.31
L18	A4 (Great West Rd) - Westbound - N of Jct 1	23,283	4.60	23,369	4.60
L18a	A4 (Great West Rd) - Westbound - N of Jct 1 - Chiswick Roundabout Jct	23,283	4.60	23,369	4.60
L18b	A4 (Great West Rd) - Westbound - W of Jct 2	20,713	7.23	20,799	7.23
L18c	A4 (Great West Rd) - Westbound - B452 Jct	20,713	7.23	20,799	7.23



Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L18d	A4 (Great West Rd) - Westbound - W of B452	20,713	7.23	20,799	7.23
L18e	A4 (Great West Rd) - Westbound - A3002 Jct	20,713	7.23	20,799	7.23
L18f	A4 (Great West Rd) - Westbound - W of A3002	27,215	3.03	27,301	3.03
L19	A4 (Great West Rd) - Eastbound - N of Jct 1	23,283	4.60	23,283	4.60
L19a	A4 (Great West Rd) - Eastbound - N of Jct 1 - Chiswick Roundabout Jct	23,283	4.60	23,283	4.60
L19b	A4 (Great West Rd) - Eastbound - W of Jct 2	20,713	7.23	20,713	7.23
L19c	A4 (Great West Rd) - Eastbound - B452 Jct	20,713	7.23	20,713	7.23
L19d	A4 (Great West Rd) - Eastbound - W of B452	20,713	7.23	20,713	7.23
L19e	A4 (Great West Rd) - Eastbound - A3002 Jct	20,713	7.23	20,713	7.23
L19f	A4 (Great West Rd) - Eastbound - W of A3002	27,215	3.03	27,215	3.03
L20	A406 (N Circular Rd)	47,077	5.54	47,093	5.54
L20a	A406 (N Circular Rd) - Slip off Chiswick Roundabout	24,048	7.54	24,056	7.54
L20b	A406 (N Circular Rd) - Slip on Chiswick Roundabout	23,607	5.81	23,615	5.81
L21	B455 (Ealing Road) - S of M4	11,329	7.02	11,329	7.02
L21a	B455 (Ealing Road) - N of M4	15,254	6.11	15,254	6.11
L22	A3002 ( Half Acre)	9,740	11.61	9,740	11.61
L22a	A3002 ( Boston Manor Rd) - S of A4	9,453	8.92	9,453	8.92
L22b	A3002 ( Boston Manor Rd) - S of A4 - A4 Jct	9,453	8.92	9,453	8.92
L22c	A3002 ( Boston Manor Rd) - N of A4 - A4 Jct	19,396	5.53	19,396	5.53
L22d	A3002 ( Boston Manor Rd) - N of A4	19,396	5.53	19,396	5.53
L23	B452 ( Windmill Rd) - S of A4	2,859	12.98	2,859	12.98
L23a	B452 ( Windmill Rd) - S of A4 - A4 Jct	2,859	12.98	2,859	12.98
L23b	B452 ( Windmill Rd) - N of A4 - A4 Jct	9,463	6.81	9,463	6.81



Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L23c	B452 ( Windmill Rd) - N of A4	9,463	6.81	9,463	6.81
R1	Chiswick Roundabout	8,921	15.05	8,930	15.05
R1a	Chiswick Roundabout	15,889	7.79	15,908	7.79
R1b	Chiswick Roundabout	15,889	7.79	15,908	7.79
R1c	Chiswick Roundabout	15,891	7.80	15,909	7.80
R1d	Chiswick Roundabout	8,345	9.19	8,363	9.19
L24	Strand-On-The-Green	10,039	5.46	10,040	5.46
L25	Lionel Rd S	1,436	3.67	1,436	3.67

### Emission Factors

For the 2016 Verification, emission factors for each road link were calculated using the relevant traffic flows and Emissions Factor Toolkit (version 8.0.1) released in 2017, which incorporates updated COPERTv5 vehicle emissions factors for NO<sub>x</sub> and vehicle fleet information.

Emission factors for the 2023 Future Year scenario were calculated using the Calculator Using Realistic Emissions for Diesels (CURED, version V3A), developed by Air Quality Consultants Ltd. This calculator gives realistic, worst case emission factors for diesels for future years which utilise recent real-world emissions test data. This calculator was used exclusively for the future year 2023 Future Year Scenario for NO<sub>x</sub>.

It should be noted that PM<sub>10</sub> emission factors were calculated using the Emission Factor Toolkit (version 8.0.1) for the 2016 Verification scenario and the 2023 Opening Year scenario.

### Meteorological Data

Meteorological data used in this assessment was taken from Heathrow Airport Meteorological Station over the period 1<sup>st</sup> January 2016 to 31<sup>st</sup> December 2016 (inclusive). Heathrow Airport Meteorological station is located at approximate NGR: 507060, 176500, which is approximately 12.1km west of the proposed development.

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 5 within Appendix I for a wind rose of utilised meteorological data.



### Roughness Length

A roughness length ( $z_0$ ) of 1.5m was used in this dispersion modelling study. This value of  $z_0$  is considered appropriate for the morphology of the assessment area and is suggested within ADMS-Roads as being suitable for 'large urban areas'.

A  $z_0$  of 0.5m was utilised to represent the morphology of the meteorological station location and is suggested as being suitable for 'parkland, open-suburbia'.

### Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used in this dispersion modelling study. This value is considered appropriate for the nature of the assessment area and meteorological station location and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

### Background Concentrations

An annual mean  $\text{NO}_2$  concentration of  $31.83\mu\text{g}/\text{m}^3$ ,  $\text{PM}_{10}$  concentration of  $18.87\mu\text{g}/\text{m}^3$  and a CO concentration of  $506.00\mu\text{g}/\text{m}^3$  as predicted by DEFRA, was used in the dispersion modelling assessment to represent annual mean pollutant levels in the vicinity of the site.

Since both the monitoring locations used in the verification process and the receptor locations used in the operational phase assessment were located in several grid squares, predicted concentrations from their respective grid squares were used to represent their respective background concentrations for the modelling process.

Table AII.3 displays the predicted background concentrations by DEFRA used in the verification process for the diffusion tube monitoring location.

**Table AII.3 Predicted Background Pollutant Concentrations for Verification**

Monitor Grid Square	Monitors	Pollutant	Predicted Background Concentration ( $\mu\text{g}/\text{m}^3$ )
			2016
517500, 178500	HS32, Bren A B C, HS5	$\text{NO}_x$	48.91
		$\text{NO}_2$	30.99
		$\text{PM}_{10}$	18.44
519500, 178500	HS33, HS69	$\text{NO}_x$	50.67
		$\text{NO}_2$	31.83
		$\text{PM}_{10}$	18.87



Table All.4 displays the predicted background concentrations by DEFRA used in the operational phase assessment for the sensitive receptor locations.

**Table All.4 Predicted Background Pollutant Concentrations for Receptors**

Receptor Grid Square	Receptors	Pollutant	Predicted Background Concentration ( $\mu\text{g}/\text{m}^3$ )
			2016
518500, 177500	R21	NO <sub>x</sub>	35.88
		NO <sub>2</sub>	23.93
		PM <sub>10</sub>	15.95
518500, 178500	R5, R5a, R6, R6a, R12	NO <sub>x</sub>	49.07
		NO <sub>2</sub>	30.96
		PM <sub>10</sub>	18.10
519500, 178500	R1, R1a, R2, R2a, R3, R3a, R4, R4a, R7, R8, R9, R10, R10a, R11, R13, R14, R15, R16, R17, R18, R19, R20	NO <sub>x</sub>	50.67
		NO <sub>2</sub>	31.83
		PM <sub>10</sub>	18.87

Background concentrations for 2016 were utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operation of the proposals.

#### **NO<sub>x</sub> to NO<sub>2</sub> Conversion**

Predicted annual mean NO<sub>x</sub> concentrations from the dispersion model were converted to NO<sub>2</sub> concentrations using the spreadsheet provided by DEFRA, which is the method detailed within LLAQM.TG (16).

#### **Verification**

The predicted results from a dispersion model may differ from measured concentrations for a large 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.



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.

For the purpose of this assessment model verification was undertaken for 2016, using traffic data, meteorological data and monitoring results from this year.

LBH undertakes monitoring of NO<sub>2</sub> concentrations at 5 suitable roadside monitoring locations within the assessment extents, which includes one automatic monitoring location. These locations are considered to be best representative of the site as they are either located within the vicinity of the site or in close proximity to the A4/M4, similarly to the proposed development. Figure 20 within Appendix I displays the monitoring locations used in the verification process.

The road contribution to total NO<sub>x</sub> concentration was calculated from the monitored NO<sub>2</sub> result for use in the verification process. This was undertaken following the methodology contained within GLA guidance LLAQM.TG (16).

The dispersion model was run with the traffic input data previously detailed for 2016 to predict the NO<sub>x</sub> concentration at the monitoring locations. The results are shown in Table AII.5.

**Table AII.5 Monitoring Results**

Monitoring Location		Monitored Road NO <sub>x</sub> Concentration (µg/m <sup>3</sup> )	Modelled Road NO <sub>x</sub> Concentration (µg/m <sup>3</sup> )
HS32	24 Adelaide Terrace	74.40	20.23
HS33	30 Surrey Crescent	66.59	26.55
HS69	Kew Bridge	59.95	43.42
BREN A B C	Brentford, Glenhurst Road	91.56	32.31
HS5	Brentford	66.66	32.95

The monitored and modelled NO<sub>x</sub> road contribution concentrations were calculated and the equation of the trendline based on the linear progression through zero was calculated. This indicated that a verification factor of **2.1506** was required to be applied to all NO<sub>x</sub> modelling results, showing the model has a tendency to underestimate pollutant concentrations throughout the assessment extents.



**Graph 1 – Primary Verification Adjustment Factor**

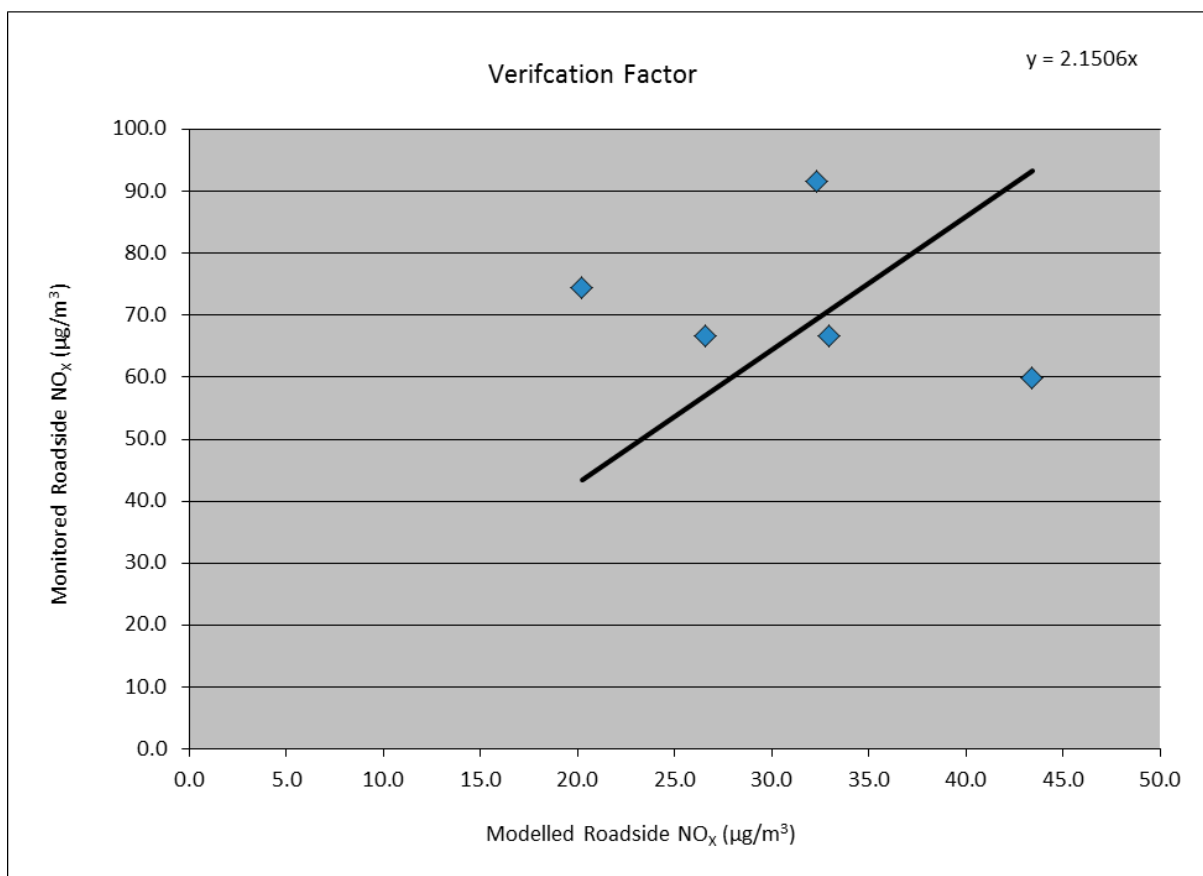


Table AII.6 presents the monitored annual mean NO<sub>2</sub> concentrations and the adjusted modelled total NO<sub>2</sub> concentration based on the above verification factor. Exceedances are shown in **bold**.

**Table AII.6 2016 NO<sub>2</sub> Monitoring Results**

Site ID	Monitoring Location	Monitored NO <sub>2</sub> Concentration (µg/m³)	Adjusted Modelled Total NO <sub>2</sub> Concentration (µg/m³)	Difference (%)
HS32	24 Adelaide Terrace	<b>59.40</b>	<b>48.91</b>	17.67
HS33	30 Surrey Crescent	<b>57.60</b>	<b>54.43</b>	5.50
HS69	Kew Bridge	<b>55.40</b>	<b>65.94</b>	-19.03
BREN A B C	Brentford, Glenhurst Road	<b>64.70</b>	<b>57.83</b>	10.63
HS5	Brentford	<b>56.90</b>	<b>58.27</b>	-2.40

LBH undertakes monitoring of annual mean PM<sub>10</sub> concentrations at one monitoring location within the assessment extents, it was therefore possible to provide a separate PM<sub>10</sub> verification factor. Table AII.7 indicates the monitored and calculated annual mean PM<sub>10</sub> concentrations.



**Table AII.7 PM<sub>10</sub> Monitoring Results**

Site ID	Monitoring Location	Monitored PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )	Modelled PM <sub>10</sub> concentration (µg/m <sup>3</sup> )
HS5	Brentford	30.70	20.71

The monitored and modelled roadside concentrations were compared to calculate the associated ratio. This indicated a verification factor of **1.4820** was required to be applied to all PM<sub>10</sub> modelling results.





## APPENDIX III ADMS-5 INPUT DATA



## ADMS-5 ASSESSMENT INPUTS

Atmospheric emissions from the proposed CHP and boiler units have the potential to result in air quality impacts in the vicinity of the development. Dispersion modelling using ADMS-5 was therefore undertaken to predict increase in NO<sub>2</sub> and CO concentrations at sensitive locations in order to consider potential changes and impacts as a result of the proposals.

Assessment inputs are described in the following Subsections.

### Dispersion Model

Dispersion modelling was undertaken using ADMS-5 (v5.2), which is developed by CERC. ADMS-5 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model utilising boundary layer height and Monin-Obukhov length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

The model utilises hourly meteorological data to define conditions for plume rise, transport and diffusion. It estimates the concentration for each source and receptor combination for each hour of input meteorology, and calculates user-selected long-term and short-term averages.

### Assessment Area

Ambient concentrations were predicted using the same assessment grids previously described for the ADMS-Roads modelling.

### Process Conditions

Process conditions were provided through correspondence with Silcock Dawson, the Engineering Consultants for the project. Reference should be made to Table AIII.1 for dispersion modelling inputs. It should be noted that the process conditions shown are per flue rather than per unit.

**Table AIII. 1 Process Conditions**

Condition	Unit	CHP	Boilers
Stack location	NGR	519076.0, 178315.1	519074.9, 178315.4
Stack diameter	m	0.3	0.8
Stack height	m	58.0	58.0
Flue gas volumetric flow rate	m <sup>3</sup> /s	0.53	3.77
Flue gas efflux velocity	m/s	7.5	7.5
Temperature	°C	120.0	90.0

Reference should be made to Figure 21 within Appendix I for a graphical representation of the stack



locations.

### Emissions

Pollutant emissions were provided through correspondence with Silcock Dawson. This is shown in Table AIII.2. It should be noted that the mass emission rates are again shown per flue rather than per unit.

**Table AIII.2 Mass Emission Rates**

Unit	Parameter	Mass Emission Rate (g/s)
CHP	NO <sub>x</sub>	0.00507
	CO	0.01521
Boilers	NO <sub>x</sub>	0.0156
	CO	0.0028

### Time Varied Emissions

As advised by Silcock Dawson, the proposed CHP boiler units are expected to operate 17 hours a day (annual operational hours of 6,205 hours). A time varied file was therefore applied to represent these hours of operation for the CHP and boiler units. This is considered to be a realistic representation of likely operations, and therefore is considered to provide a robust assessment.

### Meteorological Data

Meteorological data used in this assessment was taken from Heathrow Airport Meteorological Station over the period 1<sup>st</sup> January 2016 to 31<sup>st</sup> December 2016 (inclusive).

### Roughness Length

A  $z_0$  of 1.5m was used in this dispersion modelling study. A  $z_0$  value of 0.5m was used to represent the assessment area and the meteorological station location.

### Monin-Obukhov Length

A minimum Monin-Obukhov length of 30m was used to represent the assessment area and meteorological station location.

### Building Effects

Analysis of the site layout indicated that a number of structures should be included within the model in order to take account of effects on pollutant dispersion. It should be noted that committed developments within in the vicinity of the site have been included within the model where relevant. Building input geometries are shown in Table AIII.3.



**Table AIII.3 Building Geometries**

Building		NGR (m)		Height (m)	Length (m)	Width (m)	Angle (°)
		X	Y				
1	Block H, Central Eastern Site	518994.1	178392.7	57.5	16.7	39.5	135.1
2	Block G, Central Eastern Site	518962.2	178360.2	60.5	35.6	19.9	195.8
3	Block I, Capital Court Site	519010.4	178313.5	50.0	45.0	20.3	135.0
4	Block J, Capital Court Site	519015.9	178265.5	53.0	14.7	32.6	174.3
5	Block J, Capital Court Site	519011.0	178274.3	53.0	23.2	11.2	225.0
6	Block J, Capital Court Site	519019.5	178276.6	53.0	13.8	20.2	224.8
7	Block K, Capital Court Site	519036.5	178243.2	38.0	41.3	16.9	225.1
8	Block F, Central Southern Site	518982.2	178200.2	60.0	36.1	23.8	152.0
9	Block F, Central Southern Site	519001.7	178171.5	33.0	20.4	40.1	235.3
10	Block E, Central Southern Site	518955.0	178179.4	54.0	27.4	20.4	179.8
11	Inchape Volkswagen West London	519175.3	178406.0	28.0	23.3	54.0	222.7
12	Inchape Volkswagen West London	519206.6	178372.3	28.0	51.2	46.0	223.0
13	Wheatstone House	519228.8	178316.0	29.5	20.3	29.5	237.2
14	Wheatstone House	519229.2	178340.5	29.5	11.5	31.3	146.6
15	Wheatstone House	519257.3	178336.6	26.5	40.9	11.8	147.0
16	Big Yellow Self Storage Chiswick	518986.0	178447.6	37.0	42.2	50.8	169.9
17	Brentford Fountain Leisure Centre	519173.7	178287.1	14.9	56.8	78.0	143.7
18	Kew House School	519058.6	178183.9	17.4	17.5	45.0	224.7
19	Kew House School	519081.4	178186.8	17.4	41.4	17.0	225.2
20	Core 1, Proposed Building	519066.9	178285.0	47.3	16.7	16.3	196.0
21	Core 1, Proposed Building	519071.6	178306.1	53.6	27.5	16.8	196.0
22	Core 2, Proposed Building	519105.3	178306.7	41.0	35.6	17.3	180.0
23	Core 3, Proposed Building	519099.9	178340.4	56.7	35.2	16.4	180.0
24	Core 5, Proposed Building	519148.3	178348.7	59.9	31.3	17.0	140.0
25	Core 4, Proposed Building	519126.1	178370.0	44.1	31.6	16.4	140.0



Reference should be made to Figure 21 within Appendix I for a graphical representation of the modelled building locations.