

# **Redbridge Air Quality Annual Status Report for 2018**

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This report provides a detailed overview of air quality in London Borough of Redbridge during 2018. It has been produced to meet the requirements of the London Local Air Quality Management statutory process<sup>1</sup>.

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<sup>1</sup> LLAQM Policy and Technical Guidance 2016 (LLAQM.TG(16)). <https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/working-boroughs>

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## **Abbreviations**

AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
BEB	Buildings Emission Benchmark
CAB	Cleaner Air Borough
CAZ	Central Activity Zone
EV	Electric Vehicle
GLA	Greater London Authority
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LLAQM	London Local Air Quality Management
NRMM	Non-Road Mobile Machinery
PM <sub>10</sub>	Particulate matter less than 10 micron in diameter
PM <sub>2.5</sub>	Particulate matter less than 2.5 micron in diameter
TEB	Transport Emissions Benchmark
TfL	Transport for London

**Table A. Summary of National Air Quality Standards and Objectives**

<b>Pollutant</b>	<b>Objective (UK)</b>	<b>Averaging Period</b>	<b>Date<sup>1</sup></b>
Nitrogen dioxide - NO <sub>2</sub>	200 µg m <sup>-3</sup> not to be exceeded more than 18 times a year	1-hour mean	31 Dec 2005
	40 µg m <sup>-3</sup>	Annual mean	31 Dec 2005
Particles - PM <sub>10</sub>	50 µg m <sup>-3</sup> not to be exceeded more than 35 times a year	24-hour mean	31 Dec 2004
	40 µg m <sup>-3</sup>	Annual mean	31 Dec 2004
Particles - PM <sub>2.5</sub>	25 µg m <sup>-3</sup>	Annual mean	2020
	Target of 15% reduction in concentration at urban background locations	3 year mean	Between 2010 and 2020
Sulphur Dioxide (SO <sub>2</sub> )	266 µg m <sup>-3</sup> not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2005
	350 µg m <sup>-3</sup> not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
	125 µg m <sup>-3</sup> not to be exceeded more than 3 times a year	24 hour mean	31 Dec 2004

Note: <sup>1</sup> by which to be achieved by and maintained thereafter

## 1. Air Quality Monitoring

### 1.1 *Locations*

**Table B. Details of Automatic Monitoring Sites for 2018**

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance from monitoring site to relevant exposure (m)	Distance to kerb of nearest road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Monitoring technique
CM7	Redbridge 7 Ley Street	544454.8	187681.9	Urban background	Y	70	50m	2.7	NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> , O <sub>3</sub>	Chemiluminescent; BAM
CM4	Redbridge 4 Gardner Close	540828.3	188367.9	Urban traffic	Y	12	12m	2.	NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub>	Chemiluminescent; BAM

**Table C. Details of Non-Automatic Monitoring Sites for 2018**

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance from monitoring site to relevant exposure (m)	Distance to kerb of nearest road (N/A if not applicable) (m)	Site height (m)	Pollutants monitored	Tube co-located with an automatic monitor? (Y/N)
<i>DTA</i>	<i>Mayfield School</i>	<i>547022.3</i>	<i>187232.3</i>	<i>Urban Background</i>	<i>Y</i>	<i>&lt;5m</i>	<i>&gt;100</i>	<i>1.5</i>	<i>NO<sub>2</sub></i>	<i>N</i>
<i>DTB</i>	<i>Ilford Lane</i>	<i>543688.0</i>	<i>186139.6</i>	<i>Roadside</i>	<i>Y</i>	<i>&lt;5m</i>	<i>2.3</i>	<i>3.1</i>	<i>NO<sub>2</sub></i>	<i>N</i>

DT C	Ilford Lane BP	544132.4	184945.6	Roadside	Y	<5m	3.0	2.7	NO <sub>2</sub>	N
DT D	Ley Street	544454.8	187681.9	Urban Background	Y	>5m	50m	2.7	NO <sub>2</sub>	Y
DT E	Gardner Close	540828.3	188367.9	Roadside	Y	<5m	4.2	2.6	NO <sub>2</sub>	Y
DT F	Fullwell Cross	544560.7	190400.8	Roadside	Y	<5m	1.2	1.7	NO <sub>2</sub>	N
DT G	Perth Road	543421.7	188322.6	Roadside	Y	<5m	1.5	2.8	NO <sub>2</sub>	N
DT H	Westbound Eastern Ave	543450.6	188371.1	Roadside	Y	<5m	1.3	2.4	NO <sub>2</sub>	N
DT I	CentralRes Eastern Ave	543453.7	188384.4	Roadside	Y	<5m	2.0	2.5	NO <sub>2</sub>	N
DT J	Eastbound Eastern Ave	543442.0	1888400.2	Kerbside	Y	<5m	0.9	2.7	NO <sub>2</sub>	N
DT K	Parham Dr	543498.3	188427.6	Near Road	Y	<5m	40m from Eastern Ave	2.6	NO <sub>2</sub>	N
DT L	North Circ. Rd, Northbound Royston Gd	541816.3	188161.3	Roadside	Y	<5m	2.1	2.8	NO <sub>2</sub>	N
DT M	North Circ. Rd, Southbound Wanstead Pk	541887.8	188136.2	Roadside	Y	<5m	3.0	3.0	NO <sub>2</sub>	N
DT N	Ethel Davis School	546675.6	188886.1	Near Road	Y	<5m	15	2.8	NO <sub>2</sub>	N
DT O	Grove Road	540025.7	190494.3	Roadside	Y	<5m	8.0 horizontal	2.7	NO <sub>2</sub>	N
DT P	High Road Woodford	540076.0	190682.6	Roadside	Y	<5m	2.7	2.6	NO <sub>2</sub>	N
DT Q	M11	541992.1	191799.9	Near Road	Y	>10m	35	2.4	NO <sub>2</sub>	N
DT R	Winston Way Primary Sch.	544364.1	186597.4	Roadside	Y	<5m	3.2	2.8	NO <sub>2</sub>	N
DT S	Winston Way Gyratory	544360.4	186615.3	Kerbside	Y	>10m	0.9	2.6	NO <sub>2</sub>	N
DT T	Chadwell Heath Primary School	547158.3	187699.4	Kerbside	Y	<5m	0.6	2.8	NO <sub>2</sub>	N

DT U	Goodmayes Primary School	546665.3	187046.3	Roadside	Y	<5m	9.0	2.6	NO <sub>2</sub>	N
DT V	Isaac Newton Academy	545030.2	186919.8	Near Road	Y	<5m	15	2.6	NO <sub>2</sub>	N
DT W	Inside Winston Way Prim.Sch	544332.3	186571.3	Near Road	Y	<5m	17	3.0	NO <sub>2</sub>	N

### 1.2 Comparison of Monitoring Results with AQOs

The results presented are after adjustments for “annualisation” and for distance to a location of relevant public exposure, the details of which are described in Appendix A.

**Table D. Annual Mean NO<sub>2</sub> Ratified and Bias-adjusted Monitoring Results ( $\mu\text{g m}^{-3}$ ) (Non-automatic co-located tube date included for data trend comparisons) (DT D Perth Terrace was relocated to DT D Ley Street in 2014 with CM7)**

Site ID	Site type	Valid data capture for monitoring period % <sup>a</sup>	Valid data capture 2018 % <sup>b</sup>	Annual Mean Concentration ( $\mu\text{g m}^{-3}$ )						
				2012 <sup>c</sup>	2013 <sup>c</sup>	2014 <sup>c</sup>	2015 <sup>c</sup>	2016 <sup>c</sup>	2017 <sup>c</sup>	2018 <sup>c</sup>
CM1	Automatic Background (Perth Terrace)			36.8	35.4	32.8				
CM7	Automatic Background (Ley Street)	(97)	(97)			34.6	33.1	33	30.4	30.6
CM3	Urban Traffic									
CM4	Urban Traffic (Gardner Close)	(94)	(94)	48.3	45.0	48.3	41.0	42.3	38.8	37.4
CM5	Urban Traffic									

Site ID	Site type	Valid data capture for monitoring period % <sup>a</sup>	Valid data capture 2018 % <sup>b</sup>	Annual Mean Concentration ( $\mu\text{g m}^{-3}$ )						
				2012 <sup>c</sup>	2013 <sup>c</sup>	2014 <sup>c</sup>	2015 <sup>c</sup>	2016 <sup>c</sup>	2017 <sup>c</sup>	2018 <sup>c</sup>
<i>DT D</i>	<i>Non-Automatic Background (Ley Street)</i>	97	97					29.6	30.4	28.4
<i>DT D</i>	<i>Non-Automatic Background (Perth Terrace)</i>			33.1	37.2	33.7	31.7			
<i>DTE</i>	<i>Non-Automatic Background (Gardner Close)</i>	94	94	<b>45.6</b>	<b>48.6</b>	<b>46.8</b>	<b>48.6</b>	<b>42.9</b>	<b>42.3</b>	<b>42.4</b>

Notes: Exceedance of the NO<sub>2</sub> annual mean AQO of 40  $\mu\text{g m}^{-3}$  are shown in **bold**.

NO<sub>2</sub> annual means in excess of 60  $\mu\text{g m}^{-3}$ , indicating a potential exceedance of the NO<sub>2</sub> hourly mean AQS objective are shown in bold and underlined.

<sup>a</sup> data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

<sup>b</sup> data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

<sup>c</sup> Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%



**Table D2: Results of Non-Automatic Nitrogen Dioxide Diffusion Tubes (2012 to 2018)**

			<b>Year</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Bias adjustment factor</b>				<b>0.86</b>	<b>0.80</b>	<b>0.76</b>	<b>0.95</b>	<b>1.03</b>	<b>0.97</b>	<b>0.92</b>
<b>Site ID</b>	<b>Site Type</b>	<b>Within AQMA?</b>	<b>Annual Mean Concentration (<math>\mu\text{g}/\text{m}^3</math>) - Adjusted for bias <sup>a</sup></b>							
DT A	Background	Y	28.7	24.1	24.2	25.8	28.8	27.4	24.9	
DT B	Roadside	Y	<b><u>60.8</u></b>	<b>52.5</b>	<b>51.7</b>	<b>52.0</b>	<b>55.9</b>	<b>52.8</b>	<b>45.6</b>	
DT C	Roadside	Y	<b>57.8</b>	<b>47.5</b>	<b>49.2</b>	<b>53.1</b>	<b>57.0</b>	<b>52.6</b>	<b>46.9</b>	
DT D	Background	Y	37.2	33.7	31.7	29.6	29.0	28.4	25.2	
DT E	Roadside	Y	<b>48.6</b>	<b>46.8</b>	<b>48.6</b>	<b>42.9</b>	<b>43.4</b>	<b>42.4</b>	34.5	
DT F	Roadside	Y	<b>52.5</b>	<b>44.0</b>	<b>42.3</b>	<b>44.7</b>	<b>46.0</b>	<b>43.2</b>	37.6	
DT G	Roadside	Y	<b>45.4</b>	<b>43.9</b>	39.2	<b>46.9</b>	<b>59.1</b>	<b>55.0</b>	<b>51.5</b>	
DT H	Roadside	Y	<b><u>65.0</u></b>	<b>58.1</b>	<b><u>64.6</u></b>	<b>53.1</b>	<b>50.3</b>	<b><u>52.7</u></b>	<b>46.8</b>	
DT I	Roadside	Y	<b><u>82.3</u></b>	<b>56.7</b>	<b><u>64.3</u></b>	<b>51.8</b>	<b>54.4</b>	<b>52.5</b>	<b>47.2</b>	
DT J	Kerbside	Y	<b>50.5</b>	<b>45.1</b>	<b>45.6</b>	<b>48.0</b>	<b>55.3</b>	<b>50.3</b>	<b>43.4</b>	
DT K	Near Road	Y	38.3	<b>43.1</b>	36.8	<b>44.8</b>	<b>52.9</b>	<b>55.3</b>	<b>45.9</b>	

DT L	Roadside	Y	<b>48.4</b>	<b>46.2</b>	<b>42.4</b>	<b>45.7</b>	<b>47.6</b>	<b>42.6</b>	<b>42.2</b>
DT M	Roadside	Y	<b><u>77.3</u></b>	<b><u>66.7</u></b>	<b><u>71.6</u></b>	<b>73.0</b>	<b>80.5</b>	<b><u>78.9</u></b>	<b>68.4</b>
DT N	Near Road	Y	31.9	32.9	25.8	25.8	28.1	26.8	26.3
DT O	Roadside	Y	<b>58.2</b>	<b>45.2</b>	<b>52</b>	<b>45.7</b>	<b>49.5</b>	<b>47.4</b>	<b>44.7</b>
DT P	Roadside	Y	<b>45.6</b>	<b>40.7</b>	39.8	38.0	38.8	37.6	34.8
DT Q	Near Road	Y	<b>49.5</b>	<b>41.4</b>	<b>42.6</b>	<b>46.8</b>	<b>42.1</b>	<b>43.9</b>	36.7
DT R	Roadside	Y		<b>53.6</b>	<b>50.3</b>	<b>50.2</b>	<b>57.3</b>	<b>54.5</b>	<b>53.4</b>
DT S	Kerbside	Y		<b>53.2</b>	<b>49.4</b>	<b>52.6</b>	<b>58.3</b>	<b>55.5</b>	<b>54.2</b>
DT T	Kerbside	Y		<b>47.2</b>	<b>41.4</b>	<b>42.0</b>	<b>47.8</b>	<b>43.3</b>	<b>44.8</b>
DT U	Roadside	Y		35.6	34.3	34.8	37.6	36.1	36.5
DT V	Near Road	Y		34.7	36	31.4	34.0	32.8	31.1
DT W	Near Road	Y			36.4	34.8	38.1	35.8	37.1

### **Trends in Annual Mean NO<sub>2</sub> Concentrations**

The data above shows the annual mean NO<sub>2</sub> concentrations 7 year trend from 2012 to 2018. The results indicate that the annual mean objective was exceeded for all years monitored at the CM3 (Fullwell Cross) and CM5 (Grove Road) roadside monitoring sites until their closure in 2012. The annual mean objective was also exceeded for 6 years at the roadside site CM4 (Gardner Close) with the exceptions of 2017 and 2018 where CM4 recorded an annual mean concentrations of 38.8 and 37.4 respectively. The results at CM4 show a unsteady downward trend over the 7 period. The background site CM1 at Perth Terrace has shown steady concentrations until its closure in 2014. Similarly the background site CM7 at Ley Street has shown steady concentrations since opening in 2014. Both background sites CM1 and CM7 have continually met the annual mean objective concentration. 7 years of non-automatic data at monitoring site DT E (Gardner Close) has been included for data trend comparisons. Similarly data from background sites DT D (Perth Terrace) and DT D (Ley Street) have been included for trend comparison purposes. Site DT D (Perth Terrace) was relocated to DT D Ley Street in 2014 therefore the 7 years of data is split between the two sites. Site DT E in comparison to CM4 shows a similar unsteady concentration decrease and increase trend in the data over the 7 year period. However it is notable that in 2018 CM4 has recorded an annual average just below the Air Quality Objective for the second time over the 7 year period in comparison to DT E which also recorded an annual average concentration just below the objective. It is possible that air quality concentration trends around CM4 and DTE are consistently decreasing. We will observe the concentration trend at CM4 and DT E in future years to see how it progresses. The comparison of site DT D to sites CM1 and CM7 show that background concentration trends have remained relatively steady over the 7 year period.

Table D2 shows a significant number of non-automatic diffusion tube sites still showing pollution levels above the level of 40 µgm<sup>-3</sup>, as prescribed in the Air Quality Objectives. There is a small downward trend across Redbridge's diffusion tube sites, and roadside sites although for the most part above levels set in the Air Quality Objectives, there is an evident downward trend showing in the 2018 concentrations. We attribute this to effective local and regional air quality policies/projects that encourage drivers to switch to using less polluting modes of transport

**Table E. NO<sub>2</sub> Automatic Monitor Results: Comparison with 1-hour Mean Objective**

Site ID	Valid data capture for monitoring period % <sup>a</sup>	Valid data capture 2018 % <sup>b</sup>	Number of Hourly Means > 200 µg m <sup>-3</sup>						
			2012 <sup>c</sup>	2013 <sup>c</sup>	2014 <sup>c</sup>	2015 <sup>c</sup>	2016 <sup>c</sup>	2017 <sup>c</sup>	2018 <sup>c</sup>
CM1			0	1	0				
CM7	97	96			0	0	0	0	0
CM3									
CM4	94	93					0		0
CM5									

Notes: Exceedance of the NO<sub>2</sub> short term AQO of 200 µg m<sup>-3</sup> over the permitted 18 days per year are shown in **bold**.

<sup>a</sup> data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

<sup>b</sup> data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

<sup>c</sup> Means should be “annualised” in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

**Table F. Annual Mean PM<sub>10</sub> Automatic Monitoring Results (µg m<sup>-3</sup>)**

Site ID	Valid data capture for monitoring period % <sup>a</sup>	Valid data capture 2018 % <sup>b</sup>	Annual Mean Concentration (µg m <sup>-3</sup> )						
			2012 <sup>c</sup>	2013 <sup>c</sup>	2014 <sup>c</sup>	2015 <sup>c</sup>	2016 <sup>c</sup>	2017 <sup>c</sup>	2018 <sup>c</sup>
CM1(Background)			14.9	17.7	16.9				
CM7(Background)	87	87			22.9	18.8	16.9	15.7	18
CM3(Roadside)									
CM4(Roadside)	95	95	27.0	30.3	25.4	17.0	18.8	17.3	18
CM5(Roadside)									

Notes: Exceedance of the PM<sub>10</sub> annual mean AQO of 40 µg m<sup>-3</sup> are shown in **bold**.

<sup>a</sup> data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

<sup>b</sup> data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

<sup>c</sup> Means should be “annualised” in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

**Table G. PM<sub>10</sub> Automatic Monitor Results: Comparison with 24-Hour Mean Objective**

Site ID	Valid data capture for monitoring period % <sup>a</sup>	Valid data capture 2018 % <sup>b</sup>	Number of Daily Means > 50 µg m <sup>-3</sup>						
			2012 <sup>c</sup>	2013 <sup>c</sup>	2014 <sup>c</sup>	2015 <sup>c</sup>	2016 <sup>c</sup>	2017 <sup>c</sup>	2018 <sup>c</sup>
CM1(Background)			2(35)	2	5(35)				
CM7(Background)	87	87			7(36)	3(30)	3(28)	2	1
CM3(Roadside)			6(52)						
CM4(Roadside)	95	95	18	23	9(43)	1	6	2	1

Notes: Exceedance of the PM<sub>10</sub> short term AQO of 50 µg m<sup>-3</sup> over the permitted 35 days per year or where the 90.4th percentile exceeds 50 µg m<sup>-3</sup> are shown in **bold**. Where the period of valid data is less than 85% of a full year, the 90.4<sup>th</sup> percentile is shown in brackets after the number of exceedances.

<sup>a</sup> data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

<sup>b</sup> data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

<sup>c</sup> Means should be “annualised” in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

**Table H. Annual Mean PM<sub>2.5</sub> Automatic Monitoring Results (µg m<sup>-3</sup>)**

Site ID	Valid data capture for monitoring period % <sup>a</sup>	Valid data capture 2018 % <sup>b</sup>	Annual Mean Concentration (µg m <sup>-3</sup> )						
			2012 <sup>c</sup>	2013 <sup>c</sup>	2014 <sup>c</sup>	2015 <sup>c</sup>	2016 <sup>c</sup>	2017 <sup>c</sup>	2018 <sup>c</sup>
CM7(Background)	20	20						13.6	12

Site ID	Valid data capture for monitoring period % <sup>a</sup>	Valid data capture 2018 % <sup>b</sup>	Annual Mean Concentration ( $\mu\text{g m}^{-3}$ )						
			2012 <sup>c</sup>	2013 <sup>c</sup>	2014 <sup>c</sup>	2015 <sup>c</sup>	2016 <sup>c</sup>	2017 <sup>c</sup>	2018 <sup>c</sup>

Notes: Exceedance of the PM<sub>2.5</sub> annual mean AQO of 25  $\mu\text{g m}^{-3}$  are shown in **bold**.

<sup>a</sup> data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

<sup>b</sup> data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

<sup>c</sup> Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

\*KCL ERG advised us that they had to exclude most of 2018 PM2.5 for RB7. This is because of repeated leaks as a result of tape debris build up on the nozzle. Therefore we have no reliable PM2.5 data to report for 2018.





## **2. Action to Improve Air Quality**

### **2.1 Air Quality Action Plan Progress**

Table J provides a brief summary of Redbridge Council's new draft Air Quality Action Plan 2019-2024. This plan is currently subject to public consultation and a final draft will be published in September this year. This Action Plan is based on the new LLAQM Matrix template. We are focussing our actions on reducing emissions in our air quality focus areas and pollution hotspots. Some actions are currently progressing.

The actions have been grouped into seven categories: Monitoring, Emissions from developments and buildings; Public health and awareness raising; Delivery servicing and freight; Borough fleet actions; Localised solutions; and Cleaner transport.

Key for reading the Action Plan:

Responsibility: name of council department responsible for this action	Environmental Health:  Planning:  Estate Management:  Public Health:  Smarter Travel Team  Procurement  Engineering Services
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Ease of delivery ( <b>EOD</b> )	<p>Straightforward <b>1-2</b></p> <p>Medium <b>3-4</b></p> <p>Most difficult <b>5</b></p>
Magnitude of emissions/air quality benefits	<p>High <b>1</b></p> <p>Medium <b>2</b></p> <p>Low <b>3</b></p>
Priority level ( <b>PL</b> )	<p>High <b>1-5</b> (*actions marked <b>selected</b> are key priority actions for the council for effective emissions and exposure reductions)</p> <p>Medium <b>6-10</b></p> <p>Low <b>11-15</b></p>

Timescale	The year (or month) this action will be implemented or completed or if this is an ongoing commitment
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**Table J. Delivery of Air Quality Action Plan Measures (From the new Draft Redbridge Air Quality Action Plan 2019-2024)**

Action category	Action ID	Action description	Responsibility	Cost	Expected emissions/ concentrations benefit	Timescale	Outputs, Targets and KPIs	Further information
<b>Monitoring and Core Statutory Duties</b>	<b>1</b>	Maintain the borough's 2 automatic and 26 diffusion tube monitoring sites.	Air Quality Officer	£25K per annum	No.  Data from monitoring will assist in identifying the impact of action taken	Ongoing for maintenance of monitors, and target to install new monitors subject to available funding.	All monitors maintained and over 90% data capture	Details of our monitoring can be found here:  <a href="https://www.redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf">https://www.redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf</a>
<b>Reducing Emissions from Developments &amp; Buildings</b>								
<b>Emissions from developments and buildings</b>	<b>2</b>	Ensuring emissions from construction and operation of new developments are	Planning	Within existing resource.	<b>2</b>	2019 - ongoing	Number of planning applications conditioned	This information is reported on in our ASR

		<p>minimised by requiring developers to adhere to current and any superseding best practice guidance and supplementary planning guidance. Ensuring major sites have a dust management plan (DMP) and construction management plan (CMP) and appropriate real-time monitoring in accordance with the identified risk of the site.</p>					<p>for dust management best practice and automatic air quality monitoring in line with SPG guidance.</p> <p><b>EOD = 2</b></p> <p><b>PL = 4 (High)</b></p>	<p>which can be found here:</p> <p><a href="https://www.redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf">https://www.redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf</a></p>
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Emissions from developments and buildings	3	Adoption of a Planning Obligations SPD and securing additional funding from developers through s.106 agreements to manage and enforce construction impacts	Planning		2	2019	Reduction in complaints relating to construction projects..  Amount of money generated for AQ from s.106 agreements  <b>EOD = 2</b>  <b>PL = 4</b>	
Emissions from developments and buildings	4	Educate, raise awareness and enforce Non Road Mobile Machinery (NRMM) air quality policies.	Planning	£4000 match funding requirement for participation in the Pan-London NRMM project	2	Immediately	Number of eligible planning applications conditioned for NRMM in line with SPG Guidance.  Number of sites visited by NRMM enforcement	This information is reported on in our ASR which can be found here:  <a href="https://www.redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf">https://www.redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf</a>

							<p>project.</p> <p>Number of sites compliant after follow visit.</p> <p><b>EOD = 2</b></p> <p><b>PL = 4 (High &amp; Selected)</b></p>	<p>Further NRMM information can be found here</p> <p><a href="http://nrmm.london/">http://nrmm.london/</a></p>
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<b>Emissions from developments and buildings</b>	<b>5</b>	Enforcing CHP and biomass air quality policies for new developments	Planning	Normal Business	<b>1</b>	Immediately	Annual reporting on number of planning applications conditioned for CHP or biomass in line with SPG Guidance.  <b>EOD = 4</b>  <b>PL = 4 (High)</b>	This information is reported on in our ASR which can be found here:  <a href="https://www.redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf">https://www.redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf</a>
<b>Emissions from developments and buildings</b>	<b>6</b>	Enforcing Air Quality Neutral and Air Quality Positive policies for new developments and require Air Quality Assessments where necessary	Planning	Normal Business	<b>2</b>	Immediately	Number of air quality neutral assessments completed in accordance with GLA commissione	This information is reported on in our ASR which can be found here:  <a href="https://www.">https://www.</a>

							d guidance. <b>EOD</b> = 2 <b>PL</b> = 4 (High)	<a href="https://www.redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf">redbridge.gov.uk/media/5495/asr_london_2018_final-report.pdf</a>
<b>Emissions from developments and buildings</b>	<b>7</b>	Ensuring adequate, appropriate, and well located green space and infrastructure is included in new developments	Planning	Normal Business	<b>3</b>	Immediately	Local Planning Policy is in place to adequately cover this measure. <b>EOD</b> = 2 <b>PL</b> = 6 Medium	The Redbridge Local Plan is available to view at: <a href="https://www.redbridge.gov.uk/planning-and-building/planning-policy/local-plan/">https://www.redbridge.gov.uk/planning-and-building/planning-policy/local-plan/</a>  has a number of Borough wide policies on green

								<p>space and infrastructure :</p> <p>Section 1.22-23</p> <p>Quality of Environment</p> <p>Section 4: Promoting a Green Environment Policy LP19 Climate Change Mitigation. Policy LP24 Pollution.</p> <p>Policy LP 32 Sustainable Design and Construction. Policy LP37 Green Infrastructure Policy LP38</p>
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									Protecting Trees and enhancing landscape  Policy 39 Nature Conservation
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Emissions from developments and buildings	8	Ensuring the Borough Smoke Control Zone requirements are fully enforced and that information about the requirements are readily available to the public. Awareness will be raised with residents and fuel suppliers through direct engagement.	Environmental Health	Normal Business	1	Immediately	Annual reporting on number of smoke control complaints received and enforced.  Report on engagement with suppliers and residents  <b>EOD = 2</b>  <b>PL = 2 (High &amp; Selected)</b>	Further information provided to residents and on the council website can be found here:  <a href="https://www.redbridge.gov.uk/business-and-regeneration/environmental-health/pollution/">https://www.redbridge.gov.uk/business-and-regeneration/environmental-health/pollution/</a>
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<b>Emissions from developments and buildings</b>	<b>9</b>	Promoting and delivering in the Council's own stock energy efficiency retrofitting projects in workplaces and homes (Including using the GLA RE:NEW and RE:FIT programmes) to replace	Estate Management	Normal business and support from GLA funding streams	<b>1</b>	Immediately	Number of eligible buildings to benefit from these programmes and delivery date.  <b>EOD = 3</b>  <b>PL= 3</b>  High and selected	The council has signed up to take part in Re-fit for the corporate estate (more information on

		old polluting heat and energy plant with new low emission plant (e.g. old boilers with new ultra-low-NOx boilers); in combination with other energy conservation measures.						RE:FIT is available at <a href="https://www.london.gov.uk/what-we-do/environment/energy-energy-buildings/refit">https://www.london.gov.uk/what-we-do/environment/energy-energy-buildings/refit</a>
<b>Public health and awareness raising</b>								
<b>Public health and awareness raising</b>	<b>10</b>	Director of Public Health (DsPHs) have been fully briefed on the AQ problem in Redbridge; on what is being done, and what is needed.	Public Health and Environmental Health	Normal business	<b>2</b>	Immediately	Director has been fully briefed and will be re-briefed annually and at interim AQ meetings/projects that require public health input. AQ	

							<p>problems are in the council JSNA and amongst Health and Well Being Board priorities.</p> <p>New Draft Air Quality Action Plan is to be reported to the Health and Well Being Board in March 2019 and periodically thereafter. This is to shape local strategy to effectively tackle local AQ issues. The Public Health team</p>	
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							<p>contributes to all MAQF school projects in Redbridge through awareness raising through local GP surgeries and local schools.</p> <p><b>EOD: 1</b></p> <p><b>PL: 2</b></p>	
<b>Public health and awareness raising</b>	<b>11</b>	Public Health and Environmental Health Teams are supporting engagement with local stakeholders (businesses, schools, community groups and healthcare providers).	Public Health and Environmental Health	Normal business and MAQF	<b>2</b>	Immediately	<p>Annual reporting summarising engagement progress.</p> <p><b>EOD: 3</b></p> <p><b>PL: 6</b></p>	

<b>Public health and awareness raising</b>	<b>12</b>	Joint Strategic Needs Assessment (JSNA) has up to date information on air quality impacts on the population. Revised Health & Well Being Strategy to integrate air quality objectives.	Public Health and Environmental Health	Normal business	<b>1</b>	2019	Annual reporting summarising progress	
<b>Public health and awareness raising</b>	<b>13</b>	Strengthening co-ordination with Public Health by ensuring that at least one Consultant-grade public health specialist within the borough has air quality responsibilities outlined in their job profile	Public Health	Normal business	<b>1</b>	Immediately	Annual reporting summarising progress	
<b>Public health and awareness raising</b>	<b>14</b>	Engagement with businesses: disseminate information to Redbridge's GP surgeries and pharmacies on how to help improve air quality and reduce exposure for patients and employees.  Disseminate information	Public Health and Environmental Health	Normal business and MAQF	<b>1</b>	Immediately	Number of GP surgeries/pharmacies to receive information by Dec 2020  Number of businesses engaged with	

		to other businesses					by June 2021	
<b>Public health and awareness raising</b>	<b>15</b>	Promotion of availability of airTEXT and the Mayor of London's air pollution forecasts	Public Health and Environmental Health	£1000	<b>2</b>	Immediately	<p>Increase in number of Redbridge users annually.</p> <p>Continue to support dissemination of airTEXT</p> <p><b>EOD = 2</b></p> <p><b>PL= 4</b></p> <p>High and selected</p>	<p>Air Text information can be found here:</p> <p><a href="https://www.airtext.info/">https://www.airtext.info/</a></p> <p>Mayor of London forecasts can be found here:</p> <p><a href="https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/monitoring-and-predicting-air-pollution">https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/monitoring-and-predicting-air-pollution</a></p>

<b>Public health and awareness raising</b>	<b>16</b>	Encourage schools to join the TfL STARS accredited travel planning programme and retain/improve STARS rating through the MAQF school projects. Promoting sustainable travel and cleaner walking routes with supported mapping.	Transport	Normal business and MAQF	. 2	Immediately	Annual reporting summarising STARS progress:  Target number of schools to be signed up to STARS and level at sign up.  STARS awarded level progress and targets per	

							school  <b>EOD = 2</b> <b>PL= 4</b> High	
<b>Public health and awareness raising</b>	<b>17</b>	Reducing pollution in and around schools to improve local air quality at schools. MAQF Project to implement anti-idling and road closure measures around targeted schools. Extending Mayor's school audits to all polluted schools.	Transport	Normal business and pending MAQF funding.	<b>1</b>	2019 to 2023	Report on number of polluted schools using Mayor's school audit toolkit to undertake their own audit  <b>EOD = 4</b> <b>PL= 4</b> High & Selected	Develop audit toolkit using guidance from the Mayor and support from TfL STARS programme and issue to schools between 2019-2020.

<b>Delivery servicing and freight</b>								
<b>Delivery servicing and freight</b>	<b>18</b>	Update Redbridge procurement policies to reduce pollution from logistics/servicing and to include a requirement for suppliers with large fleets to have attained Bronze Fleet Operator Recognition Scheme (FORS) accreditation	Procurement	Normal business	<b>3</b>	2019	Annual reporting summarising FORS accreditation and improvements procured service vehicle standards  <b>EOD = 2</b>  <b>PL= 6</b> Medium	
<b>Delivery servicing and freight</b>	<b>19</b>	Update Redbridge procurement policies to preferentially score bidders delivering goods and services with zero or	Procurement	Normal business	<b>3</b>	2019	Annual reporting summarising number procured services	

		low emission vehicles.					delivering to Redbridge using low emission/zero emission vehicles.  <b>EOD = 2</b>  <b>PL= 6</b> Medium	
<b>Delivery servicing and freight</b>	<b>20</b>	Reducing emissions from deliveries to local businesses and residents. Evaluate transport being used services such as Age UK Redbridge (Daisy Fresh) for potential emission reductions.	Procurement and Transport	Normal business	<b>2</b>	2019 -2023	Annual reporting summarising comparative delivery numbers, frequency and emission standards of vehicles used  <b>EOD = 3</b>	

								PL= 6 Medium	
<b>Borough fleet actions</b>									
<b>Borough fleet actions</b>	<b>21</b>	Redbridge's own fleet is a member of the Freight Transport Association with Truck Excellence accreditation; equivalent to bronze (FORS) accreditation. The council will explore the possibility of obtaining (FORS) Gold accreditation for its own fleet.	Waste and Fleet	Normal business	<b>2</b>	2019-2021	Annual report summarising FORS accreditation progress  Obtain Silver by 2022  Obtain Gold by 2024  <b>EOD = 2</b>  <b>PL= 2 High and selected</b>		
<b>Borough fleet</b>	<b>22</b>	Increasing the number of	Waste and Fleet	Normal	<b>1</b>	2019-2021	Annual		



<b>actions</b>		electric, hybrid and cleaner vehicles in the boroughs' fleet. Redbridge are seeking to comply with the ULEZ standard.		business with support from Defra and GLA funding streams.			report summarising progress  Number ULEV by Dec 2021  <b>EOD = 2</b>  <b>PL= 2 High and selected</b>	
<b>Borough fleet actions</b>	<b>23</b>	Increase the uptake of new Euro VI vehicles in borough fleet.	Waste and Fleet	Normal business	<b>1</b>	2019-2021	Annual report summarising progress  Number of Euro VI by Dec 2021  <b>EOD = 2</b>  <b>PL= 2 High and selected</b>	

<b>Borough fleet actions</b>	<b>24</b>	Smarter Driver Training for drivers of vehicles in Borough Own Fleet i.e. through training of fuel efficient driving and providing regular re-training of staff	Waste and Fleet	Normal business	<b>2</b>	Immediately	Annual report summarising progress  <b>EOD = 2</b>  <b>PL= 4 High</b>	
<b>Localised solutions</b>								
<b>Localised solutions</b>	<b>25</b>	Green Infrastructure	Environmental Health, Transportation and Planning	Normal business and MAQF funding	<b>3</b>	Immediately	Annual report summarising number of green infrastructure projects implemented by the	

							council. <b>EOD = 2</b> <b>PL= 6</b> Medium	
<b>Localised solutions</b>	<b>26</b>	Low Emission Neighbourhoods (LENS)  Ilford Garden Junction and pending bid for Ley Street LEN	Transportation	GLA LEN funding and council match funding	<b>1</b>	Immediately	Report summarising LEN progress and emission reductions achieved by completion date March 2020.  <b>EOD = 4</b> <b>PL= 4 High</b>	

Cleaner transport								
Cleaner transport	27	Discouraging unnecessary idling by taxis, coaches and other vehicles through participation in the Pan London anti-idling campaign and through targeted education and enforcement activity around schools in the borough.	Environmental Health	Normal Business and MAQF funding for Pan London anti-idling work	3	2019-2024	Annual report summarising informal and formal enforcement action and response to anti-idling education initiatives.  EOD = 1  PL= 3 High	

<b>Cleaner transport</b>	<b>28</b>	Promote and deliver projects with Car Free Days and Road Closures.	Transportation and Environmental Health	Normal business and pending MAQF	<b>1</b>	<b>2019-2023</b>	Annual report summarising number of car free days held and road closures implemented and their effect on the targeted area/community.  <b>EOD = 3</b>  <b>PL= 3 High and selected</b>	
<b>Cleaner transport</b>	<b>29</b>	Promote the existing free residential parking permit scheme for electric vehicles (EV) to encourage	Parking Services	Normal business	<b>1</b>	Immediately	Annual report summarising number of	

		increased uptake					permits issued for EV <b>EOD = 3</b> <b>PL= 3 High and selected</b>	
<b>Cleaner transport</b>	<b>30</b>	Installation of (EV) residential electric charge points	Transportation and Planning	LIP, GULCS and OLEV funding support	<b>1</b>	2019-2020	Annual report summarising progress/ number of chargers	10 EVCPs in South Woodford, Wanstead Village and Wanstead

							installed per year <b>EOD = 3</b> <b>PL= 3 High and selected</b>	Park March 2019  5-10 EVCPs within the A406 detailed in the MAQF Ley Street LEN bid.
<b>Cleaner transport</b>	<b>31</b>	Installation of rapid chargers to help enable the take up of electric taxis, cabs and commercial vehicles (in partnership with TfL and/or OLEV)	Transportation	LIP and GULCS funding	<b>1</b>	2020	Annual report summarising progress  number of chargers installed per year <b>EOD = 3</b>	2 EV rapid charging points to be installed in the Council's Ley Street Depot detailed in the MAQF Ley Street Bid

							<b>PL= 3 High and selected</b>	<p>1 TfL rapid charger in Cranbrook Road car park, Gants Hill.</p> <p>6 Fast Chargers to be installed at Lynton House as part of the Workplace Travel Project</p>
<b>Cleaner transport</b>	<b>32</b>	Provision of infrastructure to support walking and cycling	Transportation	LIP and LEN Funding	<b>1</b>	2019-2024	Annual report summarising progress in key schemes implemented	



							from the LIP <b>EOD = 4</b> <b>PL= 4 High</b> and selected	
<b>Cleaner transport</b>	<b>33</b>	Introduce parking surcharge on diesel vehicles below Euro 6 standards for Resident and Controlled Parking Zone permits	Parking Services	Normal business	<b>1</b>	2021	Annual report summarising impact of the policy  <b>EOD = 3</b>  <b>PL= 3 High</b>	

Cleaner transport	34	Reallocation or restriction of road space around schools located in areas of high pollution.	Transportation	Normal business and MAQF	1	2019-2023	Annual report summarising progress  EOD = 3  PL= 3 High	A significant amount of road space restriction around schools have been proposed and detailed in the current MAQF and LEN bids.
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### 3. Planning Update and Other New Sources of Emissions

**Table K. Planning requirements met by planning applications in Redbridge in 2018**

Action	Number	Notes
a) Number of planning applications where an air quality impact assessment was reviewed for air quality impacts	74	
b) Number of planning applications required to monitor for construction dust	29	
c) Number of CHPs/Biomass boilers refused on air quality grounds	0	
d) Number of CHPs/Biomass boilers subject to GLA emissions limits and/or other restrictions to reduce emissions	7	
e) Number of developments required to install Ultra-Low NO <sub>x</sub> boilers	12	
f) Number of developments where an AQ Neutral building and/or transport assessments undertaken	14	
g) Number of developments where the AQ Neutral building and/or transport assessments not meeting the benchmark and so required to include additional mitigation	3	

h) Number of planning applications with S106 agreements including other requirements to improve air quality	0	
Number of planning applications with CIL payments that include a contribution to improve air quality	0	
<b>i) NRMM: Central Activity Zone and Canary Wharf</b> Number of conditions related to NRMM included. Number of developments registered and compliant. Please include confirmation that you have checked that the development has been registered at <a href="http://www.nrmm.london">www.nrmm.london</a> and that all NRMM used on-site is compliant with Stage IIIB of the Directive and/or exemptions to the policy.	0	
<b>NRMM: Greater London (excluding Central Activity Zone and Canary Wharf)</b> Number of conditions related to NRMM included. Number of developments registered and compliant. Please include confirmation that you have checked that the development has been registered at <a href="http://www.nrmm.london">www.nrmm.london</a> and that all NRMM used on-site is compliant with Stage IIIA of the Directive and/or exemptions to the policy.	0	

**3.1 New or significantly changed industrial or other sources**

London Borough of Redbridge confirms that there are no new or significantly changed industrial or other sources identified.

## **Appendix A Details of Monitoring Site QA/QC**

### **A.1 Automatic Monitoring Sites**

Air quality monitoring data provides a measure of actual concentrations and therefore exceedences of air quality objectives. Data also provides information on trends in air pollution and can provide the basis for verifying the various models used to predict future pollution levels.

In 2018 London Borough of Redbridge undertook automatic monitoring at the following two sites:

- **CM7 - Redbridge 7** (Ley Street) located northeast of Ilford – an urban background site within the Ley Street Depot that is sited on Ley Street. The site monitored nitrogen dioxide, PM10 (by BAM), and ozone. Since 2016 this site began monitoring PM2.5 (by BAM). Redbridge 7 (Ley Street) was set up in 2014, and is also identified in this report as CM7.
- **CM4 - Redbridge 4** (Wanstead) – an urban traffic site close to the A12 towards the southwest of the Borough. The site started operating in November 1999. The site monitors nitrogen dioxide, PM10 and PM2.5 (both by BAM). Until March 2012 it also monitored carbon monoxide and sulphur dioxide.

The sites represent relevant exposure within the Borough. The sites are part of the London Air Quality Network and therefore the standards of QA/QC are similar to those of the government's AURN sites. Fortnightly local site operator (LSO) zero/span calibrations of the gas analysers are carried out by the local authority, with subsequent data collection, validation and ratification undertaken by the ERG at King's College London. In all cases the data are fully ratified unless reported otherwise. Details of the sites can be found at [www.londonair.org.uk](http://www.londonair.org.uk)

UKCAS accredited independent site audits are carried out every 6 months by the National Physics Laboratory (NPL). Additional six monthly equipment service visits by Enviro Technology Services Plc.

The Council previously operated three other automatic monitoring stations in the Borough: **Redbridge 2** - a roadside site on Ilford Broadway closed in 2003, **Redbridge 3** – a kerbside site at Fulwell Cross closed in 2012, and **Redbridge 5** – a roadside site in South Woodford closed in 2012.

### **PM<sub>10</sub> Monitoring Adjustment**

The LLAQM.TG16 guidance highlights that Met-One PM<sub>10</sub> Unheated BAM 1020 instruments conform to the equivalence criteria relating to the gravimetric European reference method. A correction using a factor of 1.2 is automatically applied to adjust for slope.

### **A.2 Diffusion Tube Quality Assurance / Quality Control**

- Diffusion Tubes are prepared and analysed by UKAS accredited Gradko International Ltd
- Diffusion Tubes are prepared using 50% triethanolamine with acetone method and analysed using UV spectrophotometry
- The lab follows the procedures set out in the Defra Technical Guidance for LAQM TG(16).

- For details attaining to 'results' – precision, bias adjustment factors; and reference methods are as follows:

Results of laboratory precision (tube precision and WASP results):

The LAQM website gives the following precision results for Gradko 50% TEA in acetone:

2018 Good (8 studies)

The laboratory performance of Gradko International was tested in April to November 2018 under AIR NO<sub>2</sub> PT Rounds AR024, AR025, AR027 and AR028. The performance was 100% in all rounds.

The version of the bias adjustment factor database used is: 03/19

There being less than 9 months of 2018 data for DT N – Ethal Davis School, DT W - Inside Winston Way Primary School, and DTP High Road Woodford, the annual means for these three sites have been calculated according to the standard annualisation procedure as detailed in Box 7.10 – Example: Annualising NO<sub>2</sub> Diffusion Tube Monitoring Data in LAQM TG16, however I have used only one background site. A spreadsheet showing the calculations is also given in the Appendix.

The bias adjustment factor has been applied to the monthly and annual means as follows

Tube nos.	Site ID	Site name	Monthly means [ $\mu\text{g}/\text{m}^3$ ] (not bias adjusted)											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,2,3	DT A	Mayfield School	30.0	32.1	37.8	26.2	20.5	20.4	21.5	24.8	29.9	27.3	27.3	
4,5,6	DT B	Ilford Lane	44.2	53.3	53.1	47.6	41.6	43.6	53.8	46.2	62.7	51.5	51.5	
7,8,9	DT C	Ilford Lane BP	46.7	57.0	54.0	51.0	41.6	51.2	55.7	42.2	59.2	48.3	48.3	
10,11,12	DT D	Ley Street	31.3	31.1	35.0	25.1	22.0	22.4	22.5	25.2				
13,14,15	DT E	Gardner Close	26.0	42.9	46.8	40.0	32.9	31.5	34.2	41.5	41.3	44.8	44.8	
16,17,18	DT F	Fulwell Cross	39.4	47.4	35.7	37.5	37.9	35.3	39.5	41.1	53.8	42.5	42.5	
19,20,21	DT G	Perth Road	45.7	51.0	60.9	49.2	48.7	71.2	54.7	44.0	77.9	40.4	40.4	
22,23,24	DT H	WestB Eastern Ave	52.8	47.7	49.9	60.2	29.4	39.8	47.4	74.7	55.8	59.3	59.3	
25,26,27	DT I	Central Res	60.2	65.6	71.9	50.1	42.0	35.5	34.8	49.3	52.5	44.1	44.1	
28,29,30	DT J	EastB Eastern Ave	51.3	45.6	50.5	34.7	44.3	36.9	41.5	60.7	59.0	58.2	58.2	
31,32,33	DT K	Parham Drive	41.4	62.0	52.7	55.3	30.2	62.5	44.1	43.1	57.9	39.5	39.5	
34,35,36	DT L	NCR Nth Royston Gdns	40.0	55.3	52.9	43.4	49.9	46.6	39.8	35.9	48.5	45.8	45.8	
37,38,39	DT M	NCR Sth Wanstead Park	73.9	82.4	82.4	70.4	63.9	66.8	68.2	75.9	85.2	74.2	74.2	
40,41,42	DT N	Ethal Davis School	47.5	33.3	31.0	25.9	21.2	18.1	22.8			31.3	31.3	
43,44,45	DT O	Grove Road	55.2	54.9	55.1	52.4	38.8	37.1	41.3	47.0	55.2	47.7	47.7	
46,47,48	DT P	High Road Woodford	38.2	44.4		34.8	34.3	29.3	34.6	38.6	48.3	40.0	40.0	
49,50,51	DT Q	Chigwell Rd M11	40.5	47.0	43.3	44.9	29.8	25.1	33.8	51.5	43.3	44.4	44.4	
52,53,54	DT R	Winston Way Primary	61.7	61.8	61.4	58.6	50.0	60.5	55.8	55.6	57.4	57.2	57.2	
55,56,57	DT S	Winston Way Gyratory	64.3	67.0	63.8	61.6	53.2	60.2	55.5	59.3	45.4	59.3	59.3	
58,59,60	DT T	Chadwell Heath Primary	53.0	62.9	56.7	46.3	44.9	42.5	43.1	46.2	43.2	50.9	50.9	
61,62,63	DT U	Goodmayes Primary	44.4	55.0	47.3	39.0	33.2	31.1	34.3	38.2	34.9	40.5	40.5	
64,65,66	DT V	Isaac Newton Academy	32.9	43.3	41.4	37.4	28.6	29.6	28.6	30.1	32.3	41.3	41.3	
67,68,69	DT W	Inside Winston Way Prim.	39.6	44.2	58.9	39.3	32.1	32.7			35.5	41.1	41.1	



2018										
Calculation of period adjusted and bias adjusted annual means										
				Calculation of period adjustment factors				bias factor		0.92
Site ID	Site name	Period mean	Period	period mean	Ratio Am/Pm	period mean	Ratio Am/Pm	Period adjustm'nt factor ( $R_a$ )	Annual means before bias adj	Bias adjusted annual means
DT A	Mayfield School	27.0	7 Months					1.000	27.0	24.9
DT B	Ilford Lane	49.6	9 Months					1.000	49.6	45.6
DT C	Ilford Lane BP	51.0	9 Months					1.000	51.0	46.9
DT D	Ley Street	27.4	9 Months					1.000	27.4	25.2
DT E	Gardner Close	37.5	9 Months					1.000	37.5	34.5
DT F	Fulwell Cross	40.8	9 Months					1.000	40.8	37.6
DT G	Perth Road	55.9	9 Months					1.000	55.9	51.5
DT H	WestB Eastern Ave	50.9	9 Months					1.000	50.9	46.8
DT I	Central Res	51.3	9 Months					1.000	51.3	47.2
DT J	EastB Eastern Ave	47.2	9 Months					1.000	47.2	43.4
DT K	Parham Drive	49.9	9 Months					1.000	49.9	45.9
DT L	NCR Nth Royston Gdns	45.8	9 Months					1.000	45.8	42.2
DT M	NCR Sth Wanstead Park	74.3	9 Months					1.000	74.3	68.4
DT N	Ethal Davis School	37.8	7 Months	28.5	0.990			1.013	28.9	26.6
DT O	Grove Road	48.6	9 Months					1.000	48.6	44.7
DT P	High Road Woodford	37.8	8 Months	37.8	1.070			1.013	38.3	35.2
DT Q	Chigwell Rd M11	39.9	9 Months					1.000	39.9	36.7
DT R	Winston Way Primary	58.1	9 Months					1.000	58.1	53.4
DT S	Winston Way Gyrotory	58.9	9 Months					1.000	58.9	54.2
DT T	Chadwell Heath Primary	48.7	9 Months					1.000	48.7	44.8
DT U	Goodmayes Primary	39.7	9 Months					1.000	39.7	36.5
DT V	Isaac Newton Academy	33.8	9 Months					1.000	33.8	31.1
DT W	Inside Winston Way Prim	40.3	7 Months	40.3	0.980			1.013	40.9	37.6

Average Am/Pm ratios = Period adjustment factor ( $R_a$ )		1.013		#DIV/0!
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Background Site	Annual Mean 2018	Period Mean 2018	Ratio (Am/Pm)
(RB7) Ley Street	30.7	31.1	0.99
(BG2) B & D - Scrattons Fm	25.4	25.7	0.99
(EN7) Enfield - Pr.of Wales Sch	23.5	23.6	1.0
Average Ra = 0.99			
<b><u>Used For Site DTN</u></b>			

Background Site	Annual Mean 2018	Period Mean 2018	Ratio (Am/Pm)
(RB7) Ley Street	30.7	28.3	1.08
(BG2) B & D - Scrattons Fm	25.4	24.2	1.05
(EN7) Enfield - Pr.of Wales Sch	23.5	21.7	1.08
Average Ra = 1.07			
<b><u>Used For Site DTP</u></b>			

Background Site	Annual Mean 2018	Period Mean 2018	Ratio (Am/Pm)
(RB7) Ley Street	30.7	31.6	0.97
(BG2) B & D - Scrattons Fm	25.4	26.1	0.97
(EN7) Enfield - Pr.of Wales Sch	23.5	23.7	0.99
Average Ra = 0.98			
<b><u>Used For Site DTW</u></b>			



### Factor from Local Co-location Studies (if available)

The local co-location studies at the Redbridge 7, Ley Street, CMT = DT D and Redbridge 4, Gardner Close, CM4 = DT E gave an average local bias factor for 2018 of 1.02. This was derived by averaging the B Values from the Local Bias Adjustment Tool in accordance with the method in paragraph 7.192 of LAQM TG16. The average is then expressed as factor. 1 is added to the value. Finally an inverse is taken to give the bias adjustment factor.

<b>2018</b>	<b>Bias adjustment factor</b>
Background Redbridge local: CM7=DT D Bias A value = 1.07 Bias B value = -6%	
Roadside Redbridge local: CM4=DT E Bias A value = 0.99 Bias B value = 1%	
Average local: CM7=DT D and CM4=DT E As in method in paragraph 7.192 of LAQM (TG16) = <b>1.02</b>	
<b><u>National Default used</u></b> – (8 studies)	<b>0.92</b>

### Discussion of Choice of Factor to Use

For each of the two local sites there were only 9 months of “Good Precision” diffusion tube data. (Bureau Veritas advised us that due to over-exposure of the tubes between October to December 2018, these tube results are not as accurate as the others and therefore will be disregarded in our annualisation calculation).

Whilst overall automatic data capture at CM7 was good with 12 months of “Good data capture”, automatic data capture at CM4 was good overall but with only 10 months of “Good data capture”. The diffusion tubes are in similar exposure positions to the sampler inlets of the chemiluminescent analysers at the continuous sites. In deciding upon the choice of factor to use, we have applied the National Default of 0.92 in our calculations in preference to the local factor of 1.02 since the former derives from good precision data and eight sites.

### Bias adjustment factors for previous years:

2017: A national bias factor of 0.97 used (Lab: ESG Glasgow)

2016: A national bias factor of 1.03 used (Lab: ESG Glasgow)

**A.3 Adjustments to the Ratified Monitoring Data**

Short-term to Long-term Data Adjustment

No short to long term adjustments required this year to the ratified monitoring data.

**Appendix B Full Monthly Diffusion Tube Results for 2018**

**Table M. NO<sub>2</sub> Diffusion Tube Results**

Site ID	Valid data capture for monitoring period % <sup>a</sup>	Valid data capture 2018 % <sup>b</sup>	Annual Mean NO <sub>2</sub> (Bias Adj Factor =0.92)														Annual mean – raw data <sup>c</sup>	Annual mean – bias adjusted <sup>c</sup>
			Jan	Feb	March	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec				
DT A	75	75	30.0	32.1	37.8	26.2	20.5	20.4	21.5	24.8	29.9				27.0	24.9		
DT B	75	75	44.2	53.3	53.1	47.6	41.6	43.6	53.8	46.2	62.7				49.6	45.6		
DT C	75	75	46.7	57.0	54.0	51.0	41.6	51.2	55.7	42.2	59.2				51.0	46.9		
DT D	75	75	31.3	31.1	35.0	25.1	22.0	22.4	22.5	25.2	32.2				27.4	25.2		
DT E	75	75	26.0	42.9	46.8	40.0	32.9	31.5	34.2	41.5	41.3				37.5	34.5		
DT F	75	75	39.4	47.4	35.7	37.5	37.9	35.3	39.5	41.1	53.8				40.8	37.6		
DT G	75	75	45.7	51.0	60.9	49.2	48.7	71.2	54.7	44.0	77.9				55.9	51.5		
DT H	75	75	52.8	47.7	49.9	60.2	29.4	39.8	47.4	74.7	55.8				50.9	46.8		
DT I	75	75	60.2	65.6	71.9	50.1	42.0	35.5	34.8	49.3	52.5				51.3	47.2		
DT J	75	75	51.3	45.6	50.5	34.7	44.3	36.9	41.5	60.7	59.0				47.2	43.4		
DT K	75	75	41.4	62.0	52.7	55.3	30.2	62.5	44.1	43.1	57.9				49.9	45.9		

Site ID	Valid data capture for monitoring period % <sup>a</sup>	Valid data capture 2018 % <sup>b</sup>	Annual Mean NO <sub>2</sub> (Bias Adj Factor =0.92)														Annual mean – raw data <sup>c</sup>	Annual mean – bias adjusted <sup>c</sup>
			Jan	Feb	March	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec				
DT L	75	75	40.0	55.3	52.9	43.4	49.9	46.6	39.8	35.9	48.5				45.8	42.2		
DT M	75	75	73.9	82.4	82.4	70.4	63.9	66.8	68.2	75.9	85.2				74.3	68.4		
DT N	58	58	47.5	33.3	31.0	25.9	21.2	18.1	22.8						28.9	26.6		
DT O	75	75	55.2	54.9	55.1	52.4	38.8	37.1	41.3	47.0	55.2				48.6	44.7		
DT P	66	66	38.2	44.4		34.8	34.3	29.3	34.6	38.6	48.3				38.3	35.2		
DT Q	75	75	40.5	47.0	43.3	44.9	29.8	25.1	33.8	51.5	43.3				39.9	36.7		
DT R	75	75	61.7	61.8	61.4	58.6	50.0	60.5	55.8	55.6	57.4				58.1	53.4		
DT S	75	75	64.3	67.0	63.8	61.6	53.2	60.2	55.5	59.3	45.4				58.9	54.2		
DT T	75	75	53.0	62.9	56.7	46.3	44.9	42.5	43.1	46.2	43.2				48.7	44.8		
DT U	75	75	44.4	55.0	47.3	39.0	33.2	31.1	34.3	38.2	34.9				39.7	36.5		
DT V	75	75	32.9	43.3	41.4	37.4	28.6	29.6	28.6	30.1	32.3				33.8	31.1		
DT W	58	58	39.6	44.2	58.9	39.3	32.1	32.7			35.5				40.9	37.6		

Exceedance of the NO<sub>2</sub> annual mean AQO of 40 µg m<sup>-3</sup> are shown in **bold**.

<sup>a</sup> Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

<sup>b</sup> Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

<sup>c</sup> Means should be “annualised” in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%



### Distance Adjustment

The bias-adjusted NO<sub>2</sub> annual mean diffusion tube concentration exceedances reported at the sites listed in table N (above) have been distance corrected for the nearest location relevant for exposure. These predictions have been done using the NO<sub>2</sub> fall-off with distance calculator available on the LAQM Support website.

The following factors have been used to predict the annual mean NO<sub>2</sub> concentration (in µg/m<sup>3</sup>) at the the receptor/relevant exposure :

- How far from the KERB is the location where the measurement was made (in meters)
- How far from the KERB is the receptor/relevant exposure (in meters)
- The local annual mean background NO<sub>2</sub> concentration (in µg/m<sup>3</sup>)
- The measured annual mean NO<sub>2</sub> concentration (in µg/m<sup>3</sup>)

The measurement and background concentrations must be for the same year. The background concentration could come from the national maps published at (<http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>) or from a nearby monitor in a background location. 2016 National map background concentrations have been in this report. Use of a measured result from nearby background monitor for background concentration will be denoted by \*

Data for the distance of the kerb to the measurement location has been taken from table B in this report.

The calculator follows the procedure set out in paragraphs 7.77 to 7.79 of LAQM TG(16) and Box 2.3 of LAQM TG(09). The results will have greater uncertainty than measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large. Each distance should be greater than 0.1m and less than 50m. The NO<sub>2</sub> fall off with distance correction has only been applied to sites with relevant exposure that exceed the AQ objectives and that also meet the distance requirement.

**Table O. NO<sub>2</sub> Distance Corrected Diffusion Tube Results**

<i>Site ID</i>	<i>Annual mean – raw data<sup>c</sup></i>	<i>Annual mean – bias adjusted<sup>c</sup></i>	<i>Local Annual mean – background</i>	<i>Distance of measurement from kerb of nearest road (m)</i>	<i>Distance of receptor from kerb (m)</i>	<i>Annual mean – distance corrected</i>
DT A	27.0	24.9				
DT B	49.6	45.6	29.5	2.3	2	<b>46.1</b>
DT C	51.0	46.9	25.5	3.0	4.9	<b>44.2</b>
DT D	27.4	25.2				
DT E	37.5	34.5	27.3	4.2	11.3	32.5
DT F	40.8	37.6	20.9	1.2	8.7	30.7
DT G	55.9	51.5	25.3	1.5	6.4	<b>43.2</b>
DT H	50.9	46.8	25.3	1.3	4.3	<b>41.3</b>
DT I	51.3	47.2				
DT J	47.2	43.4	25.3	0.9	7.5	35.8
DT K	49.9	45.9	25.3	40	43.9	<b>44.4</b>
DT L	45.8	42.2	30.8	2.1	26.2	35.4

<i>Site ID</i>	<i>Annual mean – raw data <sup>c</sup></i>	<i>Annual mean – bias adjusted <sup>c</sup></i>	<i>Local Annual mean – background</i>	<i>Distance of measurement from kerb of nearest road (m)</i>	<i>Distance of receptor from kerb (m)</i>	<i>Annual mean – distance corrected</i>
DT M	74.3	68.4	30.8	3.0	4.8	<b>63.8</b>
DT N	28.9	26.6				
DT O	48.6	44.7	32.4	8.0	12.8	<b>42.7</b>
DT P	38.3	35.2				
DT Q	39.9	36.7				
DT R	58.1	53.4	26.4	3.2	16.8	<b>44.2</b>
DT S	58.9	54.2				
DT T	48.7	44.8	21.9	0.6	6.6	34.8
DT U	39.7	36.5				
DT V	33.8	31.1				
DT W	40.9	37.6				







Exceedance of the NO<sub>2</sub> annual mean AQO of 40 µg m<sup>-3</sup> are shown in **bold**.

<sup>a</sup> Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

<sup>b</sup> Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

<sup>c</sup> Means should be “annualised” in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%