2016 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management

June 2016

Peel Hall Planning Appeal Summary version

WARRINGTON
Borough Council

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Executive Summary: Air Quality in Our Area

Air Quality in Warrington

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Across the UK it is predicted[4] that poor air quality leads to 29,000 premature deaths from exposure to particulate pollution, and an additional 11,000 from exposure to nitrogen dioxide. For Warrington, 4.8% of all mortality[5] is attributable to man-made particulate pollution, which is equal to 95 associated deaths. This is slightly worse than the average for the north west of 4.6%. There are no figures available for Warrington on the health impact from nitrogen dioxide (NO_2) levels.

Whilst the majority of Warrington has good air quality, there are areas close to major roads where nitrogen dioxide levels are high and exceed national standards. There are current 3 Air Quality Management Areas (AQMAs) designated in Warrington: around the motorway network; Parker Street area; and Sankey Green Island.

The Council has expanded its' monitoring programme to consider NO_2 levels in a number of areas that were originally predicted by computer modelling to meet the objective limits. This monitoring has highlighted a number of areas, principally the main arterial roads that lead into the town centre, that have areas that are close to, or exceed, the limits. A detailed assessment has been produced with the intention to be designated a new AQMA by the end of October 2016. Action plans are then to be developed to try to tackle these exceedances and improve air quality.

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013
[4] Every breath we take: the lifelong impact of air pollution, Feb 2016
[5] Public Health Outcomes Framework Indicator 3.01 – Fraction of mortality attributable to particulate pollution, 2013

Measured levels for NO_2 across Warrington are slighlty raised when compared to the lower 2014 figures but the overall trend is that pollution levels are remaining constant when taking into account meteorological conditions that affect dispersion and secondary formation of pollutants.

Whilst particulates known as $PM_{2.5}$ are not included within the regulations, there is substantial health evidence of the impacts. Therefore action plans and policies are to be developed to include reducing $PM_{2.5}$ alongside nitrogen dioxide.

The current AQMAs, the detailed assessment and air quality data is available to be viewed at www.warrington.gov.uk/airquality

Local Priorities and Challenges

Local priorities revolve around a successful economy, reducing deprivation, improving the health inequalities across the wards. The Health and Wellbeing Strategy sets out the overarching aims for "Working together for stronger neighbourhoods, healthier people, a vibrant and resilient economy and greater equality across all our communities"

There are a number of challenges that the Council faces to improving air quality. The major challenge is to balance the needs of a successful local economy and, growth in housing and traffic with potential air quality impacts.

Warrington has a successful and expanding economy with major new projects such as the Omega site off the M62 motorway which includes new major warehousing, distribution and manufacturing industry. This brings much needed jobs and finance into the local economy but does increase heavy goods and delivery vehicles with increased employee journeys.

Across the UK, the housing issue of quantity and affordability presents a major challenge. For Warrington, the population is predicted to grow on average by 10% over the next 10 years, which equates to an average of 650 new homes required to be built per year. This brings increased traffic and also pressures on locations of developments for them not to be in existing areas of poor air quality.

Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by Warrington Borough Council can be found in Table 2.1. Further information related to declared AQMAs, including maps of AQMA boundaries are available online at https://www.warrington.gov.uk/info/201090/environmental_issues/2024/pollution The action plan for the current AQMAs is included within the Local Transport Plan 3 which is available at https://www.warrington.gov.uk/info/201080/streets_and_transport/2038/transport_planning_and_policy

We propose to declare a new AQMA for the town centre and major arterial link roads, namely Winwick Road, Knutsford Road and Latchford Village, Wilderspool Causeway, and Chester Road (see monitoring section). We propose to revoke the Parker Street and Sankey Green Island AQMAs and to include these in the town centre single AQMA (see monitoring section). A new action plan is proposed to be developed as a standalone policy which can then be referenced from transport, planning and health policies.

Automatic Monitoring Sites

Warrington Borough Council undertook automatic (continuous) monitoring at 3 sites during 2015. Table A.1 in Appendix A shows the details of the sites.

Monitoring data from the Selby Street AURN site is available at

https://uk-air.defra.gov.uk/networks/network-info?view=aurn

The data for Chester Road and Parker Street is available from the UK Air Quality website at

http://www.ukairquality.net/

Alternatively data can be provided by the Council on request.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

Non-Automatic Monitoring Sites

Warrington Borough Council undertook non- automatic (passive) monitoring of NO_2 using diffusion tubes at 45 sites during 2015. Table A.2 in Appendix A shows the details of the sites.

A map showing the location of the monitoring sites is provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Current AQMAs continue to show exceedances in the annual mean objective and confirm the need for these areas to remain designated.

As with previous annual reviews there continues to be measured exceedances on Mersey Street, Winwick Road, Knutsford Road (including Latchford Village area), Wilderspool Causeway and Chester Road. These areas have now all been included within the detailed assessment which confirms the conclusions from the monitoring results and that the Council needs to progress to designating these areas as a single AQMA. The detailed assessment report was submitted to Defra on 13 June 2016 for appraisal. The Council now expects to designate the proposed AQMA by the end of September following approval by the Executive Board.

Additional exceedances have been found at 3 locations in Padgate: DT40 (King Edward Street), DT41 (Padgate Lane 1), DT42 (Padgate Lane 2). DT40 records 45.6, but when the distance calculation is applied to assess levels at the façade of the nearest property, this falls but does show a slight exceedance of 41.6 µg/m^3. Similarly for DT42 the measured exceedance falls but again shows a slight exceedance of 41.7 µg/m^3. At DT40, the levels falls below the objective to 37.8µg/m^3. The exceedances represent a relatively limited number of residential close to a major traffic lighted junction. In additon, during 2015 there was a prolonged period of road works in the area that may have led to increased levels. Therefore it is proposed to continue monitoring at these locations in 2016 and, if further exceedances are observed, then the Council will progress to a detailed assessment.

There are no locations where there is a measured annual means greater than 60µg/m^3, which would indicate that an exceedance of the 1-hour mean objective could be likely.

Trend data for NO_2 is shown in Appendix C. This demonstrates the annual fluctuations that can be seen in levels which has been concluded to be meteorological conditions that affect dispersion and secondary formation of pollutants. The overall trend when taking into account annual fluctactions suggests that levels are remaining constant.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Selby Street	Urban Background	359,151	388,218	NO_2, SO_2, $PM_{2.5}$, PM_{10}	N	Chemilumin-escence /FDMS	N (22m)	50m	2.5
CM2	Parker Street	Roadside	360,015	387,907	NO_2	Y	Chemilumin-escence	Y (1m)	2 m	1.5
CM3	Chester Road	Roadside	360,331	386,454	NO_2	N	Chemilumin-escence	Y (1m)	2 m	1.5

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT1	WA08 Risley Moss	Rural background	366,949	392,004	NO_2	N	n/a	n/a	N	1.5
DT2	WA14 Bruche Avenue	Urban Background	362,792	389,503	NO_2	N	5	28	N	1.5
DT3	WA22 Selby Street	Urban Background	359, 152	388, 218	NO_2	N	n/a	50	Y	2.5
DT4	WA23 Selby Street	Urban Background	359, 152	388, 218	NO_2	N	n/a	50	Y	2.5
DT5	WA24 Selby Street	Urban Background	359, 152	388, 218	NO_2	N	n/a	50	Y	2.5
DT6	WA111 M6 Manchester Road	Roadside	366,102	389,214	NO_2	Y	0	16	N	2.5
DT7	WA20 Parker St	Roadside	360,044	388,048	NO_2	Y	2	1.5	N	2.5
DT8	WA21 White Street	Roadside	360,051	388,028	NO_2	Y	0	22	N	2.5
DT9	WA102 Wilson Patten Street	Roadside	360,309	387,848	NO_2	Y	5	1	N	2.5
DT10	WA114 Winmarleigh Street	Roadside	360,243	387,932	NO_2	Y	2	2	N	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT11	WA29 Crosfield Island 1	Roadside	359,450	388,242	NO_2	Y	0	10	N	2.5
DT12	WA67 Crosfield Island 2	Roadside	359,509	388,235	NO_2	Y	0	14.5	N	2.5
DT13	WA65 Baxter Street 1	Roadside	359,452	388,111	NO_2	Y	0	2	N	2.5
DT14	WA66 Baxter Street 2	Roadside	359,392	388,104	NO_2	Y	0	18	N	2.5
DT15	WA85 Old Liverpool Road 4	Roadside	359,430	387,947	NO_2	N	4	2	N	2.5
DT16	WA30 Old Liverpool Rd	Roadside	358,867	387,672	NO_2	N	3	3	N	2.5
DT17	WA86 Old Liverpool Road 5	Roadside	357,765	387,908	NO_2	N	2	3	N	2.5
DT18	WA68 Chester Road	Roadside	360,648	387,388	NO_2	N	3	3	N	2.5
DT19	WA72 Chester Road 3	Roadside	360,513	387,048	NO_2	N	5.5	3	N	2.5
DT20	WA87 Chester Road 5	Roadside	360,407	386,237	NO_2	N	4	2	N	2.5
DT21	WA93 Walton	Roadside	360,450	386,052	NO_2	N	3	2	N	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
	Terrace									
DT22	WA76 Wilderspool Causeway	Roadside	360,880	387,247	NO_2	N	2.5	2.5	N	2.5
DT23	WA94 Wilderspool Causeway 2	Roadside	361,319	386,508	NO_2	N	0	2	N	2.5
DT24	WA03 Stockton Heath 1	Roadside	361,393	386,194	NO_2	N	1	3	N	2.5
DT25	WA90 Stockton Heath 3	Roadside	361,470	385,981	NO_2	N	3	2	N	2.5
DT26	WA77 Knutsford Road 1	Roadside	361,065	387,645	NO_2	N	0	3	N	2.5
DT27	WA103 Knutsford Road 2	Roadside	361,898	387,430	NO_2	N	5	7	N	2.5
DT28	WA101 York Street	Roadside	361,019	387.633	NO_2	N	0	47m (to Knutsford Road	N	2.5
DT29	WA91 Latchford Village	Roadside	362,700	387,153	NO_2	N	4.5	3	N	2.5
DT30	WA92 Kingsway South (Latchford)	Roadside	362,810	387,187	NO_2	N	0	3	N	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT31	WA105 Latchford Village 2	Roadside	362,779	387,288	NO_2	N	1	1.5	N	2.5
DT32	WA104 Kingsway South 2	Roadside	362,806	387,533	NO_2	N	7	3	N	2.5
DT33	WA115 Latchford Village 3	Roadside	362,604	387,222	NO_2	N	0	2	N	2.5
DT34	WA78 Mersey Street	Roadside	361,005	388,145	NO_2	N	2.5	6	N	2.5
DT35	WA88 Mersey Street 2	Roadside	361,091	388,246	NO_2	N	8	3	N	2.5
DT36	WA100 Napier Street	Roadside	361,005	388,106	NO_2	N	0	35 (to Mersey Street)	N	2.5
DT37	WA99 James Lee House	Roadside	361,097	388,459	NO_2	N	0	3	N	2.5
DT38	WA80 Bewsey Street	Near Railway Line and expressway	360,462	388,501	NO_2	N	0	30 (to train line)	N	2.5
DT39	WA83 Crosfield Street	Roadside	360,040	388,406	NO_2	N	4.5	2.5	N	2.5
DT40	WA89 King Edward Street	Roadside	362,392	389,101	NO_2	N	2.5	2	N	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT41	WA107 Padgate Lane 1	Roadside	362,235	389,248	NO_2	N	2.5	1.5	N	2.5
DT42	WA108 Padgate Lane 2	Roadside	362,060	389,170	NO_2	N	2.5	2	N	2.5
DT43	WA95 Winwick Road 1	Roadside	360,598	389,820	NO_2	N	5.5	5	N	2.5
DT44	WA96 Winwick Road 2	Roadside	360,484	390,416	NO_2	N	5.5	3	N	2.5
DT45	WA112 Winwick Road 3	Roadside	360,434	390,968	NO_2	N	0	2	N	2.5
DT46	WA97 Long Lane	Roadside	360,647	390,362	NO_2	N	8	5	N	2.5
DT47	WA113 Harvey Court Sandy Lane West	Roadside	360,564	391,127	NO_2	N	0	5	N	2.5

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
CM1	Urban Background	Automatic	94.4	94.4	24.0	26.7	25.6	20.5	24.4
CM2	Roadside	Automatic	75.5	75.5	**45.9**	**52.7**	**49.4**	**53.8**	**40**
CM3	Roadside	Automatic	97.3	97.3	**64.1**	**42.9**	37.7	32.2	37.0
DT1	Rural background	Diffusion tube	66.7	66.7	21.1	26.1	24.6	19.1	25.2
DT2	Urban Background	Diffusion tube	100	100	20.9	24.5	24.5	19.1	23.3
DT3	Urban Background	Diffusion tube	100	100	24.4	27.7	25.6	20.3	24.4
DT4	Urban Background	Diffusion tube	91.7	91.7	25.6	28.6	25.0	20.5	25.0
DT5	Urban Background	Diffusion tube	91.7	91.7	23.2	27.9	25.2	20.7	24.4
DT6	Roadside	Diffusion tube	91.7	91.7	-	-	-	**41.7**	**55.5**
DT7	Roadside	Diffusion tube	58.3	58.3	**58.0**	**67.0**	**67.5**	**47.6**	**55.2**
DT8	Roadside	Diffusion tube	91.7	91.7	37.3	**40.2**	39.2	27.2	36.2

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
DT9	Roadside	Diffusion tube	91.7	91.7	-	-	**54.4**	**41.1**	**47.0**
DT10	Roadside	Diffusion tube	100	100	-	-	-	29.5	**40.1**
DT11	Roadside	Diffusion tube	100	100	**44.1**	**47.4**	**48.2**	35.3	**44.1**
DT12	Roadside	Diffusion tube	83.3	83.3	38.2	**42.5**	**42.3**	33.8	**41.2**
DT13	Roadside	Diffusion tube	100	100	**46.6**	**51.1**	**54.6**	**40.0**	**51.0**
DT14	Roadside	Diffusion tube	83.3	83.3	38.4	**43.5**	**43.3**	31.0	37.4
DT15	Roadside	Diffusion tube	100	100	38.9	37.9	38.9	34.7	**41.1**
DT16	Roadside	Diffusion tube	100	100	32.8	38.7	37.1	33.4	**41.4**
DT17	Roadside	Diffusion tube	100	100	-	**43**	37.5	30.1	36.6
DT18	Roadside	Diffusion tube	91.7	91.7	**41.7**	**47**	**51.2**	35.7	**44.7**
DT19	Roadside	Diffusion tube	100	100	37.5	**44**	**44.7**	34.2	39.9

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
DT20	Roadside	Diffusion tube	58.3	58.3	-	**45**	37.9	30.1	**40.1**
DT21	Roadside	Diffusion tube	100	100	-	**41**	**44.7**	33.2	**45.1**
DT22	Roadside	Diffusion tube	91.7	91.7	38.2	**43**	39.8	30.4	39.1
DT23	Roadside	Diffusion tube	33.3	33.3	-	**40**	**42.2**	31.8	**45.6**
DT24	Roadside	Diffusion tube	83.3	83.3	**46.7**	**53**	**52.2**	37.1	**50.5**
DT25	Roadside	Diffusion tube	83.3	83.3	-	39	36.3	29.5	35.3
DT26	Roadside	Diffusion tube	100	100	39.0	**44**	**43**	31.9	**40.2**
DT27	Roadside	Diffusion tube	100	100	-	-	39	28.2	36.0
DT28	Roadside	Diffusion tube	91.7	91.7	-	-	39.6	26.5	32.9
DT29	Roadside	Diffusion tube	91.7	91.7	-	**42**	**44.5**	35.9	**44.1**
DT30	Roadside	Diffusion tube	100	100	-	**45**	**45**	33.6	**42.0**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
DT31	Roadside	Diffusion tube	100	100	-	-	**47.2**	**43.7**	**49.3**
DT32	Roadside	Diffusion tube	91.7	91.7	-		39.6	29.6	38.9
DT33	Roadside	Diffusion tube	100	66.7	-	-	-	-	35.4
DT34	Roadside	Diffusion tube	91.7	91.7	**40.3**	**47**	**48.3**	37.1	**45.9**
DT35	Roadside	Diffusion tube	91.7	91.7	-	**49**	**51.8**	**42.0**	**54.2**
DT36	Roadside	Diffusion tube	83.3	83.3	-	-	**44.5**	27.7	38.1
DT37	Roadside	Diffusion tube	25	25	-	-	**40.1**	30.3	**43.5**
DT38	Near Railway Line and expressway	Diffusion tube	100	100	38.1	**44**	**41.9**	31.6	36.6
DT39	Roadside	Diffusion tube	100	100	**42.9**	**49**	**43.5**	33.3	**45.7**
DT40	Roadside	Diffusion tube	83.3	83.3	-	**49.0**	**48.9**	38.8	**45.6**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
DT41	Roadside	Diffusion tube	91.7	91.7	-	-	-	31.0	**41.4**
DT42	Roadside	Diffusion tube	100	100	-	-	-	33.9	**45.8**
DT43	Roadside	Diffusion tube	100	100	-	-	**41.9**	32.0	39.5
DT44	Roadside	Diffusion tube	75	75	-	-	**54.9**	**45.8**	**47.2**
DT45	Roadside	Diffusion tube	91.7	91.7	-	-	-	**40.0**	**52.0**
DT46	Roadside	Diffusion tube	50	50	-	-	**42.4**	32.3	**42.8**
DT47	Roadside	Diffusion tube	100	100	-	-	-	27.1	37.6

Notes: Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
CM1	Urban Background	Automatic	94.4	94.4	0	0	0	0	0
CM2	Roadside	Automatic	75.5	75.5	0 (136.8µg/m^3)	**21** (208.6µg/m^3)	0	0 (138.0µg/m^3)	0 (118 µg/m^3)
CM3	Roadside	Automatic	97.3	97.3	0 (141.0µg/m^3)	0 (122.4µg m^3)	0 (109.1µg/m^3)	0	0

Notes: Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
CM1	Urban Background	96.4	96.4	19	19	18	16	15

Notes: Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) All means have been "annualised" as per Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2011	2012	2013	2014	2015
CM1	Urban Background	96.4	96.4	11	7	7	5	2

Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

Table A.7 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
CM1	Urban Background	92.3	92.3	13	13	14	14	11

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) All means have been "annualised" as per Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.8 – SO_2 Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) (1)	Valid Data Capture 2014 (%) (2)	Number of Exceedances (percentile in bracket) (3)		
				15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
CM1	Urban background	98	94	0	0	0

Notes: Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%)

(3) If the period of valid data is less than 85%, the relevant percentiles are provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2015

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT1	29.47	29.38	25	-	15.29	14.78	-	14.3	-	-	22.91	21	21.5	25.2
DT2	25.17	27.02	23.11	18.12	13.57	15.16	14.48	15.21	22.19	26.27	18.42	19.66	19.9	23.3
DT3	23.64	27.01	24.17	19.5	13.99	16.25	14.07	15.77	21.45	29.17	21.59	23.41	20.8	24.4
DT4	24.04	27.16	24.6	19.49	13.54	-	15.17	15.6	21.57	28.05	20.67	24.63	21.3	25.0
DT5	28.05	25.04	24.52	21.81	13.79	14.08	14.2	15.83	-	27.74	19	25.6	20.9	24.5
DT6	52.69	51.32	49.4	49.38	-	42.58	29.78	44.1	57.08	61.35	40.91	38.33	47.0	**55.1**
DT7	-	-	-	42.33	36.72	-	-	40.93	54.45	58.44	45.5	45.83	46.3	**54.3**
DT8	-	43.73	34.05	28.02	26.52	25.22	24.61	25.8	31.18	35.25	34.71	30.23	30.8	36.2

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT9	-	50.29	42.88	35.04	32.82	39.01	36.45	39.41	42.21	48.73	40.23	33.41	40.0	**47.0**
DT10	39.96	41.81	39.44	32.22	25.86	28.48	29.48	28.36	32.95	39.29	39.93	33.03	34.2	**40.1**
DT11	39.87	41.36	41.69	31.74	28.05	29.18	32.79	38.75	41.8	38.96	40.2	46.67	37.6	**44.1**
DT12	35.3	40.92	37.93	41.54	26.8	30.72	29.63	30.81	35.6	-	-	42.17	35.1	**41.2**
DT13	42.71	42.3	48.86	34.93	37.11	38.99	37.8	43.86	57.81	50.8	43.42	43.43	43.5	**51.0**
DT14	33.27	40.01	-	-	29.08	25.38	25.97	25.98	38.09	41.66	30.45	28.87	31.9	37.4
DT15	39.03	46.73	38.13	32.45	29.93	25.69	30.31	29.76	37.62	38.27	39.61	33.02	35.0	**41.1**
DT16	30.8	43.76	42.84	37.17	27.64	29.35	28.57	33.45	35.58	37.93	34.95	41.11	35.3	**41.4**
DT17	38.5	35.71	36.61	29.02	25.71	27.28	27.02	24.01	35.62	39.61	27.98	27.9	31.2	36.6
DT18	36.04	44.95	39.45	35.75	32.39	-	37.01	33	41.89	47.79	37.39	33.95	38.1	**44.7**

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT19	39.3	43.97	38.52	31.24	25.16	27.48	27.98	26.9	37.25	41.38	35.17	34.1	34.0	39.9
DT20	-	-	-	43.26	27.4	31.85	26.76	29.39	34.96	39.83	-	-	33.4	39.1
DT21	40.37	46.33	37.02	46.3	35.46	32.71	35.62	32.72	39.56	40.56	42.56	32.57	38.5	**45.1**
DT22	-	43.34	36.14	24.24	28.81	29.87	30.96	26.48	37.4	41.99	35.55	32.29	33.4	39.1
DT23	-	45.88	39.12	32.42	-	-	-	-	-	-	-	37.97	38.8	**45.6**
DT24	43.98	52.25	45.96	44.14	34.6	37.58	41.95	40.31	43.51	46.13	-	-	43.0	**50.5**
DT25	37.57	37.29	35.78	27.54	21.83	24.97	22.96	23.87	-	41.2	27.75	-	30.1	35.3
DT26	43.27	40.49	39.04	32.42	26.7	30.47	28.58	27.56	37.29	40.74	34.11	31.07	34.3	**40.2**
DT27	36.34	39.61	32.5	27.89	23.33	26.1	25.76	27.78	31.21	38.87	29.97	28.78	30.7	36.0
DT28	-	37.57	33.42	26.62	21.13	21.66	24.17	20.78	28.85	38.93	29.06	25.96	28.0	32.9

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT29	45.86	44.29	38.24	35.99	26.81	32.98	31.69	35.72	37.4	46.78	37.79	-	37.6	**44.1**
DT30	41.59	39.99	35.33	38.55	25.9	31.47	27.31	35.55	39.34	52.37	30.69	31.97	35.8	**42.0**
DT31	39.65	55.56	45.7	44.29	30.4	39.27	35.66	37.96	40.11	52.76	44.23	39.26	42.1	**49.3**
DT32	36.27	41.22	41.65	31.94	23.81	27.66	26.24	-	31.98	38.71	33.27	32.55	33.2	38.9
DT33	-	-	-	-	25.03	28.63	29.95	27.24	37.78	45.65	27.67	35.11	32.1	37.7
DT34	39.73	44.74	42.36	39.15	26.18	33.23	35.75	36.6	41.58	50.8	-	40.81	39.2	**45.9**
DT35	-	53.9	48.76	48.16	34.44	37.76	40.68	46.86	45.53	51.62	54.35	46.29	46.2	**54.2**
DT36	-	41.72	38.28	27.24	25.81	31.49	30.33	27.52	32.14	39.06	-	31.56	32.5	38.1
DT37	-	-	-	-	-	30.46	-	-	-	40.64	40.22	-	37.1	**43.5**
DT38	33.46	36.46	34.15	30.31	22.92	26.03	25.26	27.92	34.44	37.67	31.99	34.1	31.2	36.6

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT39	41.31	46.18	40.43	38.45	27.42	31.31	30.82	34.77	37.8	58.55	41.69	38.69	39.0	**45.7**
DT40	40.48	35.08	45.25	39.67	27.65	-	-	35.42	32.96	53.26	39.62	39.14	38.9	**45.6**
DT41	-	42.76	39.12	42.83	23.67	30.81	30.05	34.11	36.06	38.85	39.08	30.84	35.3	**41.4**
DT42	40.99	47.82	42.17	41.29	30.36	34.1	32.1	31.86	38.3	46.19	40.12	42.88	39.0	**45.8**
DT43	34.76	43.8	41.27	30.05	26.21	31.56	30.17	33.02	29.59	38.56	36.45	28.73	33.7	39.5
DT44	-	46.26	-	33.8	37.25	42.26	18.18	45.73	44.41	46.85	-	47.53	40.3	**47.2**
DT45	-	54.95	45.75	48.65	38.16	43.65	40.65	48.91	40.1	47.99	45.5	33.43	44.3	**52.0**
DT46	41.14	43.41	39.16	-	28.91	-	-	-	-	-	45.67	20.8	36.5	**42.8**
DT47	39.45	43.04	33.44	31.52	23.7	23.24	25.16	27.1	30.55	38.06	36.45	32.76	32.0	37.6

(1) See Appendix C for details on bias adjustment

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

Figure 1 - Trend in NO2 levels

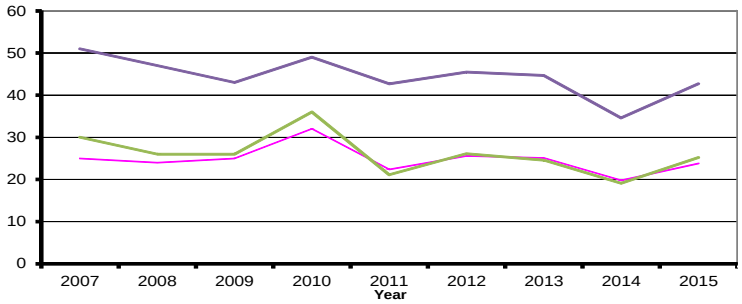
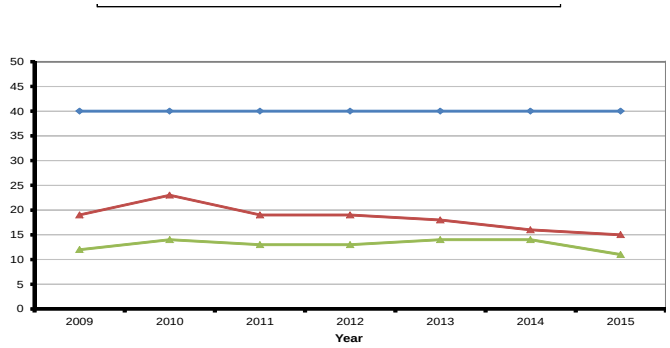


Figure 2 - Trend in PM10 and PM2.5 levels



Diffusion Tube Bias Adjustment

The Council uses Gradko International Ltd laboratories to supply and analyse our diffusion tubes. The tubes are prepared using 20% triethanolamine (TEA) in water. Manufacture and analysis of the tubes by Gradko are covered by UKAS accreditation with the WASP results for 2015 ranking the laboratory as 'satisfactory' for 100% of results. Triplicate tubes are co-located with our automated site that benefits from full quality control procedures as part of the AURN and includes an independent audit by Ricardo-AEA.

Local bias adjustment factors, using the Selby Street background data, have been calculated and used as this is considered to more effectively represent the local conditions and therefore any bias calculated is considered more relevant. Continued use of this also enables comparison with previous year's datasets. The analyser at Selby Street is affiliated within the AURN and is subject to their data quality checks and auditing. There have been no highlighted performance issues or significant maintenance issues with the analyser.

From using the tri-located tubes at Selby Street the Warrington study there were 12 periods of data, all recording good precision, collected for 2015, with a bias adjustment factor of 1.17 and a bias of 17%.

Table C1 shows the seasonal correction calculation for 3 tubes: DT7, DT20 and DT33 using the Selby Street site. Other tubes with less than 75% data capture have not been adjusted due to the missing data being sporadic throughout the year.

Table C.1 – Seasonal corrections

		Period of data		Average	Annual average	Factor	Corrected
WA87	Chester Rd 5	1/4/2015	6/11/2015	39.1		1.025	40.1
	Selby Street	1/4/2015	6/11/2015	23.8	24.4		
WA20	Parker Street	1/4/2015	7/1/2016	54.3		1.017	55.2
	Selby Street	1/4/2015	7/1/2016	24	24.4		
WA115	Latchford Village 3	30/4/2016	7/1/2016	37.7		0.938	35.4
	Selby Street	30/4/2016	7/1/2016	26	24.4		

QA/QC of Automatic Monitoring

QA/QC was contracted to ESU1 Ltd for the NOx and SO2 analysers at the Selby Street, and for NOx at the Parker Street and Chester Road sites during 2015. Fortnightly calibrations are carried out by a trained officer from the Council. Six monthly routine services are carried out by the contractor at each site. In addition, Ricardo-AEA provide 6 monthly independent QC audit checks for the Selby Street site. All QC checks have passed for each site.

The PM10 and PM2.5 FDMS analysers are affiliated into the AURN. Servicing is carried out by Air Monitors Ltd with 6 monthly QC audits by Ricardo-AEA on behalf of Defra. Fortnightly calibration checks are completed by a trained Council Officer with data supplied for verification to Bureau Veritas and Ricardo-AEA acting on behalf of Defra.

Appendix D: Map(s) of Monitoring Locations

Figure 3- Map of diffusion tube locations

Figure 4 - Map of Selby Street monitoring station

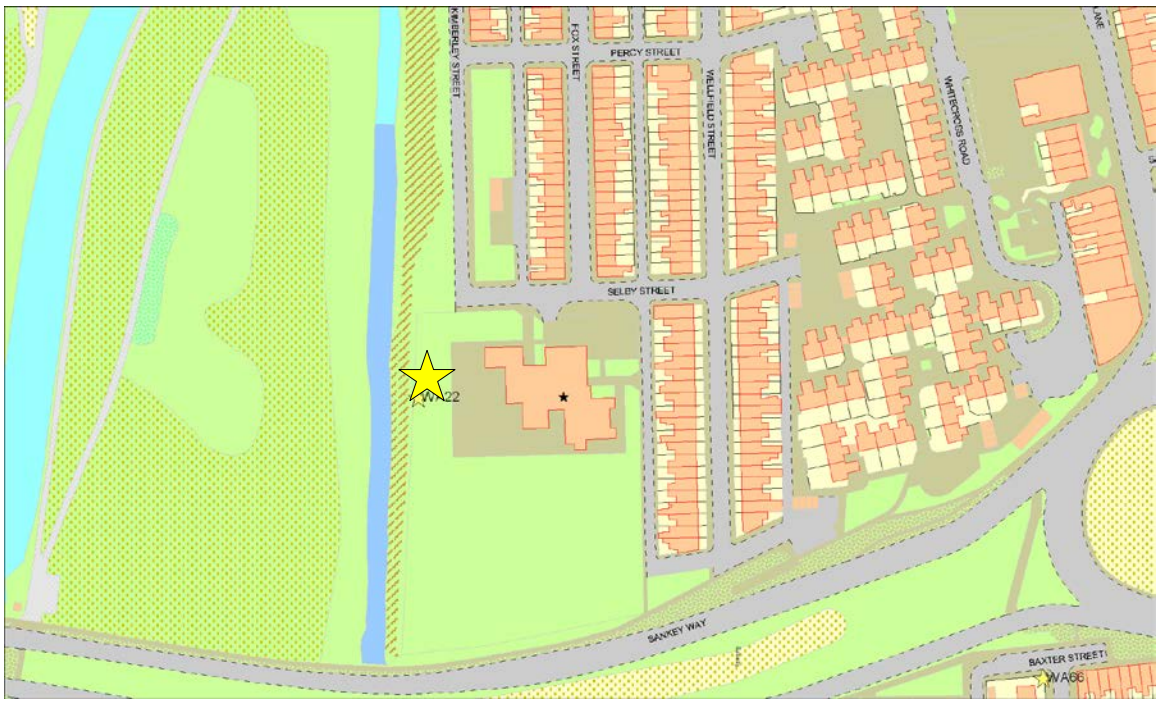


Figure 5 - Map of Chester Road analyser location

Figure 6- Map of Parker Street monitor location