2018 Air Quality Annual Status Report (ASR)

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

Date 24th April, 2018

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Executive Summary: Air Quality in Our Area

Telford and Wrekin Council have undertaken an annual status report which reviews all relevant data from 2017 obtained through diffusion tube monitoring.

This review has shown that overall, air quality within the borough of Telford and Wrekin shows very good compliance with AQ objectives, and that levels of pollutants within the Borough are relatively stable. This would indicate that all measures undertaken to ensure the wholesomeness of the air quality of the borough are currently working.

Historically, Telford and Wrekin Council have been able to monitor air quality through data provided by Ironbridge Power Station however this is no longer possible as the powers station was decommissioned in December 2015.

To fulfil our statutory duties under Part IV of the Environment Act 1995, in 2016 we introduced a new air quality monitoring strategy which involved the use of diffusion tubes in 20 locations across the Borough in order to monitor the concentrations of NO_2, predominantly being emitted from road traffic sources.

After seeing the results from 2016, we were able to identify two areas within the borough, namely Watling Street and Coach Central, where air quality levels were considered to be a potential concern. The data gathered during 2016 demonstrated that the AQ objectives have not been breached, however Telford and Wrekin Council are committed to ensure that a proactive approach to air quality is taken. This monitoring identified the need to implement further monitoring in these locations to attain a more detailed assessment of air quality within these locations. During 2017 we installed further diffusion tubes in these locations in order to better understand the extent of the problem in this location. Measures have been introduced to improve air quality which involved the introduction of smart traffic signalling. Monitoring then ceased in areas that were identified to have very low NO_2 concentrations.

2017 has identified that the measures that were put in place in Watling Street have improved the NO_2 levels. It has also shown that in Coach Central here is not an issue where monitoring has been carried out in appropriate areas with relevant exposure. Going forward we plan to continue to monitor the levels in the Watling Street/Mill Bank

area to ensure the levels are not breached, we also plan on putting some measures in place to reduce the levels in these areas further i.e. introducing signs which compel motorists to turn off their engines whilst waiting at traffic lights, the impact of these measures will be monitored throughout the year. Once again we plan to review the locations of our diffusion tubes.

In light of the boroughs plans to continue increasing the number of homes and businesses within the Borough, an Air Quality Strategy has been produced which will see the continuation of diffusion tube monitoring for NO_2 across the borough (Appendix C). This is to ensure the continued wholesomeness of the air of the Borough.

No further assessments are required for any of the pollutants monitored within the Borough.

Air Quality in Telford and Wrekin Council

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 i.e. children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities, 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].

The borough of Telford and Wrekin is a predominantly rural area on the north-eastern edge of Shropshire. The borough has a population of 166,641 (2011 estimate, Office for National Statistics) covering 29,000 hectares with its major settlement being Telford, which incorporated the existing towns of Dawley, Madeley, Oakengates and Wellington upon its construction as a New Town. The market town of Newport is the boroughs second largest populated area.

[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

The main sources of air pollution in Telford and Wrekin are emissions from busy roads. The M54 traverses the Borough across the main central urban area, and the majority of the main roads within the Borough are also focussed in this area, including the A41, the A518, the A5, A442, A4169, and the A4640.

There are a number of registered Part A processes, (12 A2 processes), 31 part B processes, 17 petrol stations, 6 dry cleaning installations, and 1 mobile plant within the Borough. There is a main railway line traversing the centre of the Borough, as well as an unused rail freight terminal.

The table below outlines the work undertaken so far, the conclusions of the reports, and the summaries of any further action.

Table 1.1 – Summaries of Reports

Year	Outcomes	Summaries
1998	PR	Prediction of exceedances
1999	PR	Prediction of exceedances
2000	USA	Not significantly affected by emissions (CO, Benzene, 1,3-Butadiene, Pb, SO_2, PM_{10}); any breaches will be negligible
2001	PR	Prediction of exceedances
2002	PR	Declaration of AQMA
2003	USA	Exceedances of SO_2 from Ironbridge Power Station, and of NO_2 from road traffic emissions in Ironbridge Gorge. Review of AQMAs determined there would be no exceedances by 2005.
2004	PR	Detailed assessment of NO_2 and SO_2 from Ironbridge Power Station and vehicular traffic. Objectives will be met in 2005 so no further work is necessary.
2005	PR	No exceedances of relevant air quality objectives, Revocation of AQMA
2006	USA	No exceedances of relevant air quality objectives
2007	PR	No exceedances of relevant air quality objectives
2008	PR	No exceedances of relevant air quality objectives
2009	USA	No exceedances of relevant air quality objectives
2011	PR	No exceedances of relevant air quality objectives (includes data from 2010)
2012	USA	No exceedances of relevant air quality objectives
2013	PR	No exceedances of relevant air quality objectives
2014	PR	No exceedances of relevant air quality objectives
2015	USA	No exceedances of relevant air quality objectives
2016	ASR	No exceedances of relevant air quality objectives

2017	ASR	No exceedances of relevant air quality objectives

Telford and Wrekin do not have any AQMAs. Telford and Wrekin have an air quality strategy, it ensures that air quality is given the significance it deserves and enshrines the Council's commitment to ensure that new development within the Borough demonstrate zero impact.

Actions to Improve Air Quality

Telford and Wrekin Council is committed to ensuring that the air quality within our borough remains excellent, as previous monitoring has indicated.

The current approach remains with regards to assessing planning applications, and to see if they meet the criteria for significance under "EPUK AQ Planning Guidance". This states that significance is:

- Number of properties affected by slight, moderate or major air quality impacts and a judgement on the overall balance.
- Where new exposure is being introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant.
- The magnitude of the changes and the descriptions of the impacts at the receptors i.e. Tables 4 and 5 findings.
- Whether or not an exceedance of an objective or limit value is predicted to arise in the study area where none existed before or an exceedance area is substantially increased.
- Whether or not the study area exceeds an objective or limit value and this exceedance is removed or the exceedance area is reduced.
- Uncertainty, including the extent to which worst-case assumptions have been made.
- The extent to which an objective or limit value is exceeded, e.g. an annual mean NO2 of 41 µg/m^3 should attract less significance than an annual mean of 51 µg/m^3.

Telford and Wrekin Council have secured a funding to create and implement a Local Sustainable Transport plan and will continue to push for such funding in the future. Analysis of the Telford Strategic Transport Model (TSTM) has identified that over half the number of car trips in the AM peak hour are less than 10km in length with 22% being less than 5km. This confirms the potential for transfer to more sustainable forms of travel. The model has been used, in conjunction with the DfT Basic Local Authority Carbon Tool, to assess the likely carbon savings from both the key component and the large project bid. The baseline number of car trips in the model area is 39,069 averaged over the morning and evening peak hours with an average speed of 48.6 km/hr. Total carbon emissions is 44,440 tonnes.

Increased Sustainable Transport Use - it is estimated that the key component element of the bid will achieve modal transfer of up to 10% based on the following evidence:

(1) Surveys undertaken as part of the development of the Telford Strategic Transport Model confirm the considerable scope for mode transfer in Telford. Over half the car trips in the AM peak hour are less than 10km in length with 22% less than 5km;

(2) A reduction of 9% in car travel was achieved in the Sustainable Travel Demonstration Towns over a five year period with investment of between £4.4m (Worcester) and £6.8m(Peterborough). The increase in bus trips was between 10 and 22%, walking 10-13% and cycling 26-30%. The percentage reduction in the number of car driver trips was greater, the shorter the trip;

(3) A personal travel planning project carried out by Sustrans in Gloucester involving 4360 households achieved a 12% shift to sustainable modes for investment of £160k; The Cycling Demonstration Towns programme shows an average increase in cycling across all six towns of 27% and a BCR of 3+. The TSTM has been used to assess the implications of a 10% modal shift in terms of the baseline data set out in B2 above. The number of car trips will reduce from 39,069 to 35,005 averaged over the morning and evening peak hours. Average speed will increase from 48.6 km/hr to 55 km/hr. Carbon Savings - The TSTM has also been used, in conjunction with the Carbon Toolkit to assess the carbon impact of a 10% modal shift. The key component bid will reduce the baseline figure from 44,440 tonnes to 40,140 tonnes. The annual saving is estimated £126,593 at 2002 prices based on TUBA valuations of £30.29 per tonne.

In light of 2016 diffusion tube monitoring results, Telford and Wrekin Council took relevant steps to address the two areas identified as having poorer air quality than other areas in the borough. To demonstrate this, the council's Public Protection Department and Highways department introduced smart traffic lights at the Watling street junction to improve traffic flow and reduce engine idling. This project has now been completed and the results from monitoring in 2017 show that the levels of NO_2 have decreased from 39.07 to 32.46.

In 2017 the council introduced additional diffusion tubes at four locations that represent relevant exposure in close proximity to Coach Central, where NO_2 concentrations were identified as some of the highest in the borough. This is the case, as after liaising with DEFRA, we understood that the diffusion tube location located at Coach Central in 2016 monitoring did not represent relevant exposure based the AQ Objectives. The monitoring in this area shows that where there is relevant exposure the levels of NO_2 are well below the AQO. As a result of this 4 of the tubes in this area are being removed to concentrate on monitoring in Mill Bank, the 2017 monitoring identified Mill Bank as having the highest NO_2 levels.

Conclusions and Priorities

Telford and Wrekin's priorities for the coming year are to continue diffusion tube monitoring for NO_2 in order to continue to build a clearer picture on the current Air Quality within Telford and Wrekin. 2018 monitoring will however extend to new locations where last year's monitoring provided an indicative idea of poorer air quality. This is to provide a more robust assessment of the extent of air quality in these areas so as to justify any future action that may be required. These additional 4 locations will be referred to as 'new locations' in table 1.2 as well as a justification for monitoring.

For the continuation of previous monitoring locations, to ensure that the diffusion tubes have been appropriately sited road traffic count data has been used to determine which remain the busiest roads, and where the nearest relevant receptors are. The busiest roads (excluding the M54 and slip roads) are identified in table 1.2.

Table 1.2 – locations of the busiest roads as monitored by Telford & Wrekin Council

Tube No.	Location	Justification	Status

1	B4373 Mossey Green Way	M54, B4373	Continued in 2018 monitoring
2	New Road	Wrockwardine Wood Way	Continued in 2018 monitoring
3	Checkley Lane	A4640	Continued in 2018 monitoring
4	Apley Avenue	Apley Avenue	Continued in 2018 monitoring
5	Dudmaston	M54	Continued in 2018 monitoring
6	Shifnal Road	M54	Continued in 2018 monitoring
7	Summerfield Road	A442	Continued in 2018 monitoring
8	Horton Road	A518	Continued in 2018 monitoring
9	Waverley	B4373	Continued in 2018 monitoring
11	Coach Central	Southwater Development, canyon	Continued in 2018 monitoring
12	Richmond Avenue	Urban Background	Continued in 2018 monitoring
13	Barrack Lane	A518	Continued in 2018 monitoring
14	Newport Car Park	Newport Centre	Continued in 2018 monitoring
15	Newdale Lawley Junction	Lawley Development	Continued in 2018 monitoring
16	Watling Street (outside swan)	B5061 Cross Roads	Continued in 2018 monitoring
17	Mill Bank	B5061 Cross Roads	Continued in 2018 monitoring
18	Holly Head Road	B5061 Cross Roads	Continued in 2018 monitoring
19	Dawley Road	B5061 Cross Roads	Continued in 2018 monitoring
20	Watling Street/Regent Street Junc	B5061 Cross Roads	Continued in 2018 monitoring
21	Watling Street	B5061 Cross Roads	Continued in 2018 monitoring
-	Withywood Drive	Southwater Development, canyon	Discontinued from further monitoring
-	Lawnswood	Southwater Development, canyon	Discontinued from further monitoring
-	Deercote (top)	Southwater Development, canyon	Continued in 2018 monitoring
-	Deercote (bottom)	Southwater Development, canyon	Discontinued from further monitoring
22	Mill Bank 2	Mill Bank extended monitoring	New monitoring location for 2018
23	Mill Bank 3	Mill Bank extended monitoring	New monitoring location for 2018
24	Mill Bank 4	Mill Bank extended monitoring	New monitoring location for 2018
25	Mill Bank 5	Mill Bank extended monitoring	New monitoring location for 2018

Local Engagement and How to get involved

For further information please see the information on Telford and Wrekin's website:

http://www.telford.gov.uk/info/20150/pollution/104/air_quality

Or contact us by phone on 01952 381818

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1 Local Air Quality Management

This report provides an overview of air quality in Telford and Wrekin Council during 2018. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Telford and Wrekin Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely to be an 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.

Telford and Wrekin Council currently does not have any AQMAs. For reference, a map of Telford and Wrekin Council's monitoring locations is available in Appendix D. However, since the continuation of monthly diffusion tube monitoring in 2016, two locations within the Borough were identified as areas of concern and made the Council consider the future possibility of declaring an AQMA if actions are not taken to manage air quality or those not taken are effective. Although there were no exceedances of the relevant National AQO, further monitoring efforts have been introduced to understand the extent of the issue and also as an indicator as to whether any implemented actions to manage air quality are effective. The further monitoring has shown that the objectives are not being breached however in 2018 we plan to reduce the levels in these areas even further.

Since the decommission of UK Surface Mines Ltd at Huntingdon Lane, which was an operation permitted by the Council where a condition was to monitor for Sulphur and Particulates, the Council do not have any data on these pollutants. However, the graph shown within the 2016 ASR suggested that between 2007 and 2013, the levels of $PM_{2.5}$ had been steadily decreasing.

Telford and Wrekin Council are however committed to lower the levels of $PM_{2.5}$ and have introduced initiatives that we hope will lead to the lowering of the levels these measures are identified in Table 2.2. The Council with continue to liaise with our Public Health colleagues at the council to develop further schemes and strategies which will aim to lower levels of $PM_{2.5}$ within the borough and improve the health and wellbeing of the population of Telford and Wrekin.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
N/A	N/A	N/A	N/A	N/A

2.2 Progress and Impact of Measures to address Air Quality in Telford and Wrekin

Telford and Wrekin Council has taken forward a number of measures during the reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Air Quality Strategy (Appendix C).

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Ironbridge Park and Ride	Alternatives to private vehicle use	Bus based Park & Ride	Telford and Wrekin Council	Fully Implemented	Fully Implemented	Amount of people using the service	N/A	The scheme is completed and is being well used.	N/A	The Ironbridge park and ride scheme aims to lower the amount of vehicle movements within the Ironbridge Gorge
2	Telford and Wrekin Council Journey Share	Alternatives to private vehicle use	Car & lift sharing schemes	Telford and Wrekin Council	Fully Implemented	Fully Implemented	Amount of people using the service	N/A	The scheme is completed and is being well used.	N/A	Aims to reduce the number of Council staff driving their car to work and encourage car sharing thus lowering emissions from vehicles.
3	Sustainable Traffic Management Plan	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Telford and Wrekin Council	The plan has been completed and a grant has been received to implement the plan.	This is being implemented in a staged approach	N/A	N/A	So far the project has implemented the Southwater Shared Space scheme.	Implemented	The Sustainable Traffic Management Plan aims to reduce the impact of vehicle movements on air quality by introducing schemes such as shared space schemes etc.
4	Watling Street Signal Upgrades	Traffic Management	Traffic Signals and Technology	Telford and Wrekin Council	Fully Implemented	Fully Implemented	Reduction in NO2 emissions	N/A	The improvements to traffic signals to link these together and be more demand responsive is currently being delivered	Implemented	Aim is to allow more efficient vehicle movement at the Watling Street Junctions to reduce engine idling

5	Coach Central	Traffic Management	Re-allocation of road space	Telford and Wrekin Council	Early stage development	Not started	Reduction in NO2 emissions	N/A	Early consideration through CTAAP	Not identified	Potential for further traffic reduction along Coach Central in order to reduce vehicle emissions.
6	Mill Bank Traffic Management signs	Traffic Management	Road Signs	Telford and Wrekin Council	Early Stage Development	Not Started	Reduction in NO2 emissions	N/A	Signs to promote drivers to turn off their engines whilst waiting at traffic lights	Not identified	Aims to reduce engine idling.

Table 2.2. gives More detail on these measures.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Ironbridge Park and Ride	Alternatives to private vehicle use	Bus based Park & Ride	Telford and Wrekin Council	Fully Implemented	Fully Implemented	Amount of people using the service	N/A	The scheme is completed and is being well used.	N/A	The Ironbridge park and ride scheme aims to lower the amount of vehicle movements within the Ironbridge Gorge
2	Telford and Wrekin Council Journey Share	Alternatives to private vehicle use	Car & lift sharing schemes	Telford and Wrekin Council	Fully Implemented	Fully Implemented	Amount of people using the service	N/A	The scheme is completed and is being well used.	N/A	Aims to reduce the number of Council staff driving their car to work and encourage car sharing thus lowering emissions from vehicles.
3	Sustainable Traffic Management Plan	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Telford and Wrekin Council	The plan has been completed and a grant has been received to implement the plan.	This is being implemented in a staged approach	N/A	N/A	So far the project has implemented the Southwater Shared Space scheme.	Implemented	The Sustainable Traffic Management Plan aims to reduce the impact of vehicle movements on air quality by introducing schemes such as shared space schemes etc.
4	Watling Street Signal Upgrades	Traffic Management	Traffic Signals and Technology	Telford and Wrekin Council	Fully Implemented	Fully Implemented	Reduction in NO_2 emissions	N/A	The improvements to traffic signals to link these together and be more demand responsive is currently being delivered	Implemented	Aim is to allow more efficient vehicle movement at the Watling Street Junctions to reduce engine idling

5	Coach Central	Traffic Management	Re-allocation of road space	Telford and Wrekin Council	Early stage development	Not started	Reduction in NO_2 emissions	N/A	Early consideration through CTAAP	Not identified	Potential for further traffic reduction along Coach Central in order to reduce vehicle emissions.
6	Mill Bank Traffic Management signs	Traffic Management	Road Signs	Telford and Wrekin Council	Early Stage Development	Not Started	Reduction in NO_2 emissions	N/A	Signs to promote drivers to turn off their engines whilst waiting at traffic lights	Not identified	Aims to reduce engine idling.

Table 2.2 – Progress on Measures to Improve Air Quality

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

DEFRA maps indicate an average level of 9.33μm^3 for 2015 (latest available data from DEFRA) this is well below the limit values of 40μm^3 however, Telford and Wrekin Council are committed to lower the levels of $PM_{2.5}$ and have introduced initiatives that we hope will lead to the lowering of the levels these measures are identified in Table 2.2. Over the next 12 months we will continue to liaise with our Public Health and Highways colleagues at the council to develop further schemes and strategies which will aim to lower levels of $PM_{2.5}$ within the borough and improve the health and wellbeing of the population of Telford and Wrekin.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

There is currently no automatic air quality monitoring infrastructure in place within the Borough.

3.1.2 Non-Automatic Monitoring Sites

Telford and Wrekin Council undertook non- automatic (passive) monitoring of NO_2 at 20 sites during 2016. Appendix A shows the details of the sites. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

Table 3.1 - Work undertaken so far, the conclusions of the reports and the summaries of any further action.

Year	Outcomes	Summaries
1998	PR	Prediction of exceedances
1999	PR	Prediction of exceedances
2000	USA	Not significantly affected by emissions (CO, Benzene, 1,3-Butadiene, Pb, SO_2, PM_{10}); any breaches will be negligible
2001	PR	Prediction of exceedances
2002	PR	Declaration of AQMA
2003	USA	Exceedances of SO_2 from Ironbridge Power Station, and of NO_2 from road traffic emissions in Ironbridge Gorge. Review of AQMAs determined there would be no exceedances by 2005.
2004	PR	Detailed assessment of NO_2 and SO_2 from Ironbridge Power Station and vehicular traffic. Objectives will be met in 2005 so no further work is necessary.

2005	PR	No exceedances of relevant air quality objectives, Revocation of AQMA
2006	USA	No exceedances of relevant air quality objectives
2007	PR	No exceedances of relevant air quality objectives
2008	PR	No exceedances of relevant air quality objectives
2009	USA	No exceedances of relevant air quality objectives
2011	PR	No exceedances of relevant air quality objectives (includes data from 2010)
2012	USA	No exceedances of relevant air quality objectives
2013	PR	No exceedances of relevant air quality objectives
2014	PR	No exceedances of relevant air quality objectives
2015	USA	No exceedances of relevant air quality objectives
2016	ASR	No exceedances of relevant air quality objectives
2017	ASR	No exceedances of relevant air quality objectives

3.2.1 Nitrogen Dioxide (NO_2)

Table A. 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 2017 dataset of monthly mean values is provided in Appendix B.

3.2.2 Particulate Matter (PM_{10})

Currently, Telford and Wrekin Council do not monitor for PM10 or PM2.5.

3.2.3 Particulate Matter ($PM_{2.5}$)

Currently, Telford and Wrekin Council do not monitor for PM_{10} or $PM_{2.5}$.

3.2.4 Sulphur Dioxide (SO2)

Currently, Telford and Wrekin Council do not monitor for PM10 or PM2.5.

Appendix A: Monitoring Results

Table A.1 – 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	Newport Car Park TF10 7DS	Urban background	374616	319182	NO_2	NO	3.1	2.60	NO	2.52
DT2	Barrack Lane TF10 9ER	Urban background	373115	316587	NO_2	NO	5.13	2.06	NO	2.34
DT3	Oxlip Close TF2 8RT	Urban background	371301	313583	NO_2	NO	5.45	1.60	NO	2.46
DT4	Richmond Avenue TF2 7EF	Urban background	369553	312682	NO_2	NO	6.35	1.34	NO	2.68
DT5	New Road Wrockwardine Wood TF2 7AA	Urban background	369922	312224	NO_2	NO	13.2	0.1	NO	2.40
DT6	Horton Road TF2 6PD	Urban background	368627	312855	NO_2	NO	4.24	0.40	NO	2.57
DT7	Sommerfield Road TF1 5DP	Urban background	368380	312211	NO_2	NO	18.07	1.77	NO	2.36
DT8	Mercia Drive TF1 6YJ	Urban background	366161	312304	NO_2	NO	15.30	0.50	NO	2.48
DT9	Apley Avenue TF1 3PN	Urban background	364997	312434	NO_2	NO	41.42	2.50	NO	2.40
DT10	Watling Street (outside the Swan) TF1 2NH	Urban background	365825	311094	NO_2	NO	5.36	2.26	NO	2.54
DT11	Manor Rise TF1 2ND	Urban background	366723	310821	NO_2	NO	11.27	2.42	NO	2.40
DT12	Mossey Green Way TF2 0DL	Urban background	368594	310130	NO_2	NO	25.04	1.46	NO	2.44

DT13	Shifnal Road TF2 9NN	Urban background	371226	309402	NO_2	NO	32.98	1.48	NO	2.47
DT14	Checkley Lane TF2 9UD	Urban background	371343	311136	NO_2	NO	16.77	1.00	NO	2.59
DT15	Newdale/Lawley Junction TF4 2SG	Urban background	367412	308780	NO_2	NO	11.22	1.00	NO	2.54
DT16	Dudmaston TF3 2DG	Urban background	370900	308536	NO_2	NO	7.10	0.50	NO	2.51
DT17	Coach Central TF3 4JQ	Urban centre	369817	308676	NO_2	NO	238.9	1.28	NO	2.66
DT18	Boscobel Close TF3 1QQ	Urban background	370949	306311	NO_2	NO	7.69	1.75	NO	2.45
DT19	Waverley TF7 5LU	Urban background	368941	304766	NO_2	NO	4.27	0.49	NO	2.33
DT20	Kemberton/Madeley TF7 4BH	Urban background	370016	304570	NO_2	NO	23.52	1.89	NO	2.43
DT21	Watling Street TF1 2NH	Urban background	366008	311056	NO_2	NO	10.64	1.42	NO	2.34
DT22	Mill Bank TF1 2NH	Urban background	365825	311089	NO_2	NO	2.83	1.24	NO	2.36
DT23	Holly Head Rd TF1 2NH	Urban background	365822	311033	NO_2	NO	20	1.57	NO	2.36
DT24	Dawley Rd TF1 2NH	Urban background	365927	311017	NO_2	NO	7.75	1.55	NO	2.38
DT25	Watling Street/ Regent Street Junction TF1 2NH	Urban background	366084	311065	NO_2	NO	4.43	3.88	NO	2.42
DT26	Deercote (top) TF3 2BQ	Urban background	370122	308620	NO_2	NO	24.2	48.55	NO	2.47
DT27	Deercote (bottom) TF3 2BQ	Urban background	370243	308516	NO_2	NO	30.3	42.64	NO	2.46
DT28	Withywood Drive TF3 2HT	Urban background	369488	308324	NO_2	NO	7.35	49.44	NO	2.37
DT29	Lawnswood TF3 2HS	Urban background	369517	308242	NO_2	NO	19.2	48.26	NO	2.30

Table A.2 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	Bias-adjusted NO_2 Annual Mean Concentration (µg/m^3) based on 0.92% correction* (3)				
					2013	2014	2015	2016	2017
DT1	Urban	Diffusion Tubes	91.67	100	No Data	No Data	No Data	18.9	19.78
DT2	background	Diffusion Tubes	100	100	No Data	No Data	No Data	24.56	17.16
DT3	Urban	Diffusion Tubes	100	30	No Data	No Data	No Data	13.89	17.13
DT4	background	Diffusion Tubes	100	100	No Data	No Data	No Data	16.55	15.07
DT5	Urban	Diffusion Tubes	100	100	No Data	No Data	No Data	17.89	16.01
DT6	background	Diffusion Tubes	91.67	100	No Data	No Data	No Data	16.68	15.55
DT7	Urban	Diffusion Tubes	100	100	No Data	No Data	No Data	19.08	18.33
DT8	background	Diffusion Tubes	100	30	No Data	No Data	No Data	13.96	12.24
DT9	Urban	Diffusion Tubes	91.67	100	No Data	No Data	No Data	24.24	23.9
DT10	background	Diffusion Tubes	91.67	100	No Data	No Data	No Data	34.62	32.46
DT11	Urban	Diffusion Tubes	100	30	No Data	No Data	No Data	15.61	23.49
DT12	background	Diffusion Tubes	83.33	100	No Data	No Data	No Data	30.14	38.22
DT13	Urban	Diffusion Tubes	100	100	No Data	No Data	No Data	25.46	18.55
DT14	background	Diffusion Tubes	100	100	No Data	No Data	No Data	21.46	21.58
DT15	Urban	Diffusion Tubes	91.67	100	No Data	No Data	No Data	17.17	32.02

DT16	background	Diffusion Tubes	100	100	No Data	No Data	No Data	No Data	18.3	16.84
DT17	Urban	Diffusion Tubes	91.67	100	No Data	No Data	No Data	No Data	36.35	27.02
DT18	background	Diffusion Tubes	100	30	No Data	No Data	No Data	No Data	16.22	26.12
DT19	Urban	Diffusion Tubes	100	100	No Data	No Data	No Data	No Data	13.35	17.91
DT20	Background	Diffusion Tubes	100	100	No Data	No Data	No Data	No Data	17.13	17.03
DT21	Urban background	Diffusion Tubes	100	70	No Data	No Data	No Data	No Data	No Data	17.38
DT22	Urban background	Diffusion Tubes	100	70	No Data	No Data	No Data	No Data	No Data	16.01
DT23	Urban background	Diffusion Tubes	100	70	No Data	No Data	No Data	No Data	No Data	16.18
DT24	Urban background	Diffusion Tubes	100	70	No Data	No Data	No Data	No Data	No Data	37.27
DT25	Urban background	Diffusion Tubes	100	70	No Data	No Data	No Data	No Data	No Data	10.60
DT26	Urban background	Diffusion Tubes	100	70	No Data	No Data	No Data	No Data	No Data	10.11
DT27	Urban background	Diffusion Tubes	100	70	No Data	No Data	No Data	No Data	No Data	18.16
DT28	Urban background	Diffusion Tubes	100	70	No Data	No Data	No Data	No Data	No Data	11.36
DT29	Urban background	Diffusion Tubes	100	70	No Data	No Data	No Data	No Data	No Data	20.19

Diffusion tube data has been bias corrected (confirm by selecting in box)

Annualisation has been conducted where data capture is <75% (confirm by selecting in box)

If applicable, all data has been distance corrected for relevant exposure (confirm by selecting in box)

☒

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 Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

*** The bias-adjustment factor is that based on National Bias Adjustment Factors spreadsheet outlined by DEFRA relevant at the time of adjustment, which can be located here https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html**

The data in Table A.2 has been annualised where appropriate using data from Aston Hill and Walsall Wood automatic monitoring stations.

Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2016

Site ID	Jan 10.01.17 – 07.02.17	Feb 07.02.17 – 07.03.17	Mar 07.03.17 – 04.04.17	Apr 04.04.17 – 02.05.17	May 02.05.17 – 30.05.17	Jun 30.05.17 – 27.06.17	Jul 27.036.17 – 25.07.17	Aug 25.07.17 – 22.08.17	Sept 22.08.17 – 19.09.17	Oct 19.09.17 – 17.10.17	Nov 17.10.17 – 14.11.17	Nov 14.11.17 – 06.12.17	Dec 06.12.17 – 03.01.18	Annual Mean		
														Raw Data	Bias Adjusted (+0.89) and Annualised (1)	Distance Corrected to Nearest Exposure (Meters) (2)
DT1	30.10	20.23	25.07	20.17	19.30	19.12	18.41	11.36	Tube Missing	18.64	26.1	30.63	27.11	22.23	19.78	19.3
DT2	25.22	19.98	18.32	18.83	17.26	15.91	17.03	14.37	18.13	15.29	22.43	25.56	21.76	19.29	17.16	15
DT3	26.88	17.40	17.29	11.39	Monitoring Ceased at this location in May 2017									18.24	17.13	15.3
DT4	27.63	20.01	16.43	14.24	13.65	12.18	12.36	11.18	12.59	15.12	20.11	23.14	21.43	16.93	15.07	13.8
DT5	27.77	21.04	19.24	16.80	21.14	11.89	13.98	10.50	14.56	13.13	20.14	23.04	20.58	17.99	16.01	12.9
DT6	30.47	18.84	19.27	14.81	13.89	12.71	11.91	11.54	15.25	16.18	20.72	24.08	Tube Missing	17.47	15.55	15.3
DT7	33.34	15.11	24.06	17.49	19.24	15.68	17.24	15.37	17.63	20.91	23.87	22.74	25.06	20.60	18.33	16.5
DT8	25.7	14.16	14.15	10.55	Monitoring Ceased at this location in May 2017									16.23	15.24	12
DT9	40.01	27.00	32.24	18.40	32.58	22.12	21.27	19.89	Tube Missing	25.63	30.85	27.14	25.12	26.85	23.90	13.5
DT10	47.05	38.27	42.89	31.54	38.42	31.3	31.4	28.03	33.32	32.84	40.96	41.94	Tube Missing	36.47	32.46	27.9
DT11	26.92	15.58	15.29	13.96	Monitoring Ceased at this location in May 2017									17.94	16.84	14.9

DT12	42.51	31.35	37.46	26.30	33.44	24.69	26.43	22.94	25.19	27.42	36.27	Tube Missing	Tube Missing	30.36	27.02	17.8
DT13	40.18	35.30	34.23	22.43	24.49	24.43	25.88	23.90	24.86	26.21	32.52	35.46	31.79	29.35	26.12	18.6
DT14	31.18	22.96	23.77	19.39	24.89	15.50	23.36	14.75	16.25	17.72	25.21	25.36	1.26	20.12	17.91	13
DT15	31.12	20.11	19.83	16.80	15.39	13.21	17.72	13.07	16.81	16.29	22.57	26.73	Tube Missing	19.14	17.03	12.9
DT16	31.07	21.08	21.59	17.54	22.66	12.59	19.82	11.27	14.12	15.24	22.69	21.44	22.68	19.52	17.38	14.4
DT17	51.46	44.64	44.38	35.99	36.48	36.21	36.15	39.79	Tube Missing	39.20	40.98	48.76	48.48	41.88	37.27	N/A
DT18	28.24	19.09	18.14	11.91	Monitoring Ceased at this location in May 2017									19.34	18.16	15.2
DT19	23.83	15.20	14.38	9.82	11.77	8.44	8.9	7.7	8.81	11.91	15.9	13.05	16.29	12.77	11.36	10.1
DT20	29.21	23.26	24.11	20.84	23.24	17.17	18.36	16.61	19.81	21.23	30.27	27.37	23.46	22.69	20.12	14.7
DT21	Monitoring Started at this location in May 2017				28.60	22.45	22.88	20.71	25.79	24.97	31.05	34.63	26.72	26.39	23.49	18.1
DT22	Monitoring Started at this location in May 2017				47.11	39.33	37.41	37.99	41.03	39.61	31.06	49.31	43.46	40.70	38.22	33.4
DT23	Monitoring Started at this location in May 2017				22.39	16.41	17.54	14.73	17.71	19.63	21.74	27.79	19.86	19.75	18.55	14.1
DT24	Monitoring Started at this location in May 2017				28.89	19.34	23.31	17.50	20.72	20.75	25.57	27.38	23.43	22.99	21.58	17.7
DT25	Monitoring Started at this location in May 2017				44.31	Tube Missing	30.75	28.35	32.09	31.51	35.72	37.93	33.15	34.10	32.12	31.3
DT26	Monitoring Started at this location in May 2017				16.75	12.45	13.43	11.90	15.16	17.60	22.72	21.34	22.12	17.05	16.01	19.2
DT27	Monitoring Started at this location in May 2017				15.18	12.68	12.45	12.38	14.59	17.68	22.51	24.05	23.58	17.23	16.18	17.6
DT28	Monitoring Started at this location in May 2017				9.86	7.24	8.73	8.87	10.14	10.18	16.27	16.45	13.83	11.29	10.60	10.8
DT29	Monitoring Started at this location in May 2017				10.15	6.48	9.05	8.21	8.97	9.88	14.76	14.47	14.98	10.77	10.11	10.1

☐ **LoDT19cal bias adjustment factor used (confirm by selecting in box)**

NationaDT20l bias adjustment factor used (confirm by selecting in box)
Annualisation has been conducted where data capture is <75% (confirm by selecting in box)

☒ **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) See Appendix C for details on bias adjustment and annualisation.
(2) Distance corrected to nearest relevant public exposure.

Unfortunately there are 13 sets of monitoring data for this monitoring period as the tubes were not put out in line with the DEFRA monitoring calendar, this has been amended and we are now following the calendar.

The data in table B.1 shows the annual monitoring results obtained through diffusion tube monitoring in 2016-17. The overall results indicate that the borough has excellent air quality in relation to the National AQO and those limits set out in the ambient air quality directive (2008/50/EC), with 80% of locations having an annual NO_2 concentration of under 30 µg/m3. There were however two areas of concern, namely Watling Street and Coach Central. * Box 1.1. DEFRA TG16 states that the National AQO do not apply for an annual mean averaging period at kerbside locations where public exposure is expected to be short-term which the monitoring location at Coach Central represents. This location will now cease monitoring however the tubes by the nearest sensitive receptor will remain in place to monitor the impact of development in this area. The areas around Watling Street, mill Bank, Holyhead Road, Dawley Road cross roads and Watling Street/Regent Street junction do meet the relevant exposure criteria outlined in Box 1.1 which is why the Council are introducing further measures in this location as discussed earlier in this report.

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

Telford & Wrekin Council Air Quality Strategy

Contents

Legislative Context

The Acts mentioned below are the main legislative drivers that govern how air quality is improved and maintained; some of which stem from EU Directives and are transposed in Acts and Regulations. All these Acts enable Councils to ensure that the air within their Boroughs is clean and not likely to cause illnesses.

Environment Act 1995

The Environment Act 1995 introduced a regime for the monitoring of air quality by Councils within their areas for the monitoring of select pollutants, and to then report this monitoring back to DEFRA with comments on any exceedances of air quality objectives (AQOs) for the select pollutants. If there were any exceedances, then the Local Authority are required to declare an Air Quality Management Area (AQMA) and set out how they will reduce the levels of the select pollutants to below the AQOs.

IPPC

The Integrated Pollution Prevention and Control Act was implemented as a way to reduce pollution from larger industrial installations, and it implements the EU Directive 2008/1/EC. It covers a number of different industries, some of which are regulated by the Council, and others by the Environment Agency. The industries are managed by having permits that contain emission limit values, as well as other conditions relating to energy efficiency, waste minimisation, and prevention of accidental emissions based on the application of Best Available Technique (BAT). A number of other EU Directives are also implemented via this regime, including the Waste Incineration Directive, the Industrial Emissions Directive and the Solvent Emissions Directive.

Clean Air Act 1993

The Clean Air Act was implemented to reduce pollution from smoke, grit and dust. It also empowers Councils to declare Smoke Control Areas, where it is an offence to use an unapproved fireplace or fuel. The origins of the 1993 act lay back in 1956 with an amendment in 1968. DEFRA are currently consulting on reviewing the Act and its provisions.

Town and Country Planning Act 1990

Air Quality is a material consideration under the Act and Local Planning Authorities must take account of it when determining applications. It is managed by the submission of reports prior to planning, or to fulfil conditions that have been placed on planning permissions. These reports are vetted (usually) by Environmental Health on behalf of the Local Planning Authority. There are a number of other Acts that impact on air quality, and these include the Road Traffic Reductions Act 1997 and the Road Traffic Reduction (National Targets) Act 1998.

Scientific Basis

It has been known since ancient times that air pollution can cause significant impacts to human health. Lao Tzu was concerned with anthropogenic effects on air, and there was a Roman law in York that regulated emissions from a number of activities (Sportisse, 2010). Further work and laws were done during the medieval period, and John Evelyn's book Fumifugium was published in 1648.

It was the infamous smogs of the 1950s that particularly reinforced in the UK that more needed to be done to improve the air if the country.

However, it wasn't until 1998 that one of the Governments advisory bodies, the Committee on the Medical Effects of Air Pollution (COMEAP) first undertook an assessment of the mortality effects of long-term exposure to particulate matter in the UK. This was updated in 2010 using updated exposure information and epidemiology. It is important to note that the document measures the effects in years lost or gained; as everyone eventually dies no lives are saved by reducing environmental exposure. Within the report, they concluded the following:

1. Removing all anthropogenic ('human-made') particulate matter air pollution (measured as PM2.5) could save the UK population approximately 36.5 million life years over the next 100 years and would be associated with an increase in UK life expectancy from birth, i.e. on average across new births, of six months. This shows the public health importance of taking measures to reduce air pollution.

2. A policy which aimed to reduce the annual average concentration of PM2.5 by 1µg/m3 would result in a saving of approximately 4 million life years or an increase in life expectancy of 20 days in people born in 2008.

3. The current (2008) burden of anthropogenic particulate matter air pollution is, with some simplifying assumptions, an effect on mortality in 2008 equivalent to nearly 29,000 deaths in the UK at typical ages and an associated loss of total population life of 340,000 life-years. The burden can also be represented as a loss of life expectancy from birth of approximately six months.

4. The uncertainties in these estimates need to be recognised: they could vary from about a sixth to double the figures shown. (COMEAP, 2010). In August 2012, COMEAP (COMEAP, 2012) released a statement on estimating the mortality burden of particulate air pollution at the local level. This provides the Council the tools with which they can calculate the mortality burden of air pollution on the local population. The carcinogenic effects of air pollution are outlined in a report from the World Health Organisations (WHO) International Agency for Research on Cancer (IARC) (Straif, *et al*., 2013).

Air Quality Monitoring in Telford

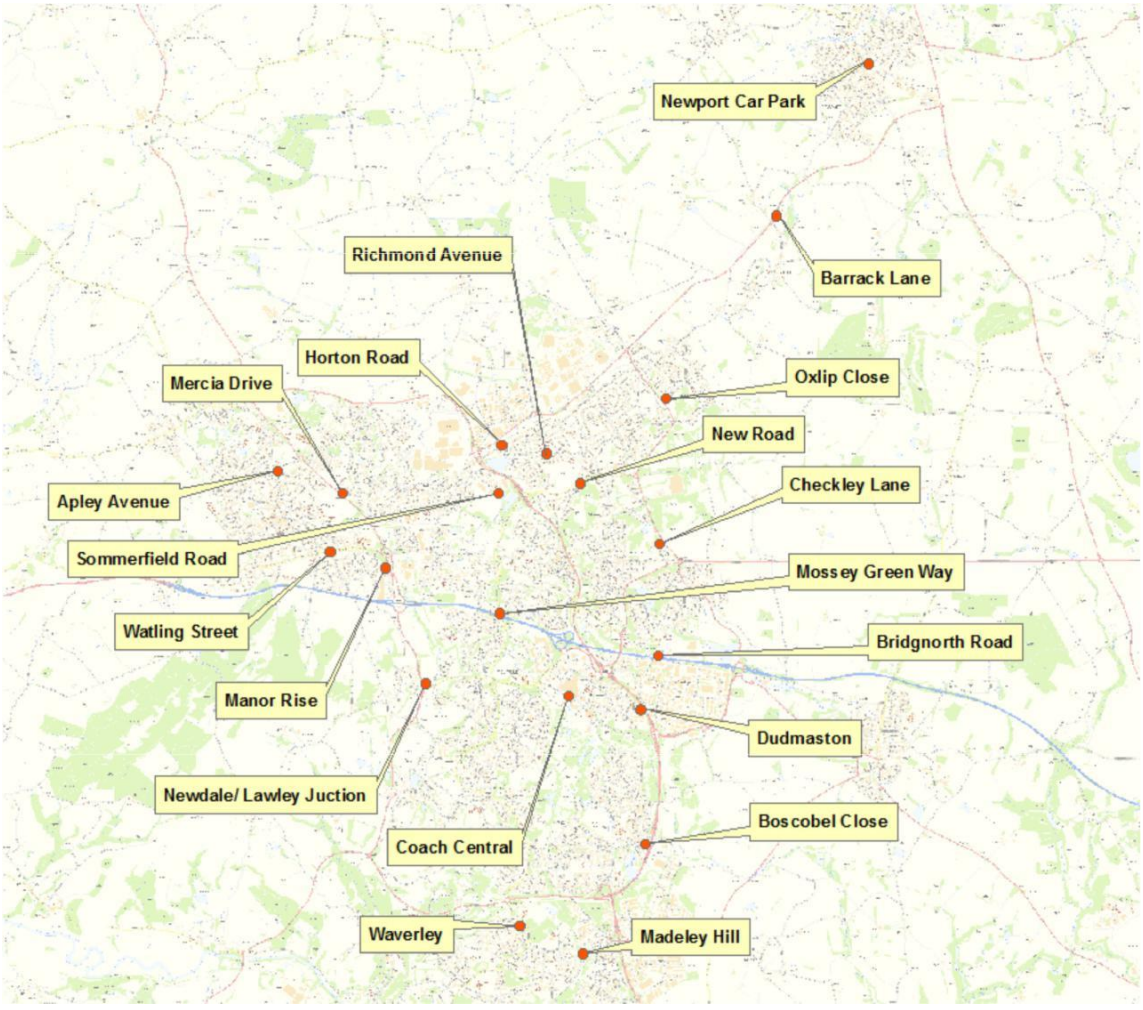
For a large number of years, air quality was monitored in the area of Telford & Wrekin via diffusion tube monitoring at locations across the Borough. These monitored for Nitrogen Oxides on a monthly basis. This has been supplemented by further work by the Council; for instance in 200X an Air Quality Management Area (AQMA) was declared by the Council for an area of Ironbridge due to vehicle emissions, as well as emissions from the power station. Subsequent monitoring showed that there was no exceedance of the relevant air quality objective, and so the

AQMA was rescinded. Monitoring within the Borough has been augmented by two permitted processes; the first is the power station itself that has an automatic monitoring system for emissions of nitrogen oxides and sulphur dioxide.

The second is automatic monitoring that is undertaken by UK Coal Surface Mines Ltd. at the open cast colliery in the south eastern area of the Borough. This monitors for particulates.

Due to the budgetary constraints brought about by the Comprehensive Spending Review in 2010, diffusion tube monitoring ceased as a cost-saving. It was determined to rely upon modelling from reports submitted to fulfil planning conditions. However, it is now felt that this is a rather circular form of proving compliance, and so it is considered necessary to bring back diffusion tube monitoring. However, funds for this would be required for sampling and officer time, and it is thought that either Section 106 funding or CIL via the planning process would be appropriate to enable the Council to monitor the long-term impact of development within the Borough.

Figure 1: Map of Previous Locations of Diffusion Tubes



Approaches to Maintaining Air Quality

Given the importance of air quality within the Borough, it is ideal to maintain, or improve, the quality of the air the residents of Telford are exposed too. The current approach is to assess planning applications, and to see if they meet the criteria for significance under “EPUK AQ Planning Guidance”. This states that significance is:

- Number of properties affected by slight, moderate or major air quality impacts and a judgement on the overall balance.
- Where new exposure is being introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant.
- The magnitude of the changes and the descriptions of the impacts at the receptors i.e. Tables 4 and 5 findings.
- Whether or not an exceedance of an objective or limit value is predicted to arise in the study area where none existed before or an exceedance area is substantially increased.
- Whether or not the study area exceeds an objective or limit value and this exceedance is removed or the exceedance area is reduced.
- Uncertainty, including the extent to which worst-case assumptions have been made.
- The extent to which an objective or limit value is exceeded, e.g. an annual mean NO2 of 41 µg/m3 should attract less significance than an annual mean of 51 µg/m3.
-

One approach is to adopt a Low Emissions Zone strategy. This recognises that certain pollutants have health impacts no matter what the level in the air we breathe, and so that people who increase the levels of pollution are required to pay to assist the Council in mitigating their presence. Whilst this recognises the polluter pays principle that is the cornerstone of most modern environmental pollution in English law, it also runs the risk of undermining development, the cornerstone of the Councils strategy for driving growth within the Borough. One of the Councils corporate aims is to improve the health and well-being of communities, and this would be an important aspect of achieving that aim.

Recommendations

To continue to use diffusion tube monitoring to and appropriately address any locations where air quality is poorer than that witnessed within other areas of the borough.

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Justification for Diffusion Tube Monitoring

Contents

Introduction

This report will set out the rationale as to why the Council will start to undertake diffusion monitoring again. Until March 2011, Telford & Wrekin Council undertook diffusion tube monitoring throughout the Borough to ensure that levels of nitrogen dioxide remained below the relevant Air Quality Objective (AQO). In agreement with DEFRA, it was decided to cease this monitoring. This meant that the Council relied on automatic monitoring stations at Huntington and Aqueduct from the opencast colliery and power station respectively, as well as evaluations of air quality submissions for the fulfilment of planning conditions. However, the opencast colliery has now closed and monitoring has ceased, and the power station is scheduled to close in 2015. This would mean that from 2015 there will be no air quality monitoring infrastructure in place within the Borough. As such, the Council would not be able to undertake its statutory obligations as set out below.

Legislative Drivers

There is a historical legacy of air quality legislation in England. The first known law was during the days of the Roman Empire, when a local law regulated local emissions from certain processes (Sportisse, 2008). In 1272, Edward I banned the use of sea coal by his castles, and banned its use in London in 1306. By 1390 Richard I had regulated its use in London. By the time of The Restoration it was well recognized that “smoak” was detrimental to the quality of the air, as demonstrated in Fumifugium by John Evelyn in 1661. However, it wasn’t until the 1950s when smog’s killed thousands of people that the first Clean Air Act was introduced to regulate the burning of coal. This had been preceded by the first of the Alkali Acts of 1863 which was created to limit the emissions of hydrochloric and sulphuric acids to atmosphere, with an Inspectorate created in 1874. The 1863 Act was subsequently amended by the Alkali, &c. Works Regulation Act of 1881, which was extended by the Alkali, &c. Works Regulation Act of 1882. This final act was repealed by the Alkali, &c. Works Regulations Act of 1906 which existed until it was replaced by the Environmental Protection Act 1990.

European Union

European Union legislation forms the framework for current English law with regards to Air Quality. Directive 96/62/EC relates to ambient air quality assessment and management, and sets limits against which concentrations of substances in the atmosphere can be evaluated. These limits were adopted into English Law in the Air Quality Standards Regulations 2010 No. 1001 as Air Quality Objectives (AQOs).

Environment Act

In England, the current legislative driver for monitoring air quality is the Environment Act 1995. Part IV of the Environment Act 1995 sets out the responsibilities of Local Authorities. Section 82 sets out the requirement for local authorities to undertake

reviews. Sub-section 1 relates to the annual review undertaken by the Council and submitted to DEFRA for their assessment. Sub-section 2 requires the Council to assess air quality data and evaluate it in light of the AQOs. Sub-section 3 tells the Council what it should do if it identifies any breaches of AQOs.

Following Sections set out the Councils responsibilities with regards to what to do if there are any breaches of relevant AQOs (declare the area of the exceedance(s) as an Air Quality Management Area (AQMA)), and what is required to be done once an AQMA has been declared.

Environmental Protection and Clean Air Acts

The Environmental Protection Act 1990 covers nuisance from smoke, fumes or dust. The Clean Air Act 1993 covers emissions of dark smoke, dust and grit from boilers and chimney stacks. Sections 14 and 15 relate to the applications for the heights of chimneys to boilers.

Relevant Regulations

The Air Quality Standards Regulations 2010 No. 1001 provides the AQOs as specified in the Act. Part 4 relates to the national exposure reduction for PM2.5.

Government Policy

Government Policy is set out in the Air Quality Strategy for England, Wales, Scotland and Wales (DEFRA, 2007). The strategy sets out air quality objectives and policy options to improve air quality in the UK.

Local Policy

There is no local policy as such; Telford & Wrekin Council operates within all the legislative requirements that are expected of them. For more information, please see the relevant sections below. However, in recognising the lack of a local policy, the Public Protection department are currently producing an air quality strategy which will address how the Council intends to maintain the excellent standard of air quality within the Borough.

Environmental Health

The Public Protection Department at Telford & Wrekin Council are responsible for fulfilling the Councils objectives under the Environment Act 1995. Until March 2011, the department was responsible for the placement and analysis of diffusion tubes throughout the Borough. It also produces the air quality progress reports and updating and screening assessments as required under the Environment Act. It is also responsible for enforcing the Clean Air Act 1993, and assesses any chimney height (D1) applications. The Public Protection Department is also responsible for enforcing the Environmental Permitting Regulations which relates to the release of industrial emissions to air. The Environment Agency

Planning

Air quality is a material consideration under the Town and Country Planning Act, and the Governments National Planning Policy Framework sets out how it expects Councils to evaluate applications with regards to air quality. The Council has a Local Planning Policy which details how planning applications will be evaluated. Policy

CS13 relates to air quality. The Public Protection department evaluates any reports submitted either pre-application, or for the fulfilment of any planning conditions, on behalf of the Local Planning Authority.

Public Health

The Public Health Department of Telford & Wrekin Council are responsible for the Joint Strategic Needs Assessment (JSNA), which is a statutory responsibility under the Health and Social Care Act (2012). There is also an obligation to report on objectives under the Public Health Outcomes Framework. One of these relates to air quality. Under Section 3; Health Protection, Indicator 3.01 is the fraction of mortality attributable to particulate air pollution. In 2010, this was calculated as 4.8 for the Borough, against an England average of 5.6, and 4.4 against an England average of 5.1 in 2012.

Scientific Basis

Toxicological Basis

It has been known for a significant period of time that exposure to poor quality air affects human health. It was not until the mid-1950's that the causes and mechanisms of the process were determined. As with most substances, the risk is related to the dose, although it is recognised that for some substances, there is a risk at any exposure. An example of this is PM2.5. It has been shown that current levels of PM2.5 exposure possess "chronic, adverse effects on pulmonary development of children" (Gauderman, et al., 2004). It does this via a number of mechanisms, including inhibiting cell growth by reducing proliferation and/or causing cell death (Longhin, et al., 2013). Experiments by Longhin, et al. (2013) show that exposure to winter air from Milan causes severe abberations in mitotic spindles, increased presence of reactive oxygen species and DNA damage *in vitro* pre-mitosis (G2) phase, and could likely account for some of the effects caused via PM2.5 exposure. It has also been shown that exposure at 25 mg/cm2 PM2.5 Milan winter air for 20 hours results in cell death by apoptosis in human bronchial epithelial cells (Gualtieri, et al., 2011).

Studies in mice show that exposure to PM2.5 has been associated with an increased risk of heart disease, insulin resistance and diabetes. Exposure to a high fat diet may exacerbate these risks (Potera, 2014).

Nitrogen Dioxide (NO2) is also a major driver with regards to health issues from air pollution. For instance (Han, et al., 2013) show that exposure to NO2 induces DNA strand breakage and the formation of DNA-Protein cross-links in the cells of various organs (brain, lung, liver, spleen, kidney and heart), and as such is a systemic genotoxin.

NO2 enters the lungs and is metabolised into reactive oxygen and nitrogen species. These have a direct effect on the lungs inflammatory response. This has been positively correlated with asthma severity, disease exacerbation and risk of death (Ather, et al., 2014).

Chemical Fate & transport

The intricacies of the fate and transport of harmful substances in the environment are myriad. Of particular importance are the compositions of the substances themselves. For instance, PM2.5 is composed of a near infinite combination of substances; it is soot (combustion particles in a spherical carbon form) with diameters ranging from 20-30 nm. The small diameters of these particles provide a relatively high surface area which facilitates the adsorption of various other particles, including metals, organic compounds and biological components including bacterial endotoxins (Longhin, et al., 2013). Other ingredients can be sea salt. Nitrogen is emitted to the atmosphere in a number of forms, from a number of processes. For example, denitrification of soils or the oceans releases nitrogen in the form of nitrogen and nitrogen dioxide in small quantities, whereas the burning of fossil fuels releases nitrogen oxide. Crops, livestock, and forests all emit nitrogen in the form of ammonia (Fowler, et al., 2014). These compounds then go through complex chemical processes in the atmosphere where they are converted to nitrogen dioxide. For instance, nitric oxide is converted to nitrogen dioxide by oxidation. Other reactions involve the change from nitrogen compound to ozone using sunlight and carbon

The remaining species that are largely present in the atmosphere are:

- Sulphur dioxide;
- Ozone;
- Heavy metals;
- Mercury;
- Aerosols composed of a mixture of sulphates, ammonia, nitrate, organic matter, dust, sea salt and water;
- Radionuclides;
- Greenhouse gases;
- Carbon monoxide, and
- Persistent organic pollutants

There is a complex interaction between all these and other chemicals in the atmosphere, sunlight and lightning that leads to transformations that make them available for inhalation, and most of them have health effects.

Authoritative Bodies Statements

COMEAP

In 1998, one of the Governments advisory bodies, the Committee on the Medical Effects of Air Pollution (COMEAP) undertook an assessment of the mortality effects of long-term exposure to particulate matter in the UK. This was updated in 2010 using updated exposure information and epidemiology. It is important to note that the document measures the effects in years lost or gained; as everyone eventually dies no lives are saved by reducing environmental exposure. Within the report, they concluded the following:

1. Removing all anthropogenic ('human-made') particulate matter air pollution (measured as PM2.5) could save the UK population approximately 36.5 million life years over the next 100 years and would be associated with an increase in UK life expectancy from birth, i.e. on average across new births, of six months. This shows the public health importance of taking measures to reduce air pollution.
2. A policy which aimed to reduce the annual average concentration of PM2.5 by 1µg/m3 would result in a saving of approximately 4 million life years or an increase in life expectancy of 20 days in people born in 2008.
3. The current (2008) burden of anthropogenic particulate matter air pollution has, with some simplifying assumptions, an effect on mortality in 2008 equivalent to nearly 29,000 deaths in the UK at typical ages and an associated loss of total population life of 340,000 life-years. The burden can also be represented as a loss of life expectancy from birth of approximately six months.
4. The uncertainties in these estimates need to be recognised: they could vary from about a sixth to double the figures shown. (COMEAP, 2009)

EHC

There is no specific EHC for air pollution, although there are two for Nitrogen Oxides; (WHO, 1977) and (WHO, 1997). (WHO, 1997) concludes that nitrogen oxides can reach concentrations in ambient and indoor air that may affect human health. Chronic exposure to nitrogen oxides is associated with respiratory illness. They recommend a

long-term guidance value of 40 g/m3 as posing an increased risk of respiratory **illness in children.**

IARC

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an evaluation from 1985. They concluded that 'soots' were a Group 1 carcinogen (are carcinogenic to humans

USEPA

The USEPA are an equivalent in the US of the Environment Agency in England and Wales. They have world renowned research arms that study many different forms of the toxicology of substances. For instance, the IRIS programme produces reference doses (via ingestion) and reference concentrations (via inhalation) for substances. For instance, there was a reference dose for nitrogen dioxide, although this has been withdrawn.

The USEPA also produces National Ambient Air Quality Standards (NAAQS) for a number of substances, including carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter and sulphur dioxide. They note the principal effects of carbon

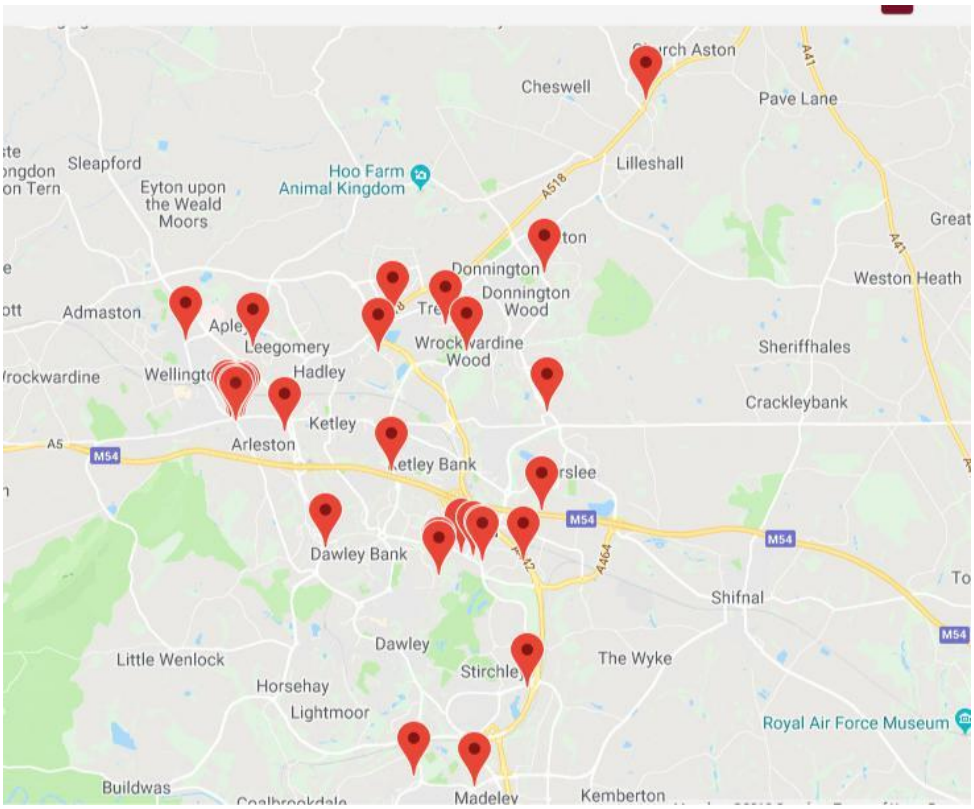
monoxide are reducing the delivery of oxygen to organs, and death; of lead being adverse effects on the nervous system, kidney function, immune, reproductive, developmental and the cardiovascular systems. The principal effects of nitrogen dioxide are respiratory effects including airway inflammation, and increased symptoms in asthmatics. The principal effects of particulate matter can include premature death in people with lung and heart disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function and increased respiratory symptoms such as coughing or difficulty breathing. The principal effects of sulphur dioxide are adverse respiratory effects such as bronchoconstriction, and elevated ventilation rates in asthmatics.

COMEAP Calculations

(COMEAP, 2012) recommended that an approach be developed by the then Health Protection Agency to enable local authorities to easily calculate the burden of long term particulate exposure on the health of citizens within the borough. This approach is still awaiting development.

Appendix D: Map(s) of Monitoring Locations

The map below illustrates all monitoring locations for the diffusion tube monitoring in 2018.



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[4] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

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