HARTLEPOOL
BOROUGH COUNCIL

2019 Air Quality Annual Status Report (ASR)

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

22nd (June, 2019)

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Executive Summary: Air Quality in Our Area

Air Quality in Hartlepool

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].

Hartlepool has formally reviewed and assessed air quality since year 2000, and has produced statutory annual reports to the UK Government. It has done this in co-operation with neighbouring Tees Valley Councils to give as broad a picture of air quality as possible, continuing a long history of joint co-operation between councils which recognised that air pollution transcended local authority boundaries.
Consistently, the annual report has concluded that Hartlepool air quality in areas where the public may be exposed is generally good when compared with Government objectives, and there has been no need to declare any Air Quality Management Areas in which adverse health effects may exist. There is no complacency in this; Hartlepool Council is committed to improving air quality as policy, but the economic options are limited against this background.
Hartlepool, along with neighbouring Tees Valley Councils, has had a strong industrial heritage. In terms of air pollution, this industrial heritage has not always been beneficial, and has often made a significant contribution to poor air quality both in actuality and in public perception. Indeed, early air quality monitoring within Hartlepool and neighbouring councils specifically targeted industrial sources of pollution. By the turn of the century, however, industrial air pollution at ground level had significantly reduced with the closure of old plants and better regulation, a process which for other less welcome reasons, is accelerating today. In this century it has been clear that it is pollution from road traffic, with its primary emissions at ground level, which is now of greatest concern to public health, and air quality monitoring within Hartlepool, neighbouring councils, and indeed within Government guidance, has changed to reflect this. Hartlepool also has an extensive coastline and at times of strong north-easterly weather, there can be high levels of natural particulates which may have health effects for some members of the public.

[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

Actions to Improve Air Quality

Road traffic across the UK has increased dramatically this century, most noticeably in respect of car ownership. While this is also true within Hartlepool and neighbouring councils, there has been beneficial legacy from the industrial heritage in that the road network has, over a long period, been dramatically improved. Within Hartlepool through traffic is generally light and is channelled onto the main A689 / A179 through route leading to the main A19 trunk road north – south which passes well to the west of the town, through rural areas. For Hartlepool, the main impact on public health is along commuter roads, and it is in this area that most action needs to be targeted to alleviate air pollution. Fortunately, most housing along these roads is low rise, and set back from kerbside so that there is good dispersion of air pollutants compared with older UK cities and towns. On the downside, it is recognised that public transport limitations have contributed to a higher level of commuter traffic for work purposes than in other large conurbations.

National action in terms of reducing emissions from vehicles is a crucial factor in reducing air pollution alongside roads. While significant strides have been made in vehicle engine technology, and on reducing harmful emissions from large diesels engines in buses and hgvs, Government policy has tended to concentrate in recent years on reducing carbon emissions, and this has filtered down into local authority policies. There has been a major shift away from petrol engines in small vehicles to diesel, which, while contributing to lower carbon emissions per mile, has inadvertently escalated those pollutants judged to be most harmful to public health, fine particulates and nitrogen dioxide, which cannot easily be reduced as with larger diesel vehicles. This has been compounded by inadequate emission testing regulations, so that actual emissions from small diesel engines in practice can be significantly higher than test. This has meant that the expected benefit of cleaner vehicle technology has not translated into significantly lower air pollution levels, and this has been confirmed by local monitoring. It will now take time for alternative low carbon / low emission technologies such as electric / hydrogen / hybrid vehicles to become economically viable alternatives. Much of the necessary infrastructure at a nationwide scale to facilitate these emerging technologies is currently unavailable.

Local actions to reduce the impact of vehicle emissions within Hartlepool are principally taken in conjunction with neighbouring councils through Tees Valley Unlimited concentrate in the following areas, with further detail in the Local Transport Plan:

- Reduce traffic congestion at peak times through improved network management and road improvements.
- Encouraging local bus companies to review services with particular emphasis on access to new and emerging employment opportunities, and to renew their fleet on an on-going basis.
- Encourage wider transport choices by improving pedestrian, cycling and public transport, including rail.
- Encourage the provision of a low emission vehicle infrastructure through the planning regime.

Over time, these improvements will all contribute to further reduction in air pollution within Hartlepool.

Local Priorities and Actions

Although not currently a statutory requirement of the National Air Quality strategy, Local Air Quality Management Policy Guidance expects local authorities to work towards reducing emissions and / or concentrations of particulate $PM_{2.5}$. The new Public Health Outcomes Framework includes particulate $PM_{2.5}$ as an air pollution indicator under domain 3.01.

Monitoring of particulate $PM_{2.5}$ is carried out within neighbouring Middlesbrough and Stockton-on-Tees councils through the national network and it is also possible to determine likely levels in all Tees Valley Council areas, including Hartlepool. Government objectives are easily met where relevant public exposure exists and this is expected to continue. Even so, Hartlepool council will continue to co-operate with the four other Tees Valley councils in trying to identify in more detail sources of fine particles, and see if any local action can cost effectively reduce emissions / concentrations.

How to Get Involved

Individuals can help to reduce air pollution by breaking the 'Car Addiction'!

- Try to avoid using the car for short journeys, or reduce the number of short journeys by better planning.
- Join a car club, or cycle, or walk.
- Use public transport when available.
- Ensure that the vehicle is well maintained; keep tyre pressures properly inflated to manufacturers' recommendation.
- Drive more consistently and avoid excessive speed, excessive braking, and prolonged idling.
- On a wider front, join a car club / car sharing scheme.
- Use park and ride facilities where available.
- If changing a car, pay greater attention to engine emission levels, downsize if practicable.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[4].

[4] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

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1 Local Air Quality Management

This report provides an overview of air quality in Hartlepool 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 Hartlepool Borough 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 E1 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 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 compliance with the objectives.

Hartlepool Borough Council currently does not have any AQMAs and can see no requirement for one. Air quality has been shown, since LAQM started in year 2000, to be consistently and generally good and this has been accepted by Defra.

For reference, a map of Hartlepool Borough Council's monitoring locations is available in Appendix D.

2.2 Progress and Impact of Measures to address Air Quality in Hartlepool

Hartlepool Borough Council has had no requirement to declare an Air Quality Management Area, and cannot economically justify a formal action plan to address air quality issues. However, the Council is committed to improving air quality in general, and does that through joint co-operation with the four neighbouring Tees Valley Councils through Tees Valley Combined Authority (April 2016, and which includes Tees Valley Unlimited), and at the environmental health level through the Tees Valley Environmental Protection Group, which also includes the Environment Agency. The Council also encourages stand alone measures that may have beneficial impact on air quality.

Measures generally impact on vehicle emission reductions and changing transport attitudes through encouraging cycling and walking, and improving public transport. Examples are:

- Working with bus companies to improve the vehicle fleet and routes
- Encourage cycling schemes and provide purpose built cycle ways
- Working with taxi firms to have lower emission vehicles and good maintenance
- Prioritise lower emission vehicles within the Council fleet
- Install renewable energy technologies across the Council building inventory
- Address climate change issues and implement a carbon management plan

Most of these schemes have been implemented in part, and the work will continue. The schemes do not address specific air quality issues, but all will have a bearing on improving 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.

Overview

Particulates $PM_{2.5}$ are very fine particulates which are now considered to be a more significant health risk than the larger particulates PM_{10}, as they penetrate further into the respiratory system and are less easily dislodged. Recognising this, the UK Public Health Outcomes Framework (Healthy Lives: Healthy People) includes an indicator relating to fine particulate matter ($PM_{2.5}$). This indicator is 3.01 in Health Protection Domain 3 – 'Fraction of mortality attributed to particulate air pollution' – with the latest factors across the Tees Valley as follows:

	England	North East	Darlington	Hartlepool	Middlesbrough	Redcar & Cleveland	Stockton-on-Tees
Fraction	5.1	3.7	3.7	3.8	4.2	4.0	4.0

These are estimates of the percentage of mortality attributable to long term exposure to particulate air pollution. The general range for the UK is between 2.5 and 4.0 for rural areas, up to 8 and higher in certain city areas.

Particulate $PM_{2.5}$ is not yet incorporated into LAQM regulation within England. As such there is no statutory requirement on local authorities to review and assess $PM_{2.5}$ for LAQM purposes, and while $PM_{2.5}$ monitoring across the UK is desirable given the links to the Public Health Outcomes Framework, it is recognised that monitoring costs can be prohibitive on local authorities. The latest 2016 Technical Guidance suggests local authorities use results from the national network of $PM_{2.5}$ monitors to assess levels, and also provides a nationally derived factor of 0.7 that can be used to estimate $PM_{2.5}$ levels from any particulate PM_{10} monitors that local authorities may have installed.

Within the Tees Valley, there are three $PM_{2.5}$ monitors as part of the national network, Middlesbrough Breckon Hill (urban industrial); Stockton Eaglescliffe (roadside); and, starting February 2016, Stockton A1035 Nelson Terrace (roadside), all giving direct $PM_{2.5}$ annual means. The Breckon Hill and Eaglescliffe stations have PM_{10} monitors alongside so that a locally derived factor of $PM_{2.5}$ to PM_{10} can be calculated and compared with the national factor and used at local PM_{10} monitors with a similar location.

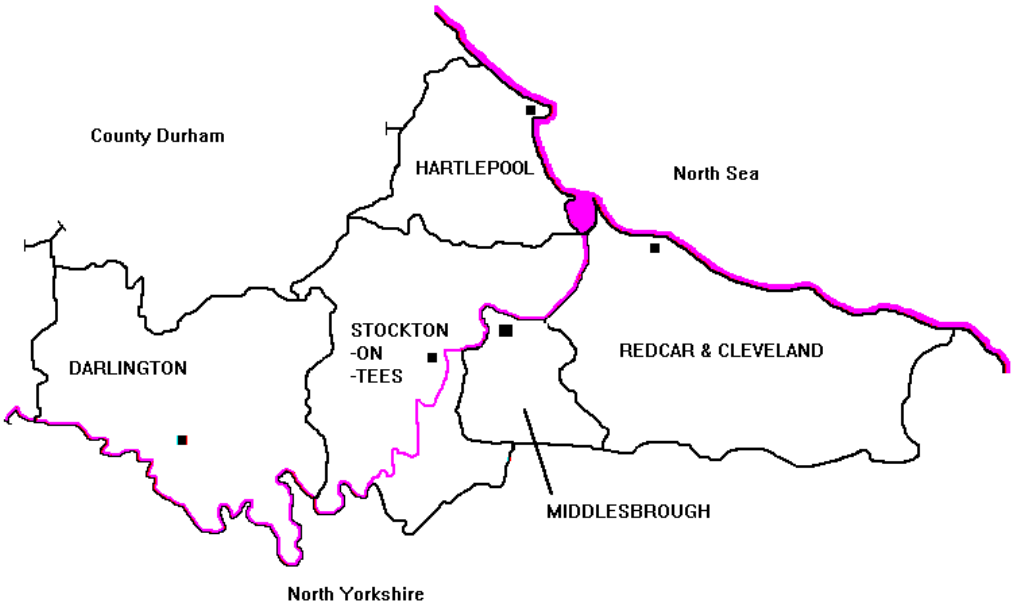
Annual means within the Tees Valley as measured at the two monitors have ranged between 9.5 and 13.1 µg/m^3, with variations year on year likely to be due to weather variations.

The UK target objective for $PM_{2.5}$ was first introduced in 2008 as an annual mean of 25 µg/m^3 (gravimetric) with no exceedances and a target 15% reduction at urban background sites between 2010 and 2020. This has been consistently met across the Tees Valley. The 2016 Technical Guidance has revised this objective to give local authorities in England a new flexible role in working towards reducing emissions and concentrations of $PM_{2.5}$. This will require local authorities to better understand local $PM_{2.5}$ sources and emission levels, data which is currently only available through national estimates.

Technical Guidance recognizes that due to its extremely small size, $PM_{2.5}$ can travel for long distances in the air and it is estimated that as much as 40% to 50% of the levels found in any given area can be from sources outside a local authority's direct boundary. Around a quarter of concentrations are thought to be secondary sourced, i.e. reactions between other pollutants in the atmosphere. In addition, coastal and rural areas can have higher proportions of natural sources such as salt, fine sand and pollens, the extent of which will be weather dependent. This means that locally emitted $PM_{2.5}$ will tend to be significantly less that 50% of the total burden, with road traffic and industry the principle sources.

Hartlepool $PM_{2.5}$

Hartlepool Borough Council is one of five unitary Councils forming the general area known as the Tees Valley. As shown below, it is the most northerly of these Councils, and is fourth largest in area, with a long coastline to the East.



Hartlepool Borough has a densely populated area to the East, but is otherwise largely rural. It has a covered shopping centre in the centre of town, but most new commercial development is around the marina area, nearer the coast. There is no significant rail traffic, and the port area is small compared with the Tees to the South. There are a few large industrial processes within the Council area, but many more are located in other Tees Valley Councils to the South. They do not significantly impact on Hartlepool air quality.

The main A19 trunk road runs North / South through the Borough, but is mainly in rural areas. Within the urban area, A689 / A179 dual carriageway runs North / South nearer to the coast, past the town centre and marina development. The road is in its own transport corridor, away from areas of relevant public exposure.

The majority of the Hartlepool area is subject to Smoke Control Orders, and natural gas is the main source of heating in all but a few rural villages. This means that air pollution from domestic and commercial sources are low. Industrial emissions are also low, leaving road transport as the most significant air pollution source.

Fine particulate pollution from road transport is likely to be the principle source, but even this is limited. Road traffic is generally light as the significant through routes are in their own transport corridors. This general view of sources is reflected in the national 1 sq km sector model maps for the borough based on 2011 emission source estimates (see reference 4). Typical background levels are shown as 8.5 – 10.5 $\mu g/m^3$/sqkm, with over 80% identified as natural or secondary sources. The average $PM_{2.5}$ loading per sqkm in 2011 is shown as 9.5 $\mu g/m^3$, reducing to 8.3 $\mu g/m^3$ in 2020 as a result of planned Government / EU measures.

Therefore, at this stage of understanding of local fine particulate emissions, it is difficult to see what positive action can be economically taken by Hartlepool Borough Council to reduce $PM_{2.5}$ levels over the coming years, other than those actions already identified in section 2.2 of this report. A more significant impact is likely to be made by changes in Government policy with regard to diesel engines in cars and small vans. Since 1995, the proportion of diesel engine cars has risen from below 10% to over 40% today due to concentration on reducing carbon emissions. Diesel engines emit more fine particulates than petrol engines, and it is difficult to fit effective abatement measures. Of as much concern are the higher levels of nitrogen oxides emitted by diesel engines, which are a key factor in secondary fine particulate formation.

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

This section sets out what monitoring has taken place and how it compares with objectives.

Hartlepool Borough Council undertook automatic (continuous) monitoring at 2 sites during 2018 and in October 2017 DEFRA installed a continuous urban background NO_2 monitor as part of the AURN network in the borough. Table A.1 in Appendix A shows the details of the sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem.

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.

3.1.2 Non-Automatic Monitoring Sites

Hartlepool Borough Council undertook non- automatic (passive) monitoring of NO_2 at 3 sites during 2018. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D.

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

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 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 2018 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.

There have been no exceedances of the annual mean or 1 hour mean objectives at any monitoring location.

Nitrogen dioxide trend graphs at the Hartlepool Stockton Road continuous monitoring station are shown below

3.2.2 Particulate Matter (PM_{10})

Table A5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

Table A. in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

There have been no exceedances of the annual mean or daily mean objective. Particulate PM_{10} trend graphs at the Hartlepool Stockton Road continuous monitoring station are shown below.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A. in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years using the nationally derived factor of 0.7 applied to the particulate PM_{10} results at the Stockton Road site. Also shown are the annual means recorded at the Middlesbrough and Stockton sites.

Derived annual means have fallen slightly from 18.8 µg/m^3 in 2012 to 15.7 µg/m^3 in 2017 but have shown an increase to18.6 in 2018. This site lies between the roadside and nearest building facade and is a worst case location for road traffic emissions. The actual monitored levels at the Middlesbrough and Stockton sites range between 9.1 and 13.1 µg/m^3 over the same period. These stations are more representative of urban traffic and of relevant public exposure. Weather conditions are thought to be the major influence on year by year variations.

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)
Stockton Road	Stockton Road (local)	Roadside	450300	529700	NO2; PM10	NO	Chemiluminescent; Beta Attenuated	10	12	2
Headland	Headland (local)	Other	452400	533600	PM10	NO	Beta Attenuated	10	5	2
Arch Court	Arch Court (AURN)	Urban Background	452429	532312	NO2	NO	Chemiluminescent			2

Notes:

(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)
S1	Powlett Road	Roadside	450400	533900	NO2	NO	0	5	NO	2.5
S2	Catcote Road (closed Dec 2014	Roadside	449400	530100	NO2	NO	0	5	NO	2.5
S3	Fens Crescent	Roadside	449600	592100	NO2	NO	0	5	NO	2.5
S4	King Oswy Drive	Roadside	449600	535950	NO2	NO	0	5	NO	2.5

Notes:

(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 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m³) (3)				
					2014	2015	2016	2017	2018
Stockton Road	Roadside	Automatic	70	70	**19.4**	**15.5**	**16.9**	**18.5**	**17.9**
S1	Roadside	Diffusion Tube	83	83	**13.9**	**13.9**	**14.6**	**9.5**	**7.5**
S2	Roadside	Diffusion Tube			**18**	/	/	/	
S3	Roadside	Diffusion Tube	100	100	**14.4**	**15.5**	**16.2**	**11.2**	**6.9**
S4	Roadside	Diffusion Tube	100	100	**13.5**	**14.7**	**13**	**9**	**7.8**
Arch Court	Urban Background	Automatic	100	100	/	/	/	/	**13**

☒ **Diffusion tube data has been bias corrected**

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m³ are shown in **bold**.

NO_2 annual means exceeding 60µg/m³, 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.

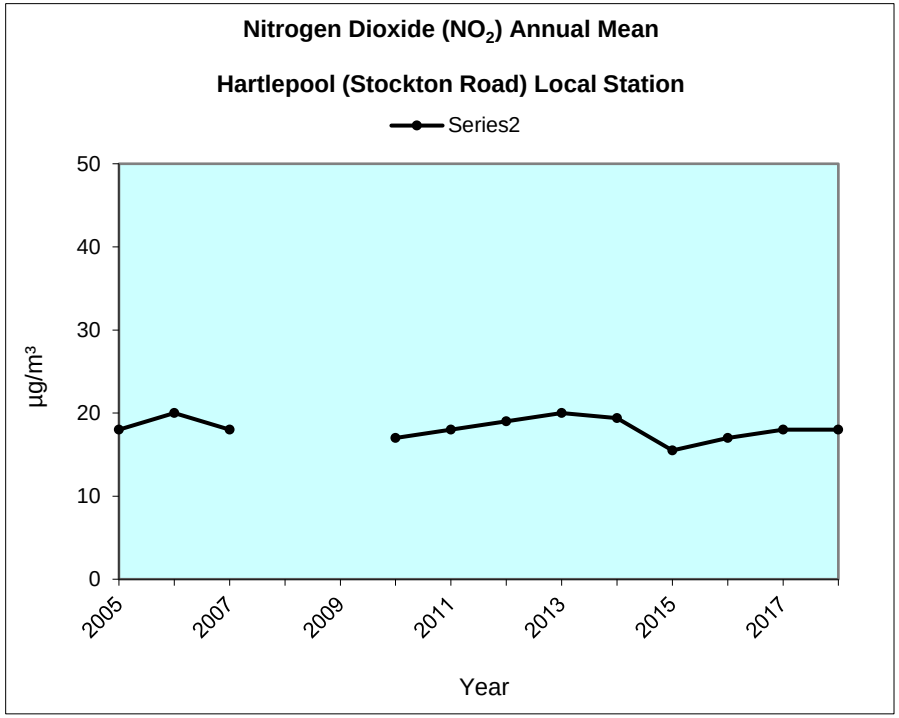
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

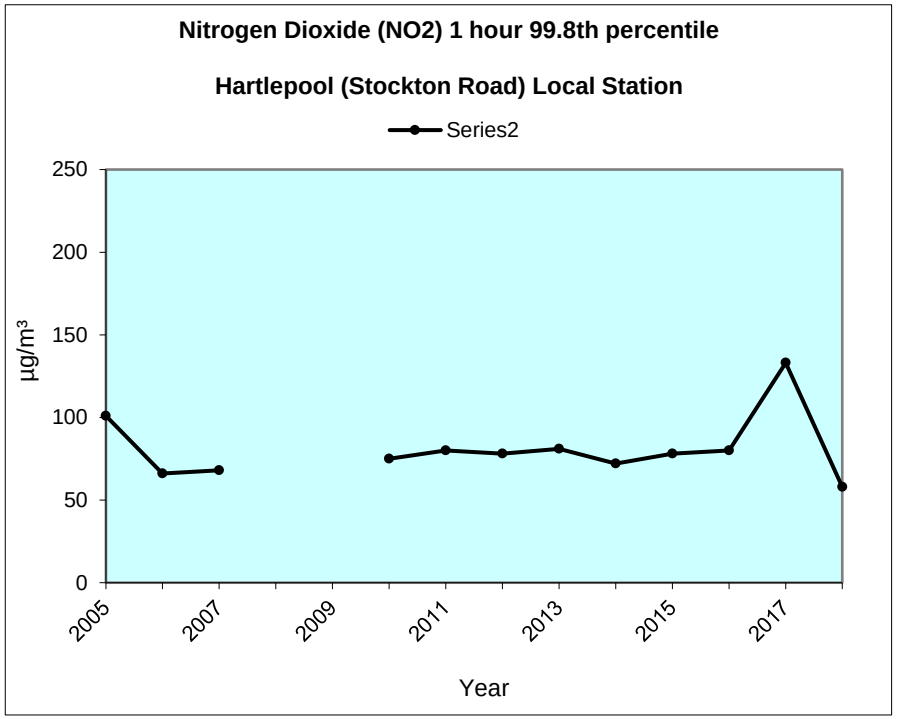
(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

HARTLEPOOL (Stockton Road) Local Station

(urban roadside site)





no data for 2008 - 2009

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 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
Stockton Road	Roadside	Automatic	100	70	**0**	0	0	0	**0**
Arch Court	Urban Background	Automatic	100	99	**0**	0	0	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 A5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
Stockton Road	Roadside	100	78	**28.8**	**26.3**	**24**	**22.5**	**26.6**
Headland	Other	100	92	**28.1**	**27.2**	**27.4**	**26.8**	**27.3**

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

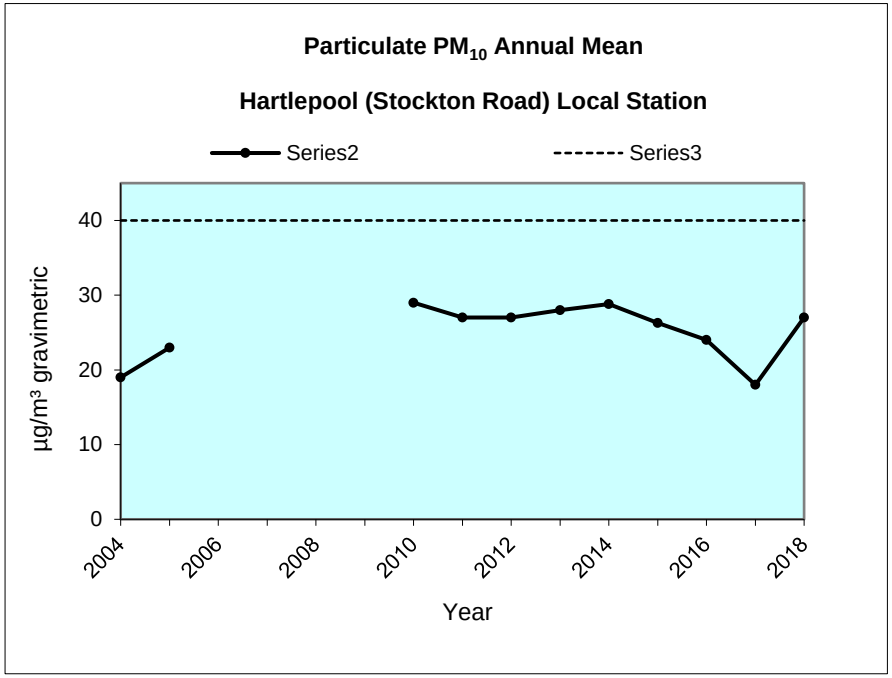
Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold.**

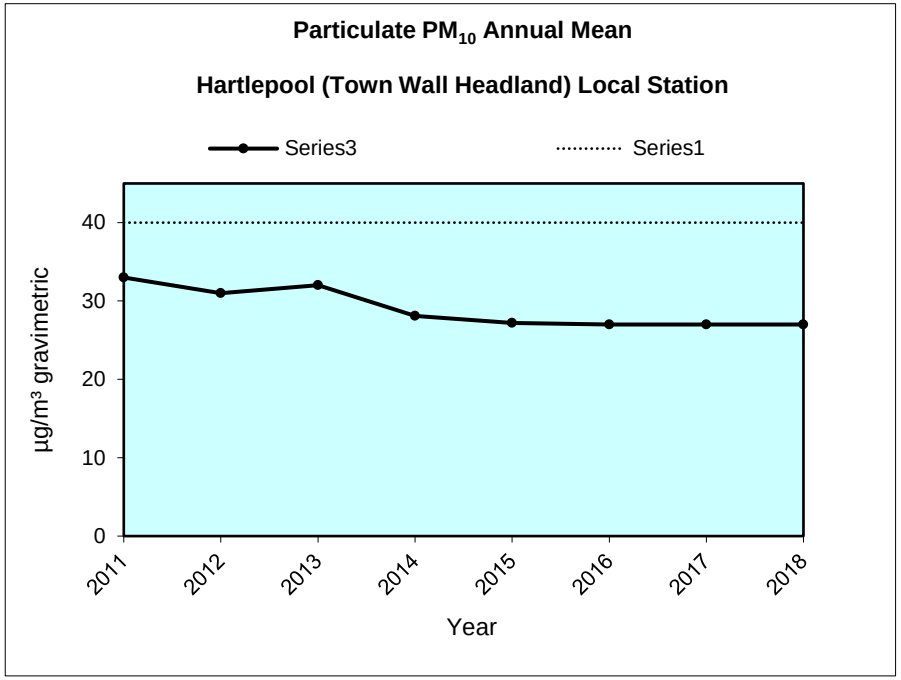
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

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

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations





No Data 2006-2009

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2014	2015	2016	2017	2018
Stockton Road	Roadside	100	78	**11(42)**	13(38)	5(34)	3(34)	9(38)
Headland	Other	100	92	**9(41)**	12(39)	10	6	12

Notes:

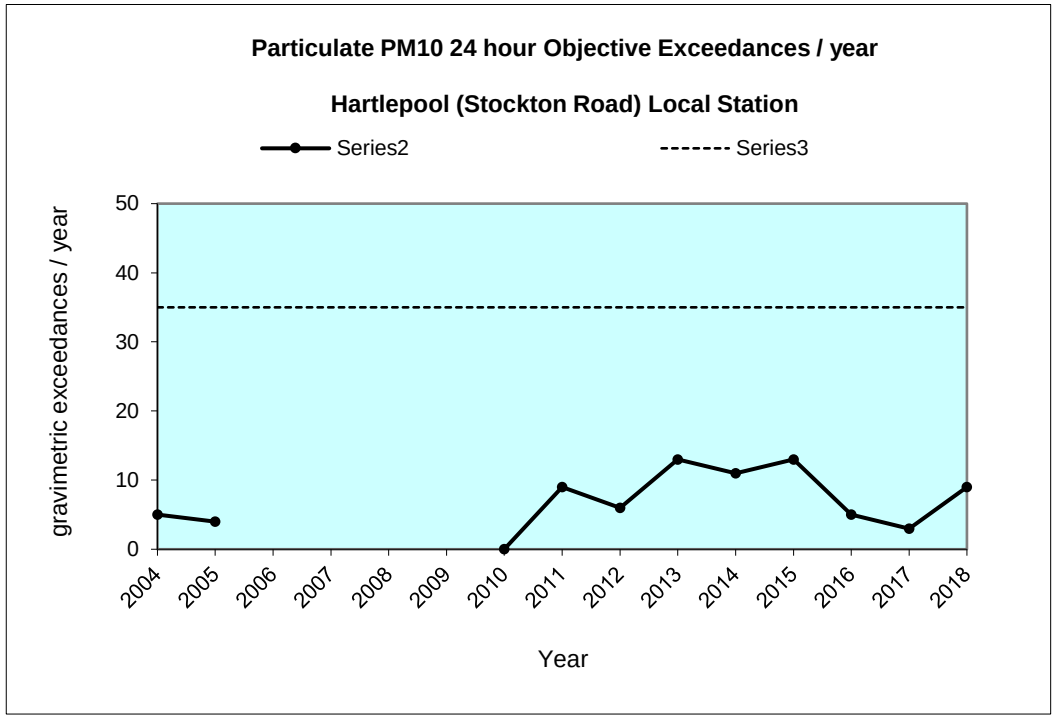
Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

(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.

Figure A.3 – Trends in Number of 24-Hour Mean PM_{10} Results >50µg/m^3



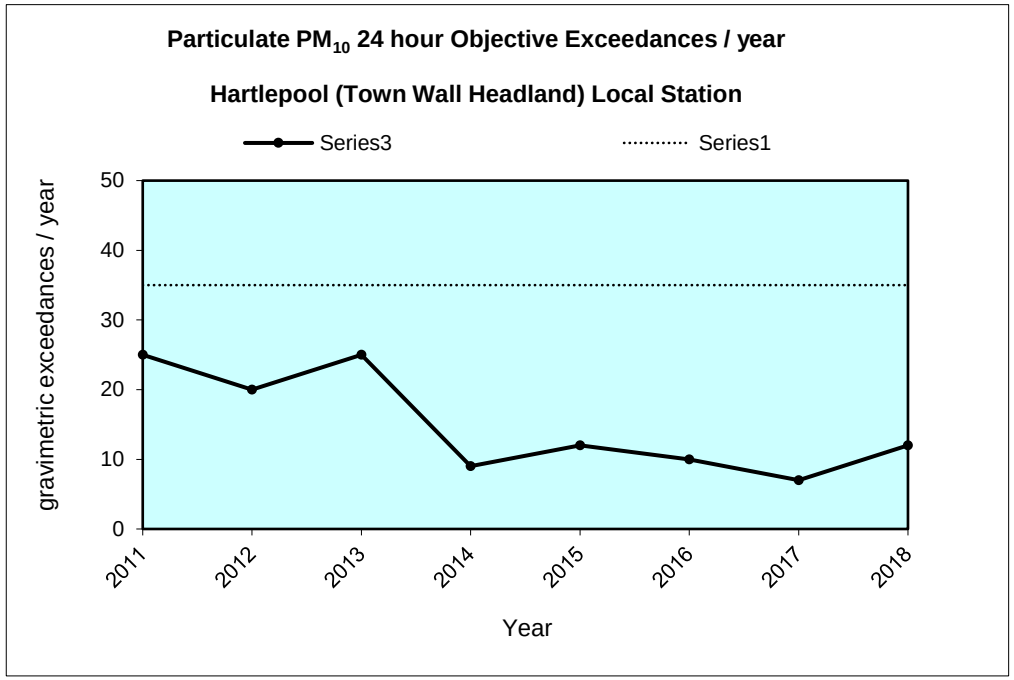

Particulate PM10 24 hour Objective Exceedances / year
Hartlepool (Town Wall Headland) Local Station
Series3
Series1
gravimetric exceedances / year
50
40
30
20
10
0
2011
2012
2013
2014
2015
2016
2017
2018
Year

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
Stockton Road	Roadside	100	73	20.2	18.4	16.8	15.7	18.6
Headland*	Other	100	92	19.7	19	19.2	18.7	19.1
Stockton on Tees (Eaglescliffe)	Roadside	100	95	10.9	10.7	9.1	8.4	10.2
Middlesbrough (Brecon Hill)	Industrial	100	96	13.1	10.5	10.1	7.4	8.9

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

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

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2018

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
S1	13.0	14.2	9.6	9.5	8.6	6.0	6.8	6.5	10.9			13.6	9.9	**7.5**	**0**
S2															
S3	12.9	10.8	11.3	8.9	6.3	4.3	6.5	6.3	7.1	10.3	11.8	13.7	9.2	**6.9**	**0.0**
S4	11.9	14.2	7.8	10.9	8.1	6.0	8.2	7.4	8.6	13.6	12.9	13.8	10.3	**7.8**	**0.0**

☒ **National bias adjustment factor used**

☒ **Annualisation has been conducted where data capture is <75%**

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.

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

Air Quality Monitoring Data QA/QC

Diffusion Tube Bias Adjustment Factors

The diffusion tubes are supplied and analysed by Environmental Scientifics Group (ESG) Didcot. Tubes are all 50% TEA in acetone. The bias factor used the ESG Didcot bias factor from the national database of March 2018 was 0.77 covering 27 studies.

PM Monitoring Adjustment

The Stockton Road and Headland PM_{10} monitors are BAM units adjusted to full gravimetric equivalence by dividing the raw data by 1.21.

Short-term to Long-term Data adjustment

During 2015, two months data was lost at the three diffusion tube locations due to missing tubes. The data has been annualised using three Tees Valley nitrogen dioxide continuous monitors. Calculations are shown later in this appendix C as table C1.

During 2014 and 2015, the nitrogen dioxide continuous monitor at Stockton Road failed, with repair work delayed by problems at the maintenance contractor, SupportingU Ltd. Seven months data was lost in each year, and results have been annualised using three Tees Valley nitrogen dioxide continuous monitors.

QA/QC of automatic monitoring

The two Hartlepool fixed continuous Local monitoring stations (one NO_x and PM_{10}, the other PM_{10}), are modern installations, and have been operated under a comprehensive service contract. Operators of the site have received supplier training.

The Council is committed to achieving accuracy, precision, data capture, traceability and long term consistency to ensure that data is representative of ambient air quality. In common with other Tees Valley Councils, Hartlepool has a documented quality assurance and control programme, which includes an established schedule of regular site calibrations, validation of data, and documentation of all procedures.

Details are summarised as follows:

Calibration gas obtained from approved gas standard suppliers. Equipment comprehensive service agreement with the supplier.

Data capture site operators are experienced and trained personnel, monitoring data capture on a daily basis where possible to ensure that faults are detected and corrected quickly.

Ratification data is screened, where possible on a daily basis, to check for unusual measurements. Suspicious data is investigated fully, and if found to be faulty, is deleted from the records. Particular attention is paid to possible environmental changes in the vicinity of the analyser.

Data is recorded monthly and compared with earlier results.

QA/QC of diffusion tube monitoring

The Hartlepool nitrogen dioxide diffusion tube programme is operated through an approved laboratory ((ESG) Didcot) with formal accreditation to BS standards, and one that participates in the AIR-PT programme. Particular attention is paid to proper installation of the tubes at the site, and reliable exposure duration.

Tube precision for this laboratory is consistently shown as good for 2018 for tube preparation 50% TEA in acetone. ESG Didcot also demonstrated 100% satisfactory performance in the AIR-PT scheme for 2015.

Appendix D: Map(s) of Monitoring Locations and AQMAs

- Historic Diffusion Tubes: (S1) Victoria Road, (S2) Catcote, (S3) Granville, (S4) Torquay, (S5) Stockton Road, (S6) Stockton Road/Owton Manor.
- Diffusion Tubes: (S1) 78 Powlett Road, (S2) 185 Catcote Road, (S3) 94 Fens Crescent, (S4) 219 King Oswy Drive.
- Continuous Monitoring Stations: (1) Town Wall, (2) Stockton Road/Barra Grove, (3) Arch Court

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[5]	
	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

[5] 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

1. LAQM Technical Guidance 2016

Published by the Department of Environment, Food and Rural Affairs, April 2016

2. LAQM Policy Guidance

Published by the Department of Environment, Food and Rural Affairs, April 2016

3. 2011 Particulate PM2.5 Background Data for Hartlepool

Published by the Department of Environment, Food and Rural Affairs, Data Archive