2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: April 2022

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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, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

The Borough of Hartlepool is situated on the North East coast within the Tees Valley and has a population of 93,663. Hartlepool has a strong industrial heritage and, in the past, this has often made a significant contribution to poor air quality in the area and, early air quality monitoring within Hartlepool and neighbouring councils was specifically targeted to industrial sources of pollution.

Many of the old industrial plants have now closed and regulation has improved significantly over the decades. In 2020 there were 19 businesses in Hartlepool regulated by the Environmental Agency and a further 16 businesses regulated by the Local Authority under The Environmental Permitting Regulations 2016. The closure of plants and better regulation has resulted in industrial air pollution at ground level being greatly reduced.

Another source of air pollution within Hartlepool arises from construction sites and residential properties. Within 2020 there were 7 planning applications approved for residential developments in Hartlepool.

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[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

[3] Defra. Air quality appraisal: damage cost guidance, July 2020

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

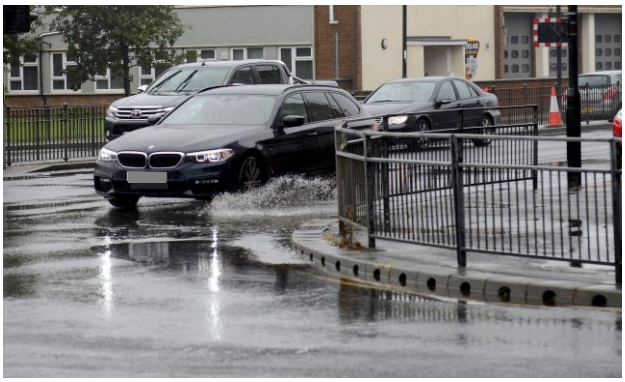
Hartlepool has an extensive coastline and at times of strong north-easterly weather, there can be high levels of natural particulates which may have health effects for some members of the public. Although not frequent events, Hartlepool does experience foam storms. Sea foam can hold algal toxins or surface-active pollutants in its bubbles which, when released into the air can pose a health risk for individuals with pre-existing health conditions and may cause irritation to the eyes.

Most residential properties in the Borough of Hartlepool are included in a smoke control area where the solid fuels used are restricted to those approved by DEFRA or fuels burned in a DEFRA approved appliance in order to reduce emmissions to the atmosphere. Notwithstanding this, Officers within the Environmental Protection team regularly receive reports, and investigate cases, where unathorised fuels and/or appliances are being used within the smoke control areas.

Over recent years there has been an increase in the use of solid fuel stoves as a source of heating for domestic properties potentially further increasing the emission of harmful environmental pollutants. A resident can install a log burner or multi fuel stove provided it is on the DEFRA list of exempted appliances and is installed by a competent person registered under the HETAS scheme.

In 2020 The Air Quality (Domestic Solid Fuel Standards) (England) Regulations 2020 were passed (and come into force on 1st May 2021) which tightened the standards relating to the sale of wood and other fuels which can be burnt in a domestic property and ensures that the sale of wood for combustion in domestic properties includes a ‘ready to burn’ mark.

Although there are several factors which affect air quality, it is pollution from road traffic, with its primary emissions at ground level, which is now of greatest concern to public health, and is the focus for air quality monitoring within Hartlepool.



Whilst road traffic has increased dramatically over recent decades in the United Kingdom, largely due to the increase in car ownership, Hartlepool still has a relatively low level of car ownership. The 2011 Office for National Statistics (ONS) Census[5] revealed that 35.3% of households in the Borough have no car. This compares with a National Figure of 25.6%.

Within Hartlepool through traffic is generally light and is channelled onto the main A689 and A179 through-route leading to the main A19 trunk road 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.

In 2020, due to the Coronavirus pandemic, vehicle miles driven on Great Britain's roads decreased by 21.3% compared to the previous year, with car traffic decreasing by 24.7% (the lowest figure in the last 29 years). By contrast, there was a 45.7% increase in cycle miles. Whilst these are National figures for 2020, annual road traffic estimates reported by the Department of Transport (DoT) [6] state that all regions saw their traffic levels decrease between 18% and 23% compared to their 2019 figures. This is likely to have resulted in improved air quality across the Borough.

[5] Office for National Statistics, Census, 2011

[6] Department of Transport, Road traffic estimates: Great Britain 2020

Hartlepool Borough Council reviews and undertakes air quality assessments independently and also in co-operation with neighbouring Councils in the Tees Valley. The Council produces annual reports for the UK Government and, once finalised, these reports are available for the public and published on the Council's website.

Air quality monitoring is carried out via the use of three automatic sites at Stockton Road, the Headland and St Abbs Walk (Automatic Urban and Rural Network AURN) as well as diffusion tubes situated across the Borough. The pollutants measured are Particulate Matter 10 (PM_{10}) and Nitrogen Dioxide (NO_2).

Particulate Matter 2.5 ($PM_{2.5}$) is not measured in Hartlepool but information is available from neighbouring Councils through monitoring stations at Middlesbrough, Eaglescliffe and Stockton. Levels have also been estimated using PM_{10} recorded data for Hartlepool and applying a nationally derived correction ratio of 0.7. (There is currently no objective for the $PM_{2.5}$ annual mean in the UK).

Hartlepool's annual report has consistently concluded that air quality in the Borough is generally good in areas where the public are regularly exposed to air pollution. As the results are below objective levels set by Government, there has been no need to declare any Air Quality Management areas in the Borough. Notwithstanding this, Hartlepool Borough Council has, through partnership-working, introduced a range of initiatives and actions as part of its commitment to improving air quality. The majority of these actions and initiatives are to reduce the environmental impact of traffic on the roads and encourage healthier, alternative methods of transport.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[7] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[8] sets

[7] Defra. Clean Air Strategy, 2019

[8] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions. As previously stated – Hartlepool has not been required to designate any AQMAs.

Hartlepool Borough Council works jointly with neighbouring authorities in the Tees Valley and other external agencies to implement actions to improve air quality. The Tees Valley Combined Authority has developed a joint strategic transport plan in collaboration with the five constituent Local Authorities, Darlington, Middlesbrough, Redcar & Cleveland, Stockton-on-Tees and Hartlepool. The plan covers the period 2020-2030 and has the vision “To provide a high quality, quick, affordable, reliable, low carbon and safe transport network for people and freight to move within, to and from Tees Valley”.

Within the Council, Environmental Health professionals work closely with officers from various disciplines, including Public Health, Traffic and Transportation and Planning to improve air quality in the area.

Conclusions and Priorities

The data collected from our automatic air quality monitoring stations and diffusion tube sites all indicate that the levels of NO_2 have fallen compared to 2019 figures and are all below the national objective levels.

The data shows that annual levels of PM_{10} at the Stockton Road station and the number of exceedances (>50 µg/m³) there have decreased. At the Headland station, annual levels have remained the same as 2019 but exceedances in the year have increased to 20 (13 in 2019) which is still well below the national objective of 35 exceedances in the year.

Monitoring of $PM_{2.5}$ is carried out within Middlesbrough, Eaglescliffe and Stockton AURN stations and can be used as an indicator of likely levels in all Tees Valley Council areas, including Hartlepool and national objectives at those sites are easily met and this is expected to continue.

The Coronavirus pandemic (COVID-19) has had an impact on the environment and had implications on air quality measurements and reporting in Hartlepool during 2020. Despite the challenges presented in 2020, Officers within the Local Authority are continually working to monitor and improve air quality within the Borough.

Local Engagement and How to get Involved

There are many ways in which residents of Hartlepool can contribute to reducing the levels of air pollution within the Borough for example:

- Reducing the level of traffic on the roads by using alternative methods of transport such as walking or cycling which has benefits for health and wellbeing as well as the environment.

  Hartlepool is part of the “Let’s Go Tees Valley” organisation which aims to change and improve the way members of the public travel around the region, making small changes to their everyday journeys. The organisation developed a Commuter Challenge during August 2018 to change the way you commute to work, encouraging car sharing, alternative modes of transport and health benefits of walking and cycling in the daily commute. Further information is available from:-

  https://www.letsgoteesvalley.co.uk/in-your-area/Hartlepool

- If you need to travel by car, consider joining a car sharing scheme. For information on car sharing please use the following link: www.liftshare.com
- Use public transport instead of private vehicles.
- If you intend to replace your existing vehicle then consider purchasing ‘greener’ vehicles such as hybrid and electric vehicles which will become more readily available in future years.
- Ensure that your vehicle is well maintained and keep tyre pressures properly inflated to manufacturer’s recommendation. Drive more smoothly and avoid excessive speed, excessive braking and prolonged idling.
- After months of home working, many residents may now have the opportunity to work from home either full time or on a hybrid basis which would lead to reduced traffic on our roads.
- Support local garden initiatives and plant more trees and greenery – and don’t burn garden waste/rubbish in the garden – take it to the waste recycling centre.

Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Hartlepool during 2020. 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 are presented in Table E.1.

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 should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

Hartlepool currently does not have any declared AQMAs.

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

Defra's appraisal of last year's ASR concluded that the report was detailed, well structured, and provided the information specified in the Guidance and that, on the basis

of the evidence provided by the local authority, the conclusions reached are acceptable for all sources and pollutants.

Specific comments included:

- The report confirms Hartlepool Borough Council continues to enjoy good air quality, and there is no requirement for the declaration of an AQMA.
- The Council have included a good overview of air quality conditions in the Executive Summary; this provides a good source of local context to the report.
- Despite having no formal AQAP, the Council have highlighted several measures they are pursing to improve air quality, both independently and in conjunction with local authorities across the Tees Valley.
- The Council should continue their co-operation with neighbouring Tees Valley Councils, and report on their progress in future ASRs.
- Whilst the Council do not monitor for $PM_{2.5}$ within their jurisdiction, the report includes a thorough discussion of the Local Authorities approach to the pollutant discussing possible sources and actions undertaken to reduce concentrations. The Council have made an explicit reference to the Public Health Outcomes Framework, reporting on the fraction of mortality attributed to particle air pollution indicator. The Council have estimated $PM_{2.5}$ concentrations within the Borough using monitored PM_{10} and from Defra background values. This section is commended and demonstrates the Councils commitment to addressing $PM_{2.5}$ concentrations and improving public health.
- Trend graphs have been provided for most monitoring data; however diffusion tube data has not been plotted, which could be included for completeness.
- The Council have not applied annualisation or distance correction adjustments as these were not required. It would be beneficial if this was explicitly stated within the Appendix.
- There are several instances of referring to outdated information within the report:

  The Defra background data used to estimate $PM_{2.5}$ is 2011 based. There is now 2018 based background data available, which should be used to report on concentrations for 2019. This can be found at: https://uk-air.defra.gov.uk/data/laqm-background-home.

  On page 7, the text refers to the number of monitoring sites in 2018. This should be updated to the latest data reported on (2019).

The Council have reported on the 2015 results of the AIR-PT scheme for the laboratory used for diffusion tubes. This should be updated for 2019.

- Robust and accurate QA/QC procedures were applied. Calculations for bias adjustment and distance-correction factors were outlined in detail. Annualisation was not required.
- As mentioned in the previous appraisals, the Council is recommended to consider reviewing their current monitoring regime and adding new diffusion tube locations, to investigate whether there are other areas of relevant exposure where there may be exceedances, but where monitoring has not yet taken place.

All recommendations from the appraisal have been actioned for this year's report. However, additional diffusion tubes in the Borough is still under consideration due to staffing issues.

Although there have been no exceedance or likely exceedance of an air quality objective in Hartlepool and therefore no requirement for Hartlepool Borough Council to declare any AQMAs; various measures and initiatives have been implemented within various departments of the Council in order to sustain and continuously improve air quality in the Borough and the Authority remains committed to monitoring and improving air quality within the Borough.

A summary of the actions which are being undertaken in the Borough is presented below. The actions help to reduce congestion, reduce vehicle numbers, reduce emissions per vehicle and improve health and wellbeing and air quality.

Motor Vehicles

- Taxi Licensing Strategy approved - new vehicle age policy takes effect on 1st April 2023. On this date, all vehicles that are not Euro 6 will no longer remain licensed in Hartlepool.
- Introduction of '20's Plenty' speed restriction zones to various areas and streets across the Borough
- Introduction of Hybrid working at Hartlepool Borough Council to reduce volume of traffic

Alternative Vehicles

- Wheels 2 Work scheme - providing electric motorbikes to working age people for up to a six-month period.
- Encouragement of low emission/ zero emission vehicles.

- E-scooter initiative with 55 drop off/collect points throughout the Borough

Cycling and Walking Initiatives

- Introduction of Summerhill Cycle Clinic.
- Bikeability training including balance bike training
- Let's Go Tees Valley encourages people who live and work in the Tees Valley to leave their cars at home and use greener, more active ways to travel on their day-to-day journeys.
- Pool Bike scheme and cycle allowance within Hartlepool Borough Council
- The Child Pedestrian Training (CPT) programme
- Work with Living Streets and the 'Let's Go team' to further promote the Living Streets 'Walk Once a Week' (WOW) initiative. WOW has operated in Hartlepool for a number of years and in the past was supported by a Living Streets Project Officer based with the Council. In 2020 Living Streets have also been able to devise a 'lockdown' version of WOW, encouraging participants to walk, cycle or scoot once a day.
- Walking Bus Initiatives
- Promotion of 'Travel Tracker' – a web based programme allowing for easy logging of active travel by school pupils.
- Establishment of Hartlepool Active Travel Hub

General Air Quality Initiatives and policies

- Committee proposal approved to develop a Net Zero and Climate Change Plan by September 2022
- The Borough Council has developed a Tree Strategy which includes objectives to: retain and protect existing trees; increase the number of trees by planting more, and encouraging others to plant more.
- The Hartlepool Local Plan 2018 specifies that where appropriate, an ecosystems services approach will be used to assess the impact of development proposals on the natural environment and improve air quality.
- Crucial Crew – educational interactive event for Primary School (year 6) children and which incorporates a scenario about air quality. (last event 2019 due to Covid 19)

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.

Data available on the Public Health England website as displayed below states that the fraction of mortality attributed to particulate air pollution within Hartlepool is 3.9 % which is lower than the overall value for England which is 5.1%.

Indicator	Period	Stockton			Region	England	England		
		Recent Trend	Count	Value	Value	Value	Lowest	Range	Highest
Fraction of mortality attributable to particulate air pollution	2019	–	-	4.0%	3.6%	5.1%	2.2%		7.0%

The data does however suggest that Hartlepool does have a slightly higher rate compared to the North East Region (3.6%).

Fraction of mortality attributable to particulate air pollution 2019 — Proportion - %

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	–	-	5.1	-	-
North East region	–	-	3.6	-	-
Middlesbrough	–	-	4.4	-	-
Redcar and Cleveland	–	-	4.1	-	-
Stockton-on-Tees	–	-	4.0	-	-
Hartlepool	–	-	3.9	-	-
Sunderland	–	-	3.7	-	-
Darlington	–	-	3.7	-	-
South Tyneside	–	-	3.6	-	-
North Tyneside	–	-	3.5	-	-
Newcastle upon Tyne	–	-	3.5	-	-
Gateshead	–	-	3.5	-	-
County Durham	–	-	3.3	-	-
Northumberland	–	-	3.1	-	-

Further information on this data can be found on Public Health England's Website using the link below:

https://fingertips.phe.org.uk/search/particulate%20air%20pollution#page/3/gid/1/pat/6/par/E12000001/ati/102/are/E06000047/iid/30101/age/230/sex/4/cid/4/tbm/1

Monitoring of particulate $PM_{2.5}$ is carried out within neighbouring Middlesbrough, Eaglescliffe 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.

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

This section sets out the monitoring undertaken within 2020 by Hartlepool Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Hartlepool Borough Council has two continuous monitoring stations, one alongside the busy main A689 Stockton Road (Barra Grove) leading into Hartlepool and measuring nitrogen dioxide and particulate PM_{10}, the other alongside the working port area on the Headland (Town Wall) measuring particulate PM_{10} only. The Headland station is a site specific location for port activity. Hartlepool Borough Council undertook automatic (continuous) monitoring at these 2 sites during 2020. Additionally, a monitor was installed by DEFRA in October 2017 at St Abbs Walk and measures continuous urban background NO_2 in the Borough as part of the Automatic Urban Rural Network (AURN). Table A.1 in Appendix A shows the details of the automatic monitoring 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.

The Data Selector - Defra, UK page presents automatic monitoring results for Hartlepool Borough Council, with automatic monitoring results also available through the UK Air Website:

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

A map showing the location of the monitoring sites is 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 monitoring of NO_2 using diffusion tubes at 3 sites during 2020. Table A.2 in Appendix A presents the details of the non-automatic 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 (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five 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.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five 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.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years using the nationally derived factor of 0.7 applied to the particulate PM_{10} results at the Stockton Road and Headland site.

Derived annual means have fallen from 18.9 µg/m^3 in 2019 to 16.67 µg/m^3 in 2020 at Stockton Road and have fallen from 22.2 µg/m^3 in 2019 to 20.8 µg/m^3 in 2020 at the Headland station.

The actual monitored levels at Middlesbrough, Stockton and Eaglescliffe sites range from 7.6 µg/m^3 to 8 µg/m^3 over the same period.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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 (Barra Grove)	Roadside	450300	529700	NO_2; PM_{10}	NO	Chemiluminescent; Beta Attenuated	10	12	2
Headland	Headland (Town Wall)	Other	452400	533600	PM_{10}	NO	Beta Attenuated	10	5	2
St Abbs Walk	St Abbs Walk (AURN)	Urban Background	451429	532312	NO_2	NO	Chemiluminescent	6.5	6	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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
S1	Powlett Road	Roadside	450400	533900	NO_2	NO	0	5	NO	2.5
S2	King Oswy Drive	Roadside	449600	535950	NO_2	NO	0	5	NO	2.5
S3	Fens Crescent	Roadside	449600	529100	NO_2	NO	0	5	NO	2.5

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.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Stockton Road	450300	529700	Roadside	49	49	16.9	18.5	17.9	13.9	7.6
St Abbs Walk	451429	532312	Urban Background	99	99			13	12.3	9.9

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Reported concentrations are those at the location of the monitoring site (annualised, as required), i.e. prior to any fall-off with distance correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

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

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

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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%).

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
S1	450400	533900	Roadside	N/A	66.7	14.6	9.5	7.5	13.4	9.7
S2	449600	535950	Roadside	N/A	66.7	16.2	11.2	6.9	13.1	8.6
S3	449600	529100	Roadside	N/A	66.7	13	9	7.8	14.2	10.7

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Diffusion tube data has been bias adjusted.**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

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**.

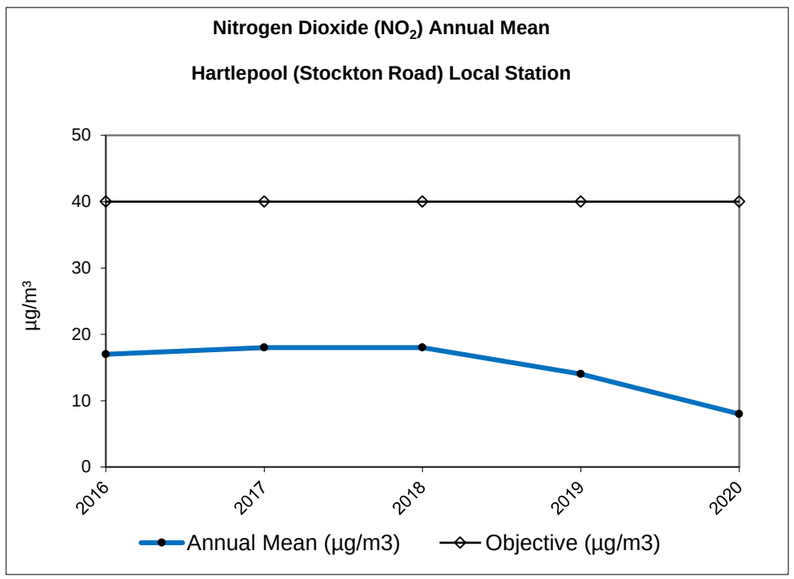
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

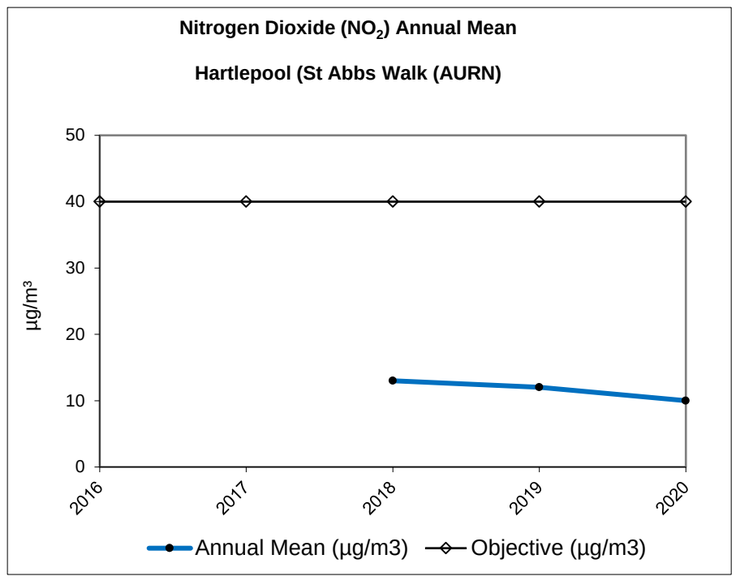
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations





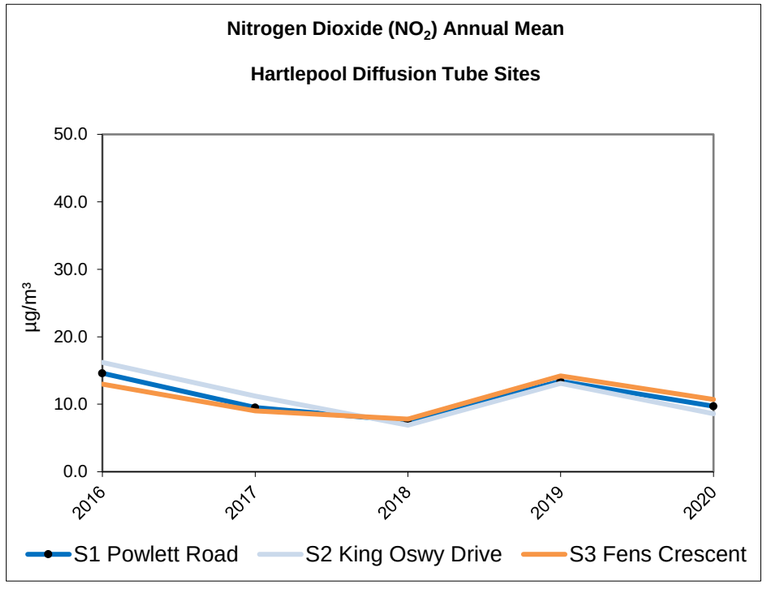


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Stockton Road	450300	529700	Roadside	49	49	0	0	0	0	0 (60)
St Abbs Walk	451429	532312	Urban Background	99	99	N/A	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

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**.

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

(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%).

Figure A.2 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

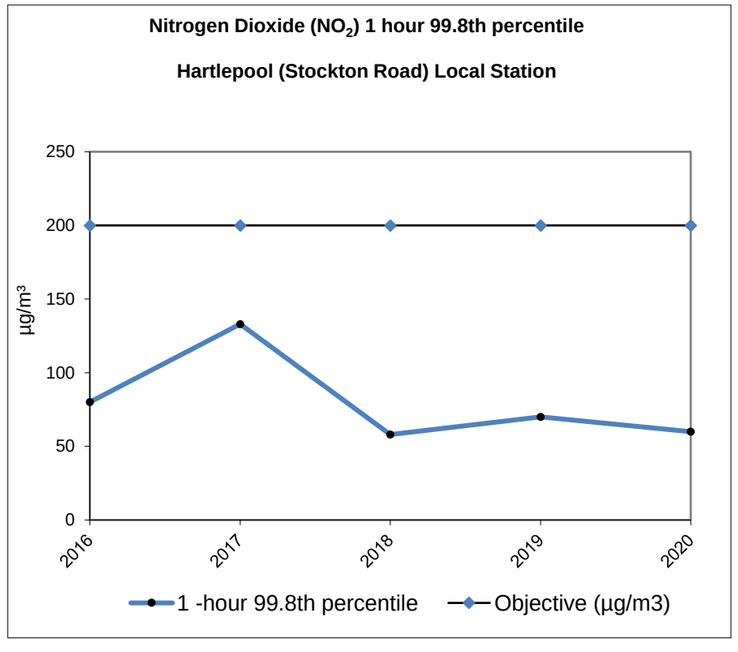


Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Stockton Road	450300	529700	Roadside	75	75	24	22.5	26.6	25.3	23.7
Headland	452400	533600	Other	95	95	27.4	26.8	27.3	29.7	29.7

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16**

Notes:

The annual mean concentrations are presented as $\mu g/m^3$.

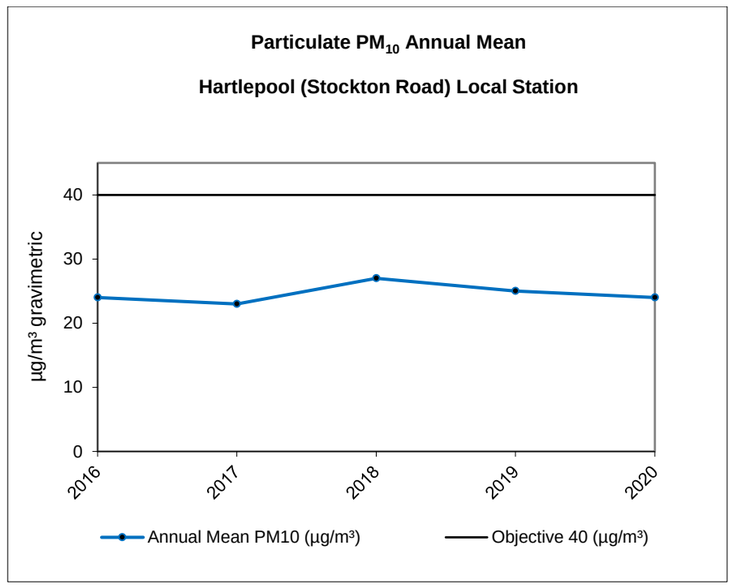
Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ are shown in **bold**.

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

(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%).

Figure A.3 – Trends in Annual Mean PM_{10} Concentrations



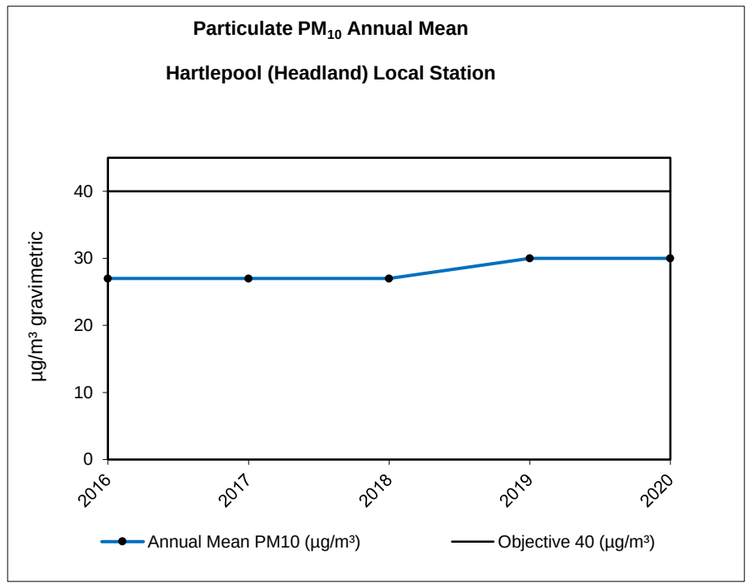


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Stockton Road	450300	529700	Roadside	75	75	5(34)	3(34)	9(38)	5(38)	1(33)
Headland	452400	533600	Other	95	95	10	7	12	13(46)	20

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

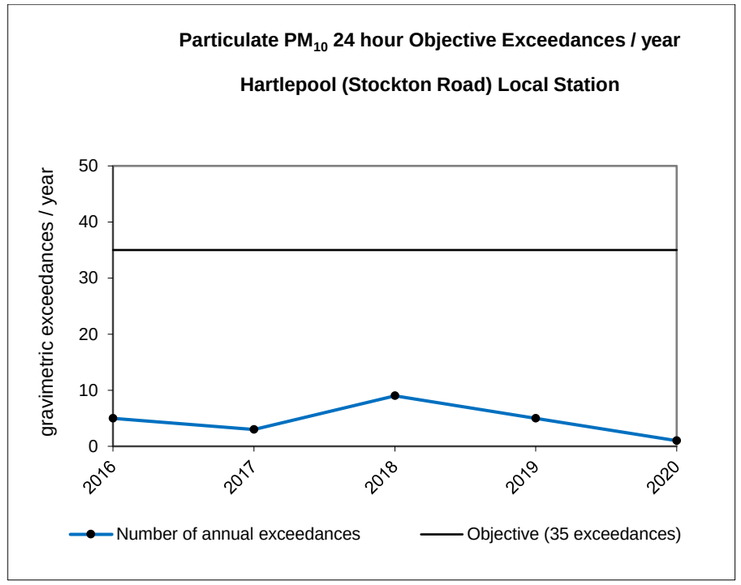
Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

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

(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%).

Figure A.4 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3



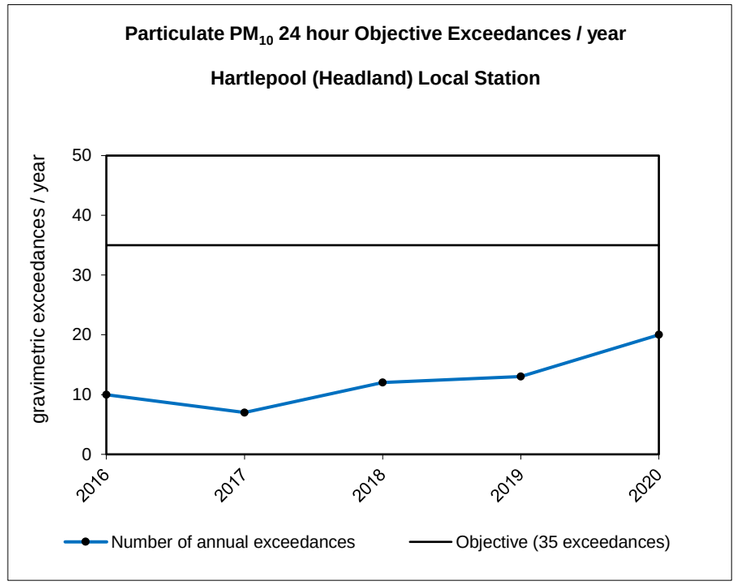


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Stockton Road	450300	529700	Roadside	75	75	16.8	15.7	18.6	18.9	16.6
Headland	452400	533600	Other	95	95	19.2	18.7	19.1	22.2	20.8

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

Notes:

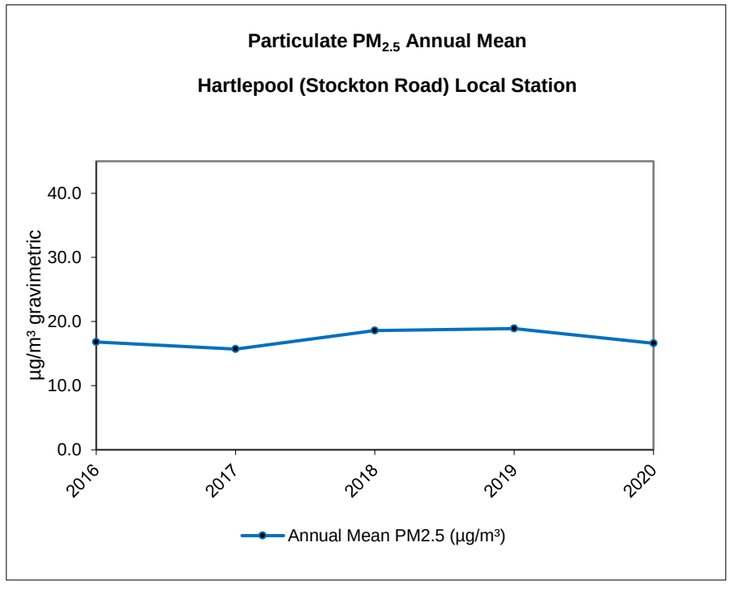
The annual mean concentrations are presented as µg/m^3.

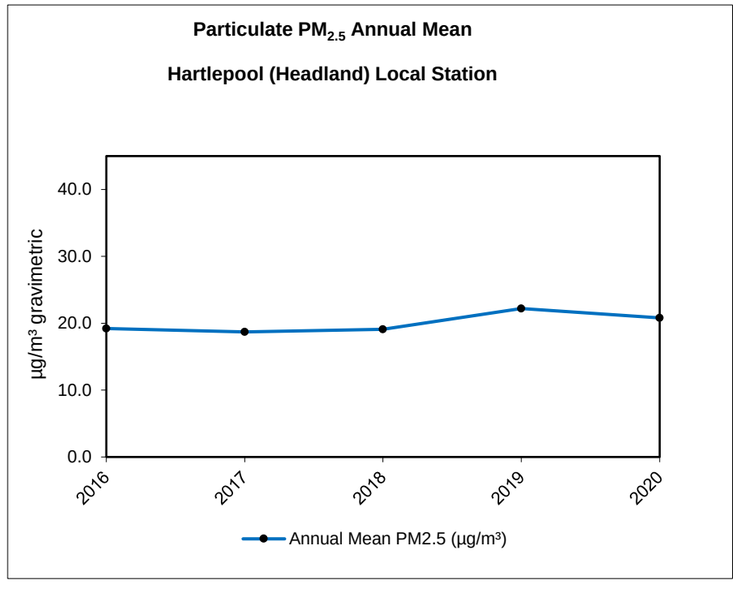
All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(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%).

Figure A.5 – Trends in Annual Mean $PM_{2.5}$ Concentrations





Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.76)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
S1	450400	533900	19.2	14.6	10.5	-	8.4	10.1	-	10.8	12.2	15.4	-	-	12.7	9.7	-	Data missing due to Covid 19 restrictions and staff absence
S2	449600	535950	17.9	14.2	8.3	-	7.6	7.7	-	9.5	10.7	13.5	-	-	11.2	8.6	-	
S3	449600	529100	25	18.9	9.5	-	10.5	9.8	-	8.9	11.8	16.6	-	-	13.9	10.7	-	

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column.**

☒ **Hartlepool confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

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**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Hartlepool During 2020

Hartlepool Borough Council have identified the following new sources relating to air quality within the reporting year of 2020.

H/2018/0249	**Change of use of land within ASHFIELD CARAVAN PARK to site additional 37 static caravan pitches**
H/2019/0260	**Residential development comprising 55 dwellings LAND AT SEATON LANE**
H/2019/0346	**Residential development comprising 81 No. affordable bungalows with parking, landscaping and access LAND AT BRIERTON LANE**
H/2019/0348	**Residential development comprising 31 No. two and three bedroomed residential properties with associated internal road LAND AT NEWHOLM COURT**
H/2019/0352	**Approval of reserved matters of planning LAND AT NORTH QUARRY FARM permission for up to 220 residential dwellings with associated access**
H/2019/0365	**Residential development of 67 dwellings LAND AT WYNYARD PARK NORTH**
H/2020/0068	**Erection of 110 No. dwellings within Sites C FORMER BRITMAG SITE**
H/2015/0209	**Application for the erection of 15 dwellings with associated infrastructure LAND AT THE FENS**

Additional Air Quality Works Undertaken by Hartlepool Borough Council During 2020

Hartlepool Borough Council has not completed any additional air quality works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

Hartlepool Borough Council nitrogen dioxide diffusion tube programme is operated through an approved laboratory (SOCOTEC, Didcot) with formal accreditation to BS standards and

one that participates in the AIR-PT programme. Particular attention is paid to correct installation of the tubes at site and reliable exposure duration.

Tube precision for this laboratory is consistently shown as good for tube preparation 50% TEA in acetone. As can be seen from the table below SOCOTEC are considered to be satisfactory as they have 100% across their most recent six tube rounds where data was available - this indicates that diffusion tube results should be accurate to within +/- 2%.

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of ≤ ± 2 as defined above.

AIR PT Round	AIR PT AR030	AIR PT AR031	AIR PT AR033	AIR PT AR034	AIR PT AR036	AIR PT AR037	AIR PT AR039	AIR PT AR040	AIR PT AR042
Round conducted in the period	January – February 2019	April – May 2019	July – August 2019	September – November 2019	January – February 2020	May – June 2020	July – August 2020	September – October 2020	January – March 2021
Aberdeen Scientific Services	75 %	100 %	100 %	100 %	100 %	NR [3]	NR [3]	100 %	100 %
Edinburgh Scientific Services	100 %	NR [2]	100 %	25 %	50 %	NR [3]	NR [3]	100 %	25 %
SOCOTEC	87.5 % [1]	100 % [1]	100 % [1]	100 % [1]	100 % [1]	NR [3]	NR [3]	100 % [1]	100 % [1]
Glasgow Scientific Services	100 %	100 %	100 %	50 %	100 %	NR [3]	NR [3]	100 %	50 %
Gradko International	75 %	100 %	100 %	100 %	75 %	NR [3]	NR [3]	75 %	25 %
Lambeth Scientific Services	50 %	100 %	50 %	100 %	100 %	NR [3]	NR [3]	100 %	100 %
Milton Keynes Council	100 %	100 %	50 %	100 %	100 %	NR [3]	NR [3]	25 %	0 %
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	NR [3]	NR [3]	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	75 %	100 %	NR [3]	NR [3]	100 %	100 %
Staffordshire County Council	100 %	75 %	75 %	75 %	100 %	NR [3]	NR [3]	50 %	100 %
Tayside Scientific Services (formerly Dundee CC)	100 %	NR [2]	100 %	NR [2]	100 %	NR [3]	NR [3]	100 %	NR [2]
West Yorkshire Analytical Services	100 %	100 %	100 %	50 %	100 %	NR [3]	NR [3]	NR [2]	NR [2]

Diffusion Tube Annualisation

The diffusion tube data for 2020 required annualisation, due to the impact on collection and analysis of the tubes during the COVID-19 pandemic (See Appendix F for more detail). The data has been annualised using the results at three Tees Valley continuous monitoring sites, all of which are background sites (two urban background and one suburban) in accordance with LAQM.TG16 box 7.9. The annualisation is performed using data from the continuous monitors (as included in the Diffusion Tube Data Processing Tool), obtained from the DEFRA UK Air data selector resource (Reference 5).

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor

based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 09/21

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of March 2022

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List. If a year is not shown, we have no data.

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.

If you have your own co-location study then see footnote 4. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m3)	Automatic Monitor Mean Conc. (Cm) (µg/m3)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
SOCOTEC Didcot	50% TEA in acetone	2020	R	Wrexham County Borough Council	9	17	13	26.6%	G	0.79
SOCOTEC Didcot	50% TEA in acetone	2020	KS	Marylebone Road Intercomparison	11	59	43	38.0%	G	0.72
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	10	23	23	2.2%	G	0.98
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	12	22	19	18.6%	G	0.84
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	9	25	18	42.0%	G	0.70
Socotec Didcot	50% TEA in acetone	2020	R	Dacorum Borough Council	10	24	19	26.2%	G	0.80
Socotec Didcot	50% TEA in acetone	2020	R	Huntingdonshire District Council	12	36	25	47.1%	G	0.68
SOCOTEC Didcot	50% TEA in acetone	2020		Overall Factor[3] (24 studies)				Use		0.76

Hartlepool Borough Council have applied a National bias adjustment factor of 0.76 to the 2020 monitoring data. The national bias adjustment factor was derived using the 'National Diffusion Tube Bias Adjustment Factor Spreadsheet 09/21 which produced a bias adjustment factor of 0.76 following 24 studies.

Discussion on use of bias correction factor

Hartlepool Borough Council has chosen to use a national bias adjustment factor for the 2020 data; which factor has been used for the previous 5 years. The national bias adjustment factor has been selected on the basis that it includes 24 sites which reflects a larger sample size than would be possible for a local bias-adjustment factor in the Borough.

A summary of bias adjustment factors used by Hartlepool Borough Council over the past five years is presented in Table C.1.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	09/21	0.76
2019	National	-	0.75
2018	National	-	0.77
2017	National	-	0.77
2016	National	-	0.79

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO_2 monitoring locations within Hartlepool Borough Council required distance correction during 2020.

QA/QC of Automatic Monitoring

The two Hartlepool fixed continuous Local monitoring stations (one NOx 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 has a 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.

PM_{10} and $PM_{2.5}$ 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.

Automatic Monitoring Annualisation

Annualisation is required for any site with data capture less than 75% but greater than 25%.

The NO_2 data from Stockton Road station required annualisation due to the impact on collection and analysis during the COVID 19 pandemic (See Appendix F for more detail)

The data has been annualised using the results at three Tees Valley continuous monitoring sites, in accordance with LAQM.TG16. Details of the sites and the data are displayed in Table C.2.

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website.

Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations within Hartlepool Borough Council required distance correction during 2020.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Diffusion Tube Site ID	Annualisation Factor Redcar and Cleveland Dormanstown	Annualisation Factor Middlesbrough Breckon Hill	Annualisation Factor Stockton –on-tees Eaglescliffe	Average Annualisation Factor	Raw Data Annual Mean (µg/m^3)	Annualised Annual Mean (µg/m^3)	Comments
S1	0.9741	1.0145	1.0441	1.0109	12.7	12.8	
S2	0.9741	1.0145	1.0441	1.0109	11.2	11.3	
S3	0.9741	1.0145	1.0441	1.0109	13.9	14.1	

Appendix D: Map of Monitoring Locations and AQMAs

Automatic Monitoring Sites: **A1** - Stockton Road, **A2** - St Abbs Walk, **A3** - Headland

Diffusion Tubes: **S1** - Powlett Road, **S2** - King Oswy Drive, **S3** - Fens Crescent

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[9]

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[10] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[11] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

[10] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[11] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Hartlepool Borough Council

The main impact of COVID-19 within Hartlepool Borough Council has been the quality and quantity of data available for monitoring. At the Stockton Road station, no data was available for NO_2 during January, February and December 2020 and erroneous data for several weeks during July, August and September was disregarded. Diffusion tubes were likewise affected - staff absence as a result of the pandemic meant that tubes could not be collected or replaced at all three sites in April, July, November and December 2020.

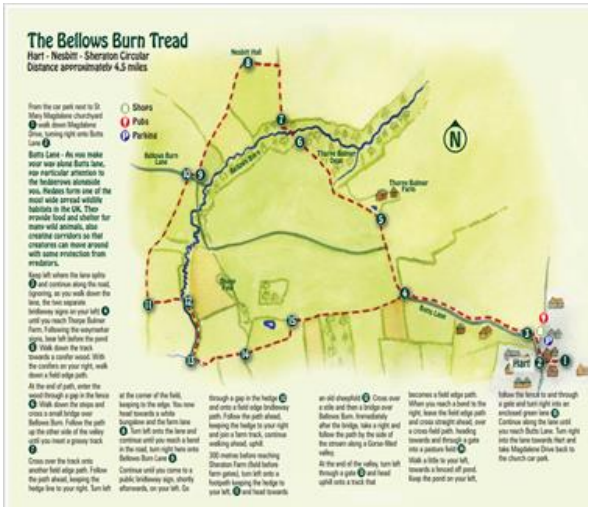
The results of monitoring that was undertaken (see relevant tables) showed that, compared with 2019, annual mean NO_2 levels were lower in 2020 than the previous year for all sites. This is likely to have been influenced by reductions in traffic numbers. PM_{10} levels were lower at the Stockton Road station in 2020 compared to 2019 but levels remained at the same level for both monitoring periods at the Headland station

Opportunities Presented by COVID-19 upon LAQM within Hartlepool Borough Council Area

Hartlepool Borough Council introduced new ways of working as a result of the pandemic. A large proportion of staff began working from home either full time or on a hybrid basis. Meetings were held online to reduce face to face contact and travel journeys to work were vastly reduced. These new working practices have been embraced and hybrid working will continue to be an option for the majority of staff in the Local Authority into the future.

Due to the pandemic there has been a renewed focus on walking and cycling in the Borough as alternative forms of travel and as a means of improving health and well-being. A range of walking and cycling guides is being produced which includes numbered routes

which feature interactive maps, giving detailed route instructions, information on the area, and a range of family friendly activities. It is expected that 12 routes will have been included in the series by 2022.



Challenges and Constraints Imposed by COVID-19 upon LAQM within Hartlepool Borough Council

- During 2020, results for diffusion tubes were not obtained for April, July, November or December due to staff absence and the impacts of COVID-19 on the analysis laboratory. (i.e. suspension of services). Therefore, it was not possible to obtain diffusion tube results for the three sites for these months in line with the national exposure monitoring calendar. This has affected data capture (67%) within 2020 resulting in data for all monitoring sites having to be annualised. In accordance with the impact matrix (Table F.1) the impact is **Small.**
- The results for NO_2 at the automatic monitoring site at Stockton Road during 2020 were not obtained for January, February and December and some erroneous data had to be disregarded during June, July, August and September. Due to Covid 19 - related staff absence and illness, the monitoring error was not able to be rectified. This affected data capture (49%) resulting in data having to be annualised. In accordance with the impact matrix the impact is **Medium.**
- Refresher training on use of equipment and manipulation of data was not undertaken during 2020.

- No promotional activities were able to take place in 2020 due to staff absence and restrictions imposed for gatherings in relation to Covid-19. This included activities to support National Air Quality Day.

The impacts as presented above are aligned with the criteria as defined in Table F 1, with professional judgement considered as part of their application.

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

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	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 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

- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Public Health England*, 'Public Health Outcomes Framework',* Public Health England, Available At: *https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page*
- Local Air Quality Management (LAQM), *National Bias Adjustment Factors, 'National Bias Adjustment Factor Spreadsheet'*, Department of Environment Food & Rural Affairs, National Bias Adjustment Factors, Available At: *https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html*
- Tees Valley Combined Authority, *Strategic Transport Plan*, Available At: *https://teesvalley-ca.gov.uk/wp-content/uploads/2020/02/STP-Main-Report-Design-Jan20.pdf*
- *UK Air Information Resource (AIR), 'Data Selector', Department of Environment Food & Rural Affairs; Available At: https://uk-air.defra.gov.uk/data/data_selector_service?q=3275829#mid*
- *UK Air Information Resource (AIR), 'Automatic Urban and Rural Network (AURN)', Department of Environment Food & Rural Affairs, Available At:*

  https://uk-air.defra.gov.uk/networks/network-info?view=aurn
- Department for Environmental, Food and Rural Affairs, *'Clean Air Strategy 2019'*

  Available at: https://www.gov.uk/government/publications/clean-air-strategy-2019