2024 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management, as amended by the Environment Act 2021

Date: June, 2024

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Executive Summary: Air Quality in Our Area

Air Quality in Redcar and Cleveland

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year[1].

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution[2].

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

Table ES 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO_2)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO_2)	Sulphur dioxide (SO_2) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

[1] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

Redcar and Cleveland monitor three of the four key pollutants identified in the table above. Cessation of SO_2 monitoring was decided during 2019 due to a long trend pattern of significantly low levels. This monitoring was replaced by $PM_{2.5}$ monitoring during 2020.

Redcar and Cleveland Borough Council maintained good air quality across the Borough for 2023. The pollutants monitored show a slight reduction from 2022 results, a trend which is anticipated to continue in the future.

Continued compliance with UK air quality objectives means that the declaration of an air quality management area (AQMA) is not required, it is predicted that this will not change in the near future. Redcar and Cleveland Borough Council is proud of its industrial heritage that now moves forward with advanced technologies and improved open spaces for residents and visitors to enjoy accessing parks, coastal spaces, and heritage museums.

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> **Commented [EG3]:** How do they enjoy ?
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Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan[3] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter ($PM_{2.5}$), the pollutant most harmful to human health. The Air Quality Strategy[4] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

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The Road to Zero[5] details the current Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel, and the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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[3] Defra. Environmental Improvement Plan 2023, January 2023

[4] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

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

Redcar and Cleveland complete an annual review of all air quality monitoring to ensure that any new sources are monitored, and the areas of greatest public exposure are assessed.

The first South Tees Clean Air Strategy, in collaboration with Middlesbrough Borough Council, has defined an action plan including milestones and performance measures with the aim to improve and prevent deterioration of air quality across South Tees.

Officers across Redcar and Cleveland Borough Council utilise legislation in the form of planning, environmental permitting and environmental protection to condition new sources of air pollution, regulate industrial activities and investigate complaints of smoke from commercial and domestic premises across the borough.

Conclusions and Priorities

Redcar and Cleveland's air quality follows the trend seen over the previous reporting years. The pollutants monitored (NO_2, NO_x, O_3, PM_{10} and $PM_{2.5}$) have all demonstrated compliance with the UK Air Quality Objectives. Current and historic data for Redcar and Cleveland Borough Council can be found via the Air Quality England website.

Redcar and Cleveland Borough Council have not declared any AQMA's and it is envisaged that this situation will not change in the future.

Annual mean figures for the pollutants monitored during 2023 have shown similar patterns to previous years, $PM_{2.5}$ levels have remained static at $7\mu g/m^3$ since the introduction of the dedicated continuous analyser. PM_{10} annual mean has reduced from $14\mu g/m^3$ to $10\mu g/m^3$. Nitrogen dioxide values from the continuous analyser have seen a slight reduction from $10\mu g/m^3$ in 2022 to $9\mu g/m^3$ and the diffusion tube network has two locations with an annual average above $20\mu g/m^3$ whilst the remaining sites are significantly below the $40\mu g/m^3$ air quality objective.

Redcar and Cleveland review the diffusion tube network on an annual basis (additional details are outlined in the main body of the report). Redcar and Cleveland Borough Council continue to keep their commitment to monitoring $PM_{2.5}$ which is identified as the main pollutant of concern for adverse health implications.

The first South Tees Air Quality Strategy, developed in collaboration with Middlesbrough Borough Council has been subject to public and stakeholder consultation during 2023 with the final strategy progressing through final sign-off with individual authority members. The

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South Tees Clean Air Strategy can be viewed on the Redcar and Cleveland Borough Council website.

Local Engagement and How to get Involved

Redcar and Cleveland promote the annual 'Clean Air Day' campaign operated by Global Action Plan. The theme for 2023 focused on 'Clean up our air to look after our mind'. In order to raise awareness and promotion of the event, communication was sent to all schools within the Borough to provide links to the resources available on-line and information available from Redcar and Cleveland Borough Council.

During the winter of 2023 Redcar and Cleveland utilised the new Defra 'Burn Better' campaign poster to remind stove users of the requirements to 'Check it, Sweep it, Feed it' and provide additional links to information on Redcar and Cleveland Borough Council's website. Posters were installed at all library locations within the Borough. It is envisaged that this publicity system will be utilised in future years to promote other campaigns / air quality initiatives and may be increased to cover town and village notice boards.
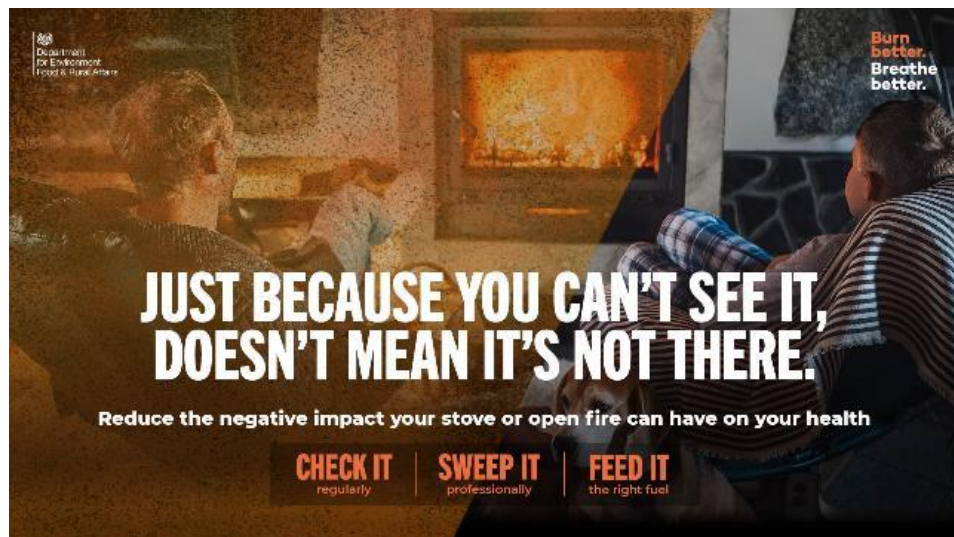
Redcar and Cleveland Borough Council's commitment to the climate change emergency has led to the development of the Greener Future website. The website provides updates on the Council's progress with carbon reduction and offers a wide range of information and links for residents, businesses, and visitors to help us with our mission.

Previously residents across the Tees Valley, which includes Redcar and Cleveland Borough Council, were able to access the Let's Go Tees Valley website which offered information on transport options across the region. This has now been replaced by a dedicated section within the Tees Valley Combined Authority (TVCA) website, outlining specific information on public transport, electric transport and cycling and walking routes.

The Enjoy Redcar / Cleveland website provides detailed information and maps for walking / cycling routes across the Borough. The website also provides information on upcoming events in the area such as wellness walks and theatre performances.

June 2023 saw Redcar and Cleveland host stage 3 of the women's Cycling Tour event, from Dalby Forest to Guisborough and the British National Road Championships in Redcar and Saltburn. Redcar and Cleveland Borough Council has become a regular location for national cycling events across England.

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Residents and visitors can access the Zap Map website to find the locations of all electric vehicle charging (EVC) locations across Redcar and Cleveland, helping them to plan their journeys.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Protection Team of Redcar and Cleveland Borough Council with the support and agreement of the following officers and departments:

Head of Environmental Health Teams: Erika Grunert, Health Protection Healthcare Quality Service Manager, Growth, Enterprise and Environment Directorate.

Climate Change and Sustainability Team

This ASR has been approved by:

Assistant Director – Growth and Enterprise, Andrew Carter

This ASR is also supported by Mark Adams, Joint Director of Public Health, South Tees.

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If you have any comments on this ASR please send them to the Environmental Protection Team at:

Redcar and Cleveland Borough Council

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1 Local Air Quality Management

This report provides an overview of air quality in Redcar and Cleveland during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Redcar and Cleveland 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 18 months. The AQAP should specify how air quality targets will be achieved and maintained and provide dates by which measures will be carried out.

Redcar and Cleveland Borough Council currently does not have any declared AQMAs. A South Tees Air Quality Strategy, in conjunction with Middlesbrough Borough Council, who cover the South Tees area and share a Director of Public Health is in place to prevent and reduce polluting activities. The South Tees Air Quality Strategy, adopted by Redcar & Cleveland Borough Council has been submitted with the 2024 ASR and can be found on the Redcar and Cleveland website.

2.2 Progress and Impact of Measures to address Air Quality in Redcar and Cleveland

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed and provided the information specified in the Guidance. Defra also offered the following points to inform future reports:

- Continue with Reference to the Public Health Outcomes Framework, following the positive work made in this submission.
- Continue analysis of trends in the air quality data in comparison to the Air Quality Objectives.
- Continue maintaining high standards of QA/QC procedures with sufficient supporting evidence provided, with robust analysis shown in this submission.
- Provide updates on the progress of current air quality initiatives and the South Tees Air Quality Strategy for 2024.

Redcar and Cleveland will continue to report on the points noted above, with specific reference to the South Tees Air Quality Strategy submitted with the ASR 2024.

Redcar and Cleveland Borough Council has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality.

- Promotion of national bike week during June 2023 to Redcar and Cleveland Council employees, explaining the cycle to work scheme and health benefits gained from using a bike as your mode of transport to work.

- Production of the Saltburn Transport Masterplan, (September 2023), which identifies schemes to improve resident and visitor experiences at Redcar and Cleveland's popular seaside tourist town.

- Display of Defra 2023 winter campaign poster regarding use of stoves as a heating appliance within all Redcar and Cleveland libraries.

- Submission of a joint Tees Valley Combined Authority bid to the UK Government's Sustainable Warmth Competition for the Homes Upgrade Grant (HUG). HUG 1

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improved 58 properties across the whole of the Tees Valley area, 30 of which were in Redcar & Cleveland.

- A further round of HUG funding was announced in November 2022 (HUG2). A consortium bid between Stockton-on-Tees, Hartlepool, Redcar and Cleveland and Darlington Borough Councils was submitted at the end of January 2023. In February 2023 the local authorities were informed that this bid was successful. It is anticipated that 120 homes across the four local authority areas will be improved during the lifetime of the scheme. The scheme was launched mid-October 2023 and will run until March 2025.

- Redcar and Cleveland is involved in two further funding initiatives; ECO4 Funding and the Great British Insulation Scheme (GBFS). These schemes form part of the Energy Company Obligation (ECO). Under ECO energy companies must provide funding for energy efficiency improvements to eligible households who are in receipt of particular benefits. ECO4 and the GBFS allows Local Authorities to declare certain additional households as eligible for funding, meaning that more households can receive support. The energy efficiency measures installed within a property are determined by the installer based upon the Energy Performance Certification (EPC) recommendations and the level of funding available. Further eligibility relates to the ability for any proposed works to increase the EPC rating of a property by two whole bands. Before ECO4 installers can undertake work in our area, Redcar and Cleveland Borough Council must first publish a Statement of Intent. The ECO4 and GBIS Statement of Intent for Redcar & Cleveland Borough Council was published in September 2023.

- Community Orchard in Kirkleatham, (March 2023), request for volunteers and apprentices to assist with planting heritage fruit trees, who were provided with alternative modes of transport options to access / assist with the event.

- Development of Green Energy Education Hub at Redcar and Cleveland College project as part of the Redcar Town Deal project, (October 2023).

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- Beach Wheels Redcar, procurement of two Hippocampes wheelchairs and one Debug hoist to facilitate the use of the beach area at Redcar by all, free to hire and hosted at the Northern Renewable Centre located on Esplande Redcar, (March 2023).

- Redcar Running Festival (September 2023), over 1000 runners took part in 5k, 10k and half marathon.

- Installation of new bike rack inside Redcar Leisure Centre for the storage of 12 bikes, (September 2023).

- Procurement of 3 road sweepers which run on hydrogenated vegetable oil (HVO), with a publicity campaign to name the road sweepers; engagement with local schools and residents, with some fantastic names suggested such as Obi-Wan Cleanobi, and Sweepasaurus Rex, (January 2023).

- Trial of HVO refuse wagons across the Borough due to the positive trials already completed and implemented with road sweepers.

- Trial of blue recycling bin tagging in an area around Normanby to improve recycling rates across the Borough, alongside communication with local residents to advise of what can and cannot be placed out for recycling, utilising information on our website recycling page, (October 2023).

- Cycle to Work Day (3rd August 2023), promoting cycle to work scheme along with real life stories from colleagues within Redcar and Cleveland Borough Council about the benefits they experience from cycling.

- The introduction of a further 25 electric vehicles into the Council's fleet, totalling 35 EV vans plus the Mayor's car.

- Fleet reviews across departments to assess suitability for EV, alternative fuel vehicles or a reduction in fleet vehicles.

- Redcar and Cleveland implementation of driver training for staff to ensure they are aware of fuel-efficient driving techniques and utilisation of route optimisation for waste and recycling services.

- Mileage Challenge Competitions put teams against each other to see how much monthly mileage claims can be reduced. The Council's hybrid working policy also supports the continued use of remote meeting solutions to prevent unnecessary vehicle journeys.

- The procurement process includes consideration of carbon and sustainability measures when considering awarding contracts to third party suppliers.

- During September 2023 the authorities within TVCA were successful in securing a publicity campaign within the free Primary Times schools magazine regarding anti-idling outside school locations and during school run times.

CARE ABOUT YOUR AIR!

Protect the environment and children's health, switch off your engine when parked.

- An idling car generates enough emissions to fill 150 balloons every minute. This can lead to poor local air quality, particularly around schools at drop off and pick up times.
- Children breathe more rapidly than adults absorbing more of these harmful emissions.
- Children are especially vulnerable to the effects of air pollution, which can aggravate conditions such as asthma and can be linked to other lung conditions including respiratory infections.

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Redcar and Cleveland Borough Council worked to promote these measures in partnership with the following stakeholders during 2023:

- Tees Valley Combined Authority (TVCA)
- Tees Valley Environmental Protection Group (TVEPG)
- Environment Agency (EA)

2.3 PM₂.₅ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[6], local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter (PM₂.₅)). There is clear evidence that PM₂.₅ (particulate matter smaller than 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Redcar and Cleveland Borough Council is taking the following measures to address PM₂.₅:

- Enforcement of smoke emissions from domestic properties within Smoke Control Areas (SCA).
- Use of the planning regime consultation process to identify new sources of PM₂.₅ and apply enforceable conditions to ensure emissions to atmosphere are controlled. Identification of new and changed sources within 2023 have been detailed in Appendix C.
- Continued regulation of industrial processes under the Environmental Permitting Regulations, ensuring use of best practice technologies and operational procedures. At the end of 2023 we had regulated 44 installations with Part B permits.
- Continued commitment to monitor PM₂.₅ at the automatic monitoring station in Dormanstown, as detailed in table A.8 below.
- Redcar and Cleveland Borough Council is one of the five local authorities that forms the Tees Valley Combined Authority (TVCA) this allows all authorities to have a region wide Transport Plan 2020-2030 that enables improvements to transport links, EV charging points and improved cycle networks across the whole area.
- Members of the TVCA authorities form the long-standing Tees Valley Environmental Protection Group (TVEPG) with representatives from each local authority Environmental Health Team and the Environment Agency to discuss and highlight air pollution matters.

Commented [EG43]: Could we quantify level of enforcement?
Commented [LG44R43]: No, none has been done

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[6] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

- Commitment by Redcar and Cleveland Borough Council to increase the number of their own electric / efficient fleet vehicles, utilisation of solar power technologies on Council buildings and promotion of cycling schemes for employees.

Redcar and Cleveland have 51 SCA's covering a large proportion of the borough. A map depicting SCA has been provided in Appendix D. The Environmental Protection Team is responsible for enforcement of excessive smoke emissions from domestic properties within the SCA's. Trend data of complaints received over the last 5 years has been outlined below.

Figure 2.3.1: Trend Data – Complaints within Smoke Control Areas
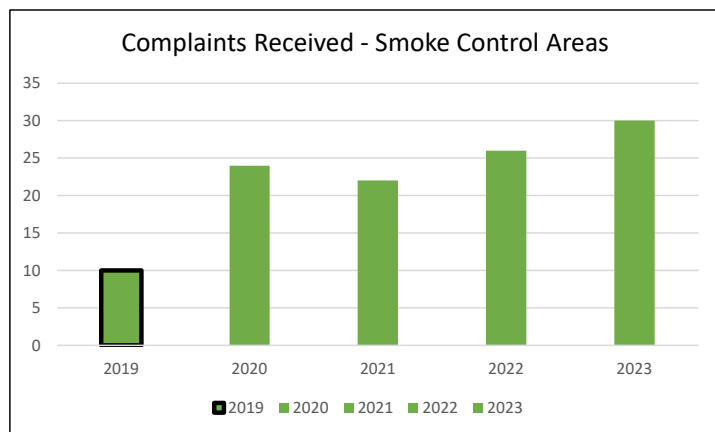
Note: Data for 2019 was impacted due to a cyber-attack that Redcar and Cleveland Borough Council suffered just prior to the global pandemic.

The number of complaints received has increased over the period shown, this could be linked to an increase in awareness and understanding of SCA, in part due to publicity campaigns by Redcar and Cleveland Borough Council. During the investigation of complaints Officers within the Environmental Protection Team have noted an increase in the knowledge of stove owners regarding stove and fuel choices, maintenance of appliances and routine chimney sweeping. During 2023 Redcar and Cleveland investigated 30 complaints / enquiries regarding smoke from properties within the SCA's. The investigations did not result in the issue of any warning / improvement notices or fixed penalties, however, initial complaint letters sent to the property being complained about highlight the rules within SCA's and health implications. It is hoped that this early

notification prohibits the need for further enforcement action as part of the service stepped approach towards enforcement.

Within the TVCA area there are three $PM_{2.5}$ analysers, two sites are part of the AURN one in Middlesbrough and one in Stockton-on-Tees, and the third site is at Dormanstown in Redcar and Cleveland. Annual means for these three sites are reported in Table A.8.

UK Health Security Agency (UKHSA) provides fingertips data for a wide variety of public health outcomes. The data now reports two factors relating to health and air quality; fraction of mortality attributable to particulate air pollution and air pollution fine particulate matter – concentrations of total $PM_{2.5}$ highlighting the importance of particulate matter on health. Data for Redcar and Cleveland, TVCA authorities and regional data for these two outcomes has been reported below. Data can be located on the Office for Health Improvement Disparities website.

Table 2.3.2 UK Public Health Outcomes linked to Air Pollution

	England	North East	Redcar & Cleveland	Darlington	Hartlepool	Middlesbrough	Stockton-on-Tees
Fraction of Mortality Attributable to Particulate Air Pollution (2022)							
Fraction	5.8	5.4	4.9	5.2	5.1	5.9	5.5
Air Pollution Fine Particulate Matter (New Method) – Concentrations of total $PM_{2.5}$ (2021)							
Fraction	7.4	6.4	5.9	6.1	6.0	7.0	6.5

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

This section sets out the monitoring undertaken within 2023 by Redcar and Cleveland Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Redcar and Cleveland Borough Council undertook automatic (continuous) monitoring at one site during 2023. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The Air Quality in England (AQE) page presents automatic monitoring results for Redcar and Cleveland Borough Council, with automatic monitoring results also available through the UK-Air website .

A map showing the location of the 2023 monitoring site and historic site 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.

The Redcar and Cleveland automatic monitoring station is based in Dormanstown and has been operational since 2012. It is located in a suburban area within the grounds of a local primary academy and is sited within 4km of the two major industrial and chemical complexes in Redcar and Cleveland; Wilton International and Teesworks (the former Redcar steelworks).

During 2023 Redcar and Cleveland monitored oxides of nitrogen (NO_x), ozone (O_3) and particulate matter in fractions PM_{10} and $PM_{2.5}$. Live and historic datasets are available from the AQE website. The website also provides a Daily Air Quality Index (DAQI), a measure used to provide information on air quality, potential air pollution incidents and health advice for the population susceptible to a lower air quality. Redcar and Cleveland Borough Council reported in 2022 the first very high episode of poor air quality, which we were unable to identify a trigger for. However, during 2023 Redcar and Cleveland returned to

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the previous year's index band trends and had no reports over an Index 4 Moderate result as depicted below.

Pollution Summary	**Create Graph**	**Index Bands Summary**	**Download Local Authority Data**		**Download Data Reports**					

Days in each index band for Redcar and Cleveland Borough Council

Choose a date period below to view a summary of how many days each site had in each index band.   [Switch to AURN data]

Start date 01/01/2023   **End date** 31/12/2023   [Calculate]

The number of days in each index band for the following date period is shown below: **01/01/2023 - 31/12/2023**

Monitoring site	Index 1 Low	Index 2 Low	Index 3 Low	Index 4 Moderate	Index 5 Moderate	Index 6 Moderate	Index 7 High	Index 8 High	Index 9 High	Index 10 Very High
Redcar Dormanstown (RED3) [View pie chart]	5	266	92	2	0	0	0	0	0	0

3.1.2 Non-Automatic Monitoring Sites

Redcar and Cleveland Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 13 sites during 2023. 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.

The diffusion tube network in Redcar and Cleveland has been operational since 2014, focusing on locations with public exposure, high traffic flows, areas of standing traffic and schools. Diffusion tubes are reviewed on an annual basis to identify areas of new exposure, remove sites that are significantly below the air quality objective level and to ensure that the Borough is represented spatially with monitoring across ward areas. All locations will remain in-situ for a minimum of two years.

The 2023 diffusion tube network review rational has been included with the Appendices, Table B.2.

No additional diffusion tube locations were chosen for monitoring during 2023, the R26, Trunk Road location was removed at the end of 2022 due to a full year of missing tubes and an alternative location in this area was not possible for installation.

The diffusion tube network includes the use of a travel blank to provide a quality check for the transportation of tubes. Monthly, non-bias adjusted, results from the travel blank have

been provided and indicate, as has been seen in previous years, that the travel process has a negligible effect on the final diffusion tube results.

ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
R00	0.2	0.2	0.4	0.2	0.3	0.3	0.2	0.1	0.2	0.4	0.2	0.5

The diffusion tubes used in the study are 50% trimethylamine (TEA) in acetone, the results have been bias adjusted using the national bias adjustment factor (0.83) and additional information relating to the choice of bias selection is provided 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 2023 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. Redcar and Cleveland Borough Council has not been required to distance correct any data.

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.

Throughout 2023 there have been no exceedances of the annual mean or 1-hour air quality objective of 200µg/m^3 for nitrogen dioxide at the continuous monitoring site. All diffusion tube locations have measured an annual mean below the 40µg/m^3 objective level.

Trend data for Redcar and Cleveland Borough Council diffusion tube locations, Figure A.2, details that monitored annual mean concentrations are regularly below the 40µg/m^3 objective. As with previous years Site ID R54, Ormesby Bank 1, remains the highest nitrogen dioxide concentration for 2023, however concentrations are reducing from the peak in 2021. Redcar and Cleveland during 2023 have continued to monitor a second location, Site ID R63 Ormesby Bank 2, as part of the diffusion tube network given the elevated levels recorded at Site R54. Monthly raw data continues to show a varied nitrogen dioxide pattern between the two sites, despite the locations being similar in nature. Both locations will remain as part of the diffusion tube network in the year ahead.

Diffusion tube data has been bias adjusted using the national correction factor of 0.83. During 2023 one site, R52, West Dyke, suffered a loss of 4 diffusion tubes and requires annualisation as the data capture is below 75%. Annualisation of this site has been completed using the annualisation tool on the Diffusion Tube Data Processing spreadsheet. Nitrogen dioxide automatic data from the site in Dormanstown, along with a site in Middlesbrough Council's area that forms part of the AURN network has been chosen to complete the annualisation. Both datasets are applicable for use due to a data capture greater than 85%. The annualisation factor is 1.0301, changing the raw mean at R54 from 17.3µg/m^3 to 17.8µg/m^3.

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.

During 2023 the annual mean PM$_{10}$ value has reduced to 10µg/m^3 from the 2022 figure of 14µg/m^3 and significantly below the air quality objective level of 40µg/m^3. Figure A.3 shows long term PM$_{10}$ concentrations for Redcar and Cleveland, depicting a gradual reduction since 1998.

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. On a positive note, 2023 data has seen Redcar and Cleveland return to 0 exceedances for this air quality 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.

Redcar and Cleveland have monitored PM$_{2.5}$ since mid-2020 at the automatic monitoring site, Dormanstown. Prior to this date PM$_{2.5}$ values were calculated using the PM$_{10}$ dataset.

The 2023 annual average remains the same as 2022 and 2021 at 7µg/m^3. Table A.8 also reports values from local authorities within the Tees Valley, during 2023 Redcar and Cleveland has monitored the lowest value along with neighbouring authority Middlesbrough and one site in Stockton-on-Tees.

The UK Government have outlined in their Air Quality Strategy legally binding targets to see an annual mean concentration of PM$_{2.5}$ of 10µg/m^3 by 2040.

3.2.4 Ozone (O$_3$)

Redcar and Cleveland Borough Council have monitored ozone from the current automatic monitoring station in Dormanstown, and the previous site at Corporation Road, since 1998. Ozone is not a required reporting pollutant for LAQM purposes due to its creation via chemical reaction in the atmosphere between NO$_x$, VOC's and sunlight. Higher concentrations of ozone are noticed during the spring and summer when sunlight levels are at their greatest. It is not always possible to target origins of ozone due to the chemical reactions in atmosphere and ability to travel long distances from original source areas.

During 2023 ozone levels reduced from the previous year, the maximum 8-hour reduced to 104µg/m^3 and the 8-hour running mean >100µg/m^3 recorded 9 exceedances over two days, a reduction from 2022 (40 exceedances over 6 days).

Commented [EG49]: Remind me why we continue to monitor ?

Commented [LG50R49]: We have the analyser, have always monitored and due to our coastal situation its best to monitor. We are future-proofing in case ozone becomes a required pollutant.

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? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Inlet Height (m)
Redcar Dormanstown	Dormanstown (2012 to present)	Suburban	458379	523486	NO_2, PM_{10}, PM2.5, O3	No AQMA	NO2 - Chemiluminescent, PM10 - BAM from 2013, PM2.5 - BAM from 2020, O3 - UV Absorption	1	150	2.5
Redcar Corporation Road	Corporation Road (1997 to 2011)	Suburban	459900	524600	NO_2, PM10, SO2, O3	No AQMA	NO2 - Chemiluminescent, PM10 - TEOM (vcm correction), SO2 - UV fluorescence, O3 - UV Absorption	1	20	2.5

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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)
R17, R18, R19	Dormanstown	Suburban	458379	523486	NO2	No AQMA	0.0	150.0	Yes	2.5
R27	West Lane	Roadside	454712	520678	NO2	No AQMA	42.0	1.0	No	2.0
R51	Broadway	Suburban	455379	520543	NO2	No AQMA	0.0	10.0	No	2.0
R52	West Dyke Road	Suburban	460292	524876	NO2	No AQMA	0.0	2.1	No	2.5
R54	Ormesby Bank (1)	Roadside	453831	516212	NO2	No AQMA	8.5	4.4	No	2.5
R55	Church Street	Suburban	461553	516074	NO2	No AQMA	10.9	2.4	No	2.5
R58	Fabian Road	Roadside	455518	519353	NO2	No AQMA	15.6	3.0	No	2.5
R59	Redcar Road	Roadside	460869	523657	NO2	No AQMA	2.1	4.3	No	2.5
R60	Flatts Lane	Roadside	454864	517813	NO2	No AQMA	11.7	2.0	No	2.5
R61	St Josephs Court	Roadside	459695	524414	NO2	No AQMA	2.5	2.4	No	2.5
R62	Stirling Road	Suburban	461308	523946	NO2	No AQMA	0.0	9.4	No	2.0
R63	Ormesby Bank (2)	Suburban	453462	516420	NO2	No AQMA	0.0	11.8	No	2.0
R64	Hutton Lane	Suburban	460440	515021	NO2	No AQMA	0.0	13.6	No	2.0

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 NO₂ Monitoring Results: Automatic Monitoring (μg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
Redcar Dormanstown	458379	523486	Suburban	99.8	100	9	9	11	10	9

☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

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

☐ **Where exceedances of the NO₂ annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023.**

Notes:

The annual mean concentrations are presented as μg/m³.

Exceedances of the NO₂ annual mean objective of 40μg/m³ are shown in **bold**.

All means have been "annualised" as per LAQM.TG22 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 NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

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 2023 (%) [2]	2019	2020	2021	2022	2023
R17, R18, R19	458379	523486	Suburban	100.0	100.0	15.2	13.2	11.5	11.7	11.6
R27	454712	520678	Roadside	90.4	100.0	24.8	21.0	23.1	20.6	21.1
R51	455379	520543	Suburban	100.0	100.0		11.7	12.1	11.8	11.5
R52	460292	524876	Suburban	67.3	100.0		16.3	15.7	14.9	14.8
R54	453831	516212	Roadside	100.0	100.0		27.3	30.5	24.4	23.9
R55	461553	516074	Suburban	100.0	100.0		16.3	18.1	15.5	15.6
R58	455518	519353	Roadside	92.3	100.0			13.8	12.3	12.9
R59	460869	523657	Roadside	90.4	100.0			13.9	14.0	13.0
R60	454864	517813	Roadside	82.7	100.0			16.9	17.7	16.0
R61	459695	524414	Roadside	92.3	100.0				11.7	11.0
R62	461308	523946	Suburban	92.3	100.0				9.3	9.0
R63	453462	516420	Suburban	100.0	100.0				10.5	10.3
R64	460440	515021	Suburban	100.0	100.0				5.8	5.4

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☒ **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/m³.

Exceedances of the NO₂ annual mean objective of 40µg/m³ 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** <u>**underlined**</u>.
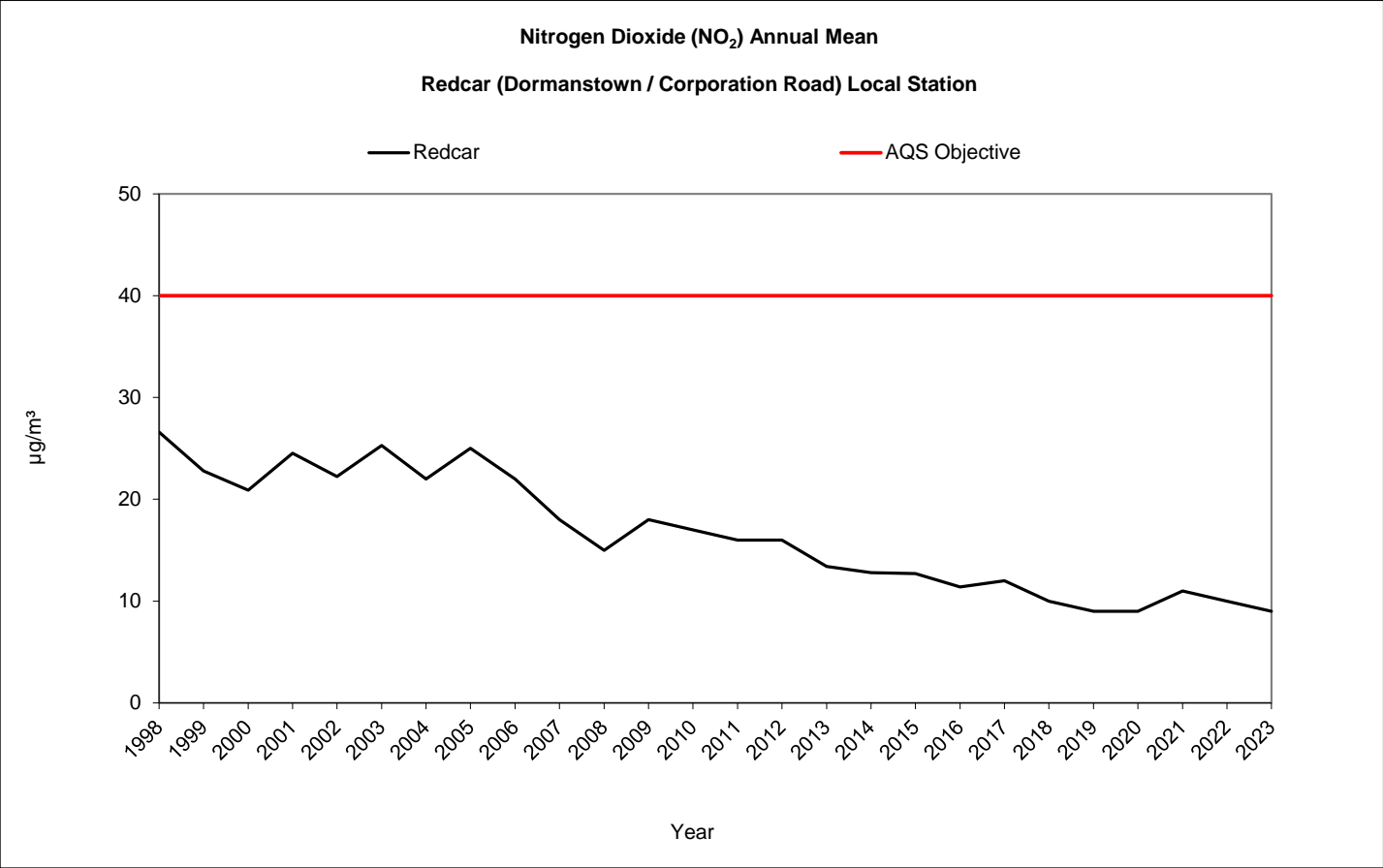
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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 NO₂ Concentration

Nitrogen Dioxide (NO₂) Annual Mean

Redcar (Dormanstown / Corporation Road) Local Station

Redcar and Cleveland Borough Council

Table A.5 – 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
Redcar Dormanstown	458379	523486	Suburban	99.8	100	0	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m³ have been recorded.

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ 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 Annual Mean NO₂ Concentration at six Long-Term Diffusion Tube Locations across Redcar & Cleveland
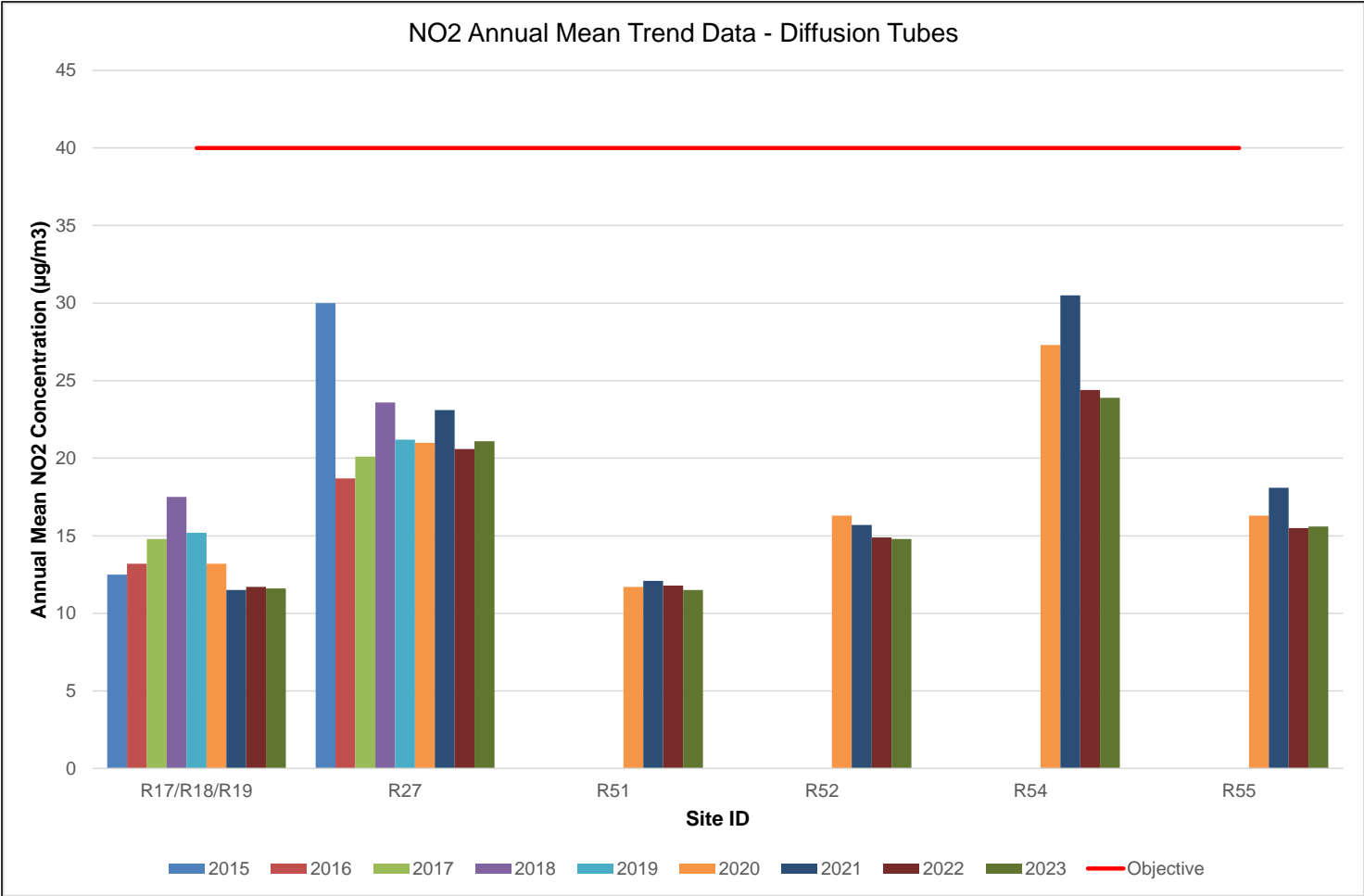
Table A.6 – Annual Mean PM₁₀ Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
Redcar Dormanstown	458379	523486	Suburban	96.8	100	14	13	14	14	10

☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ are shown in **bold**.

All means have been "annualised" as per LAQM.TG22 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$_{10}$ Concentration
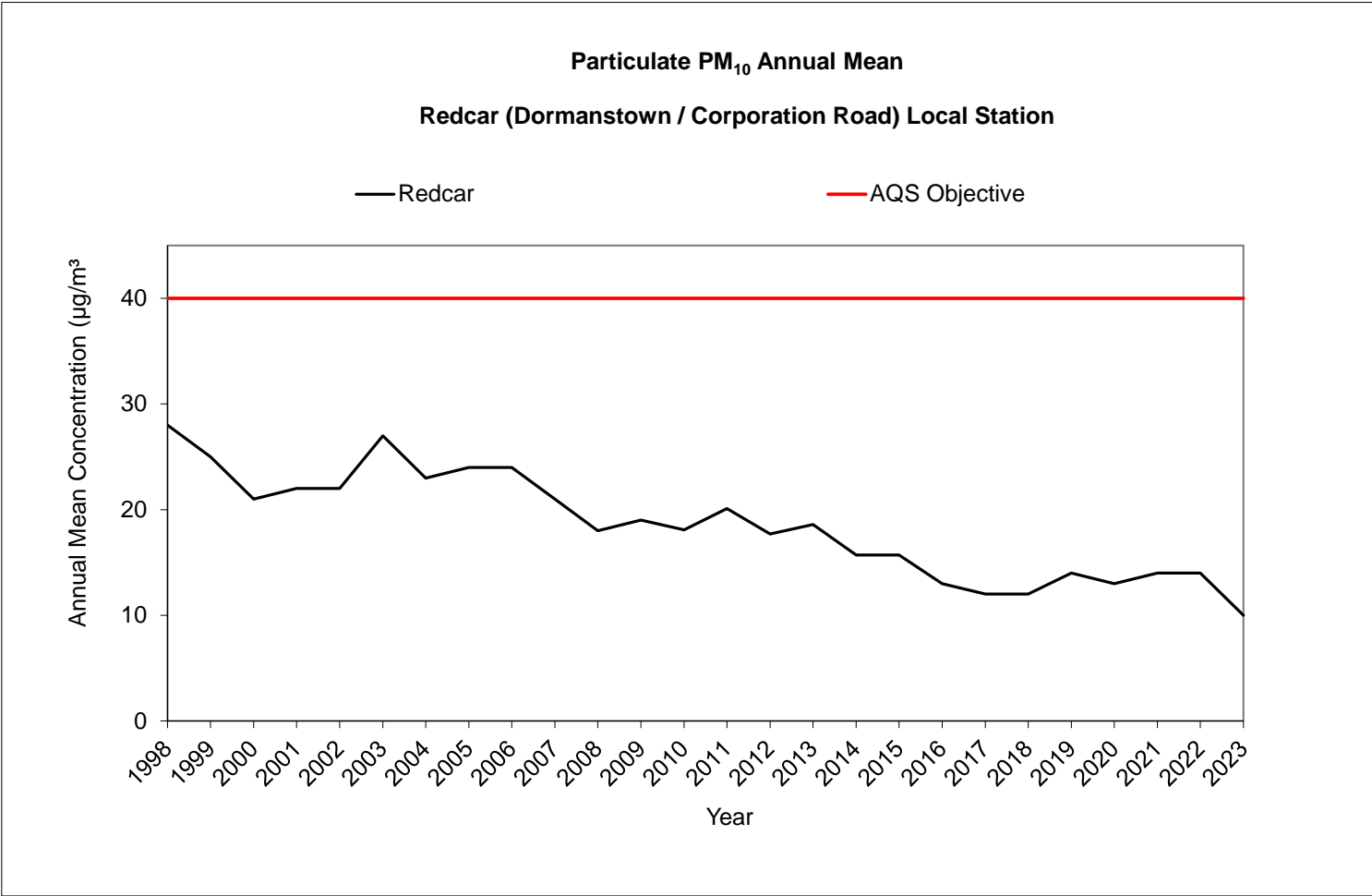
Table A.7 – 24-Hour Mean PM$_{10}$ Monitoring Results, Number of PM$_{10}$ 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
Redcar Dormanstown	458379	523486	Suburban	96.8	100	0	0	0	3	0

Notes:

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%).

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 2023 (%) [2]	2019	2020	2021	2022	2023
Redcar Dormanstown	458379	523486	Suburban	99.0	100	9.8*	9.1*	7	7	7
Middlesbrough Breckon Hill	450506	519620	Urban Background	83	100	10.3	7.6	6	8	7
Stockton Eaglescliffe	441623	513674	Roadside	81	100	8	8	8	8	8
Stockton A1305 Nelson Terrace	444331	519170	Roadside	90	100	8	8	7	9	7

☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

Notes:

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

All means have been "annualised" as per LAQM.TG22 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%).

*Denotes PM$_{2.5}$ values calculated from PM$_{10}$ data.

Figure A.4 – Trends in Annual Mean PM$_{2.5}$ Concentration
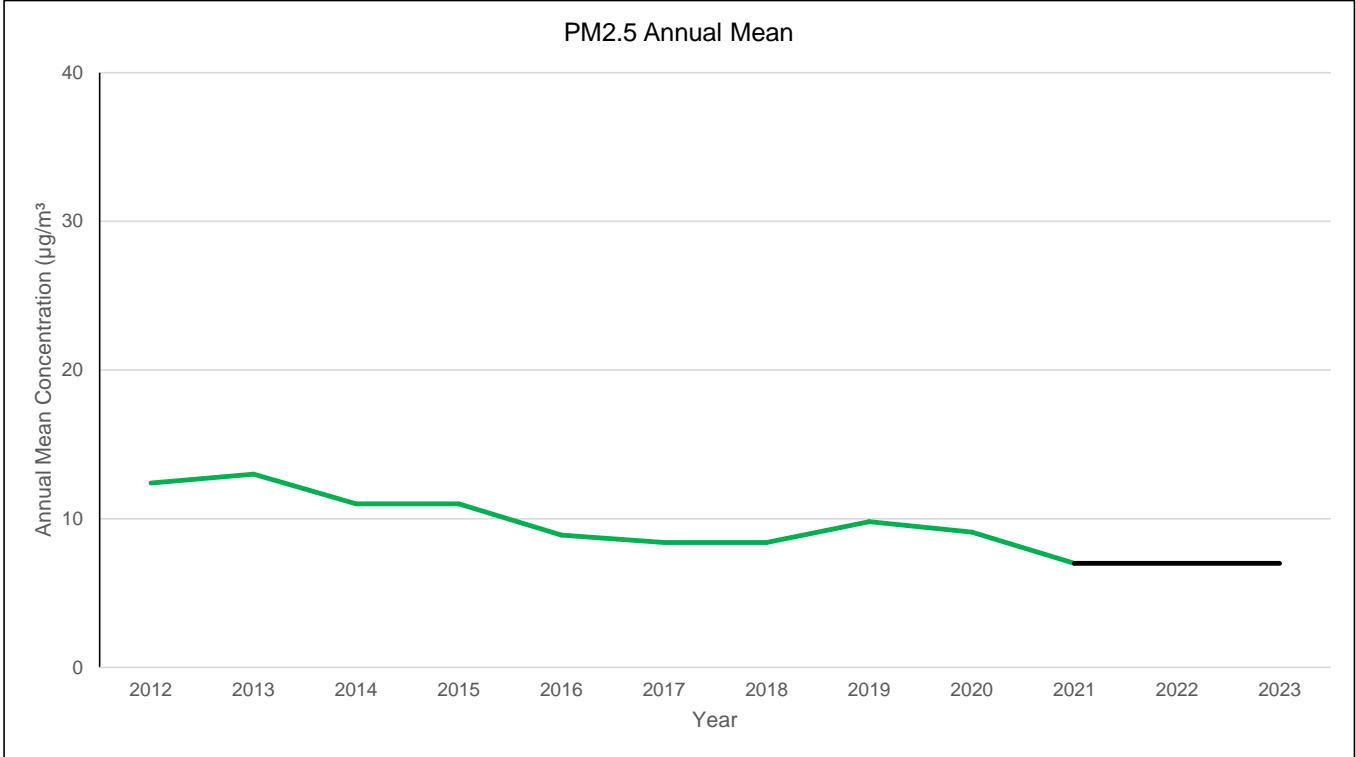
Notes:

The green line denotes PM$_{2.5}$ concentrations calculated from PM$_{10}$ data. Since 2021 Redcar and Cleveland Borough Council has monitored PM$_{2.5}$ with a dedicated continuous analyser.

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO₂ 2023 Diffusion Tube Results (µg/m³)

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 0.83	Annual Mean: Distance Corrected to Nearest Exposure	Comment
R17	458379	523486	25.6	15.5	12.4	9.4	8.1	7.9	11.5	9.3	10.8	14.3	20.6	19.9	-	-	-	Triplicate Site with R17, R18 and R19 - Annual data provided for R19 only
R18	458379	523486	23.0	20.0	15.8	9.1	8.7	7.2	9.6	9.1	12.3	13.6	20.1	21.2	-	-	-	Triplicate Site with R17, R18 and R19 - Annual data provided for R19 only
R19	458379	523486	24.1	18.1	12.4	5.0	9.2	7.4	15.9	8.5	11.9	14.7	20.1	20.8	14.0	11.6	-	Triplicate Site with R17, R18 and R19 - Annual data provided for R19 only
R27	454712	520678	23.3	24.0	24.8	29.9	30.2	31.5	19.2	24.3	23.5	28.5		20.1	25.4	21.1	-	
R51	455379	520543	19.9	16.5	15.4	13.2	11.7	10.8	10.0	9.3	11.3	15.0	20.5	12.7	13.9	11.5	-	
R52	460292	524876			20.1		15.8		14.0	16.8	16.5	19.3	23.0	12.7	17.3	14.8	-	
R54	453831	516212	28.0	29.2	29.0	33.2	32.9	28.3	21.5	28.2	27.9	29.5	36.3	21.4	28.8	23.9	-	
R55	461553	516074	25.0	22.0	21.4	16.1	17.3	15.3	15.4	13.1	18.1	17.8	25.0	19.2	18.8	15.6	-	
R58	455518	519353	17.9		16.0	16.0	15.6	14.8	10.5	11.8	14.6	17.8	21.6	14.3	15.5	12.9	-	
R59	460869	523657	21.7	19.7	17.5	15.3	13.8	10.6	7.8		12.6	15.7	19.6	17.8	15.6	13.0	-	
R60	454864	517813	28.8	22.0	20.5	16.8	17.4	15.4		17.2	20.4	18.4		15.6	19.2	16.0	-	
R61	459695	524414	20.4	18.2	13.7	11.6	12.4	10.6	9.6	9.0	12.5	12.4	15.9		13.3	11.0	-	
R62	461308	523946	18.5	14.1	10.1	9.7	8.2	6.5	7.0	7.6	8.2		17.0	12.6	10.8	9.0	-	
R63	453462	516420	15.4	12.9	14.1	13.2	10.4	12.0	8.6	10.1	10.8	12.3	17.2	11.6	12.4	10.3	-	
R64	460440	515021	9.3	7.2	6.9	6.3	5.3	4.5	4.3	4.2	5.0	6.6	10.7	7.0	6.4	5.4	-	

☐ All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1.

☒ Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

☐ Local bias adjustment factor used.

☒ National bias adjustment factor used.

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

☒ Redcar and Cleveland Borough Council confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

Table B.2 – Diffusion Tube Review 2023

Tube ID	Site Name	Retain / Remove	Justification
R17/R18/R19	Dormanstown	Retain	Co-location study at the site of the automatic monitoring station.
R26	Trunk Road	Remove	Location removed due to full-year data loss in 2022.
R27	West Lane	Retain	Long-term location site to monitor emissions from the nearby A66 main arterial through road.
R51	Broadway	Retain	Area of good public exposure and located close to main link road through borough.
R52	West Dyke Road	Retain	Area of good public exposure and in proximity of Redcar Central Railway Station.
R54	Ormesby Bank (1)	Retain	Location reports the highest annual NO_2 results, monitoring supported by additional site close by (R63).
R55	Church Street	Retain	Site in area of good exposure and location of higher NO_2 results for Redcar and Cleveland.
R58	Fabian Road	Retain	Site in area of good public exposure, agree to keep for informing longer term trend results.

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R59	Redcar Road	Retain	Site in area of good public exposure, agree to keep for informing longer term trend results.
R60	Flatts Lane	Retain	Site in area of good public exposure, agree to keep for informing longer term trend results.
R61	St Josephs Court	Retain	Site monitoring only commenced in 2022, a minimum of 2-years' worth of data required to inform retention.
R62	Stirling Road	Retain	Site monitoring only commenced in 2022, a minimum of 2-years' worth of data required to inform retention.
R63	Ormesby Bank (2)	Retain	Site monitoring only commenced in 2022, a minimum of 2-years' worth of data required to inform retention and supports R54 monitoring.
R64	Hutton Lane	Retain	Site monitoring only commenced in 2022, a minimum of 2-years' worth of data required to inform retention.

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

New or Changed Sources Identified Within Redcar and Cleveland Borough Council During 2023

Redcar and Cleveland Borough Council has identified the following potential new sources relating to air quality during the 2023 reporting year. The sources listed below have been identified as part of the planning regime and include applications for renewable energies and additional electric vehicle (EV) charging points.

- R/2023/0429/FF – Creation of charging zones, erection of 6 EV chargers, erection of canopy, sub-station enclosure and associated forecourt works. Application at one of the petrol filling stations within the Borough.
- R/2023/0689/FF – Installation of new pipeline structure consisting of an evaporator, vapour separator and other ancillary vessels and equipment.
- R/2023/0830/FFM – Remediation and strengthening works to quay at Redcar Bulk Terminal.
- R/2023/0276/FFM – Residential development of 70 dwellings with associated parking.
- NYM/2023/0342 – Application for the installation of 16 solar panels to the south roof and air source heat pump, an application within the North York Moors Planning Authority

Consultations for Environmental Permitting Regime Applications from the Environment Agency:

- EA Environmental Permitting Consultation: Redcar Holdings Limited, Redcar Energy Centre, Redcar Bulk Terminal, Redcar.
- EA Environmental Permitting Consultation: Scott Bros Limited, Grangetown Soil Washing Facility, Land East of John Boyle Road, Grangetown.

Redcar and Cleveland Borough Council have a number of large-scale developments progressing through the planning process which have the potential to be sources of air

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quality changes during construction and operational phases. The following development and associated planning applications during 2023 have been:

- Teesworks redevelopment on the former Redcar steelworks had a large number of applications, mainly conditional discharge: R/2023/0800/OOM, R/2023/0869/CD, R/2023/0870/CD, R/2023/0799/FFM, R/2023/0816/CD, R/2023/0806/CD, R/2023/0743/CD, R/2023/0679/NM, R/2023/0680/NM, R/2023/0681/NM, R/2023/0667/CD, R/2023/0668/NM, R/2023/0624/NM, R/2023/0594/RM, R/2023/0482/OOM, R/2023/0507/CD, R/2023/0411/FF, R/2023/0343/FFM, R/2023/0334/PND.
- The Woodsmith Project spanning two local authority areas (Redcar and Cleveland Borough Council and North Yorkshire Council) for the development of a polyhalite mine and underground tunnel transfer system: R/2023/0754/SCP, R/2023/0531/CD, R/2023/0532/CD, R/2023/0451/CD, R/2023/0401/CD, R/2023/0385/NM.

Additional Air Quality Works Undertaken by Redcar and Cleveland Borough Council During 2023

Redcar and Cleveland Borough Council, in association with Middlesbrough Borough Council has produced the first South Tees Clean Air Strategy (CAS). The CAS consultation for the public and stakeholders was completed during July and August 2023. Responses from the consultation have informed further amendments to the CAS. A copy of the adopted strategy has been submitted with the 2024 ASR and can be located on the Redcar and Cleveland Borough Council website.

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Commented [LG59R58]: Removed, couldn't find a concise sentence to replace

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QA/QC of Diffusion Tube Monitoring

Gradko International Limited provided Redcar and Cleveland Borough Council with the 12-months 2023 diffusion tube supply using 50% Trimethylamine (TEA) in Acetone. Gradko are a UKAS accredited laboratory and participate in the AIR-PT analysis scheme. The most recent round of results, September 2021 to October 2023, showed Gradko achieved 100% of results determined to be satisfactory.

Changeover of the diffusion tubes was completed in accordance with the 2023 national calendar without any deviation. Diffusion tubes are deployed in accordance with LAQM Guidance to ensure correct installation over the specified exposure time period.

Diffusion Tube Annualisation

During 2023 only one monitoring location in Redcar and Cleveland required annualisation, all other locations had a recorded data capture of 75% and above. There were no sites with a data capture below 25% in Redcar and Cleveland during 2023.

Site ID R52, West Dyke Road in Redcar, suffered a loss of 4 diffusion tubes throughout 2023, as a result data capture is less than 75% and requires annualisation. The Diffusion Tube Data Processing Tool has been used to complete annualisation. Continuous monitoring data from the Dormanstown site in Redcar has been used alongside data from a monitoring site in Middlesbrough, the closest geographically to Redcar and Cleveland Borough Council. The Middlesbrough site is part of the AURN Network. Both locations have a data capture greater than 85% and are therefore suitable for use. The continuous monitoring data spans the same timeframe as the 2023 diffusion tube calendar, 4th January 2023 to 3rd January 2024. Results of annualisation are listed in Table C.1.

Table C.1 – Annualisation Summary (concentrations presented in µg/m³)

Site ID	Annualisation Factor Dormanstown	Annualisation Factor Middlesbrough	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
R52	1.0537	1.0064	1.0301	17.3	17.8

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 ASR has 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.TG22 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.

Redcar and Cleveland Borough Council

Table C.2 - Comparison of National and Local Bias Adjustment

Site ID	NO₂ Raw Data	Local Bias Adjustment (0.67)	National Bias Adjustment (0.83)
R17/R18/R19	14.0	9.4	11.6
R27	25.4	17.0	21.1
R51	13.9	9.3	11.5
R52	17.3	11.6	14.8
R54	28.8	19.3	23.9
R55	18.8	12.6	15.6
R58	15.5	10.4	12.9
R59	15.6	10.5	13.0
R60	19.2	12.9	16.0
R61	13.3	8.9	11.0
R62	10.8	7.2	9.0
R63	12.4	8.3	10.3
R64	6.4	4.3	5.4

Table C.3 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.83
2022	National	03/23	0.82
2021	National	03/22	0.83
2020	National	03/21	0.82
2019	National	03/20	0.87

Table C.4 – Local Bias Adjustment Calculation

Redcar and Cleveland Borough Council has not used a local bias adjustment factor for 2023 data, however an overview of the calculation used to determine the local bias factor has been outlined below for information only.

	Local Bias Adjustment Input 1
Periods used to calculate bias	10
Bias Factor A	0.67 (0.6 - 0.76)
Bias Factor B	50% (32% - 68%)
Diffusion Tube Mean (µg/m³)	14.8
Mean CV (Precision)	6.4%
Automatic Mean (µg/m³)	9.8
Data Capture	100%
Adjusted Tube Mean (µg/m³)	10 (9 – 11)

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been 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 required distance correction during 2023 for Redcar and Cleveland Borough Council.

QA/QC of Automatic Monitoring

Redcar and Cleveland's automatic monitoring station, Dormanstown, monitored the following pollutants during 2023:

- NO_x
- PM_{10}
- $PM_{2.5}$
- O_3

A full-service contract is utilised via the analyser suppliers to complete routine maintenance and fault rectification. The continuous monitoring data is collected and rescaled by Ricardo-AEA, historic datasets are available on-line for public viewing on the AQE website. Local Site Operator (LSO) duties are now undertaken by two officers from the Environmental Protection Team, this has been increased from previous years to build in resilience and prevent delays in response to faults. Both officers have received training from the analyser suppliers to ensure that knowledge is available to successfully complete these duties.

As a result of increased errors / faults experienced during 2021, 2022 saw a return to fortnightly calibration visits to the Dormanstown site. This process continued during 2023 as it proved successful and greater officer knowledge within the Environmental Protection Team enabled this to be routinely undertaken. Redcar and Cleveland Borough Council are committed to ensure that all data is collected to provide a representative overview of ambient air quality across the area. This is ensured by completing regular calibration visits, validation of data and a detailed documentation of actions undertaken.

Further detail regarding QA/QC processing within Redcar and Cleveland is provided below:

Calibration	Daily 'automatic' calibration with routine fortnightly checks by two experienced and trained members of the Environmental Protection Team. Calibration gas supplied by an approved gas standard business. Annual certification of the site is completed by Ricardo-AEA, last certificate dated August 2023. Service of the analysers is undertaken after the calibration certification.
Equipment	A comprehensive service agreement is in place with the analyser supplier.
Data Capture	Site operators are experienced and trained personnel. Monitoring data capture is inspected daily, where possible, by Ricardo-AEA to ensure that faults are detected and corrected quickly.
Ratification	Data verification is an on-going process to identify unusual measurements.

Data ratification reviews all calibrated data, information from analyser services, repairs and any other information available for |

the particular site or analyser over the ratification period. In addition, the results from independent QA/QC audits are incorporated to take account of any problems detected during audits, such as:

- Long-term drift in ozone instrument calibration
- Faulty NO_x converters
- Drifts in calibration cylinder concentrations
- Instrument leaks or flow fault
- Faulty instrument configuration

Incorporation of the QA/QC audits ensures that ratified data is traceable to UK national and international gas calibration standards.

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The PM_{10} and $PM_{2.5}$ automatic analysers at the Dormanstown site are BAM gravimetric equivalence for particulate matter. The PM_{10} analyser has been subject to the Ricardo Energy and Environment correction factor.

Automatic Monitoring Annualisation

During 2023 the Dormanstown automatic monitoring station recorded a data capture greater than 75% for all analysers, therefore annualisation of automatic data was not required. The 2023 data capture range at the Dormanstown was 96.8% to 99.8%.

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, automatic annual mean NO_2 concentrations corrected for distance are presented in Table A.3.

No automatic NO_2 monitoring locations required distance correction during 2023 within Redcar and Cleveland.

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

Figure D.1 – Map of Non-Automatic Monitoring Site

1:75,000

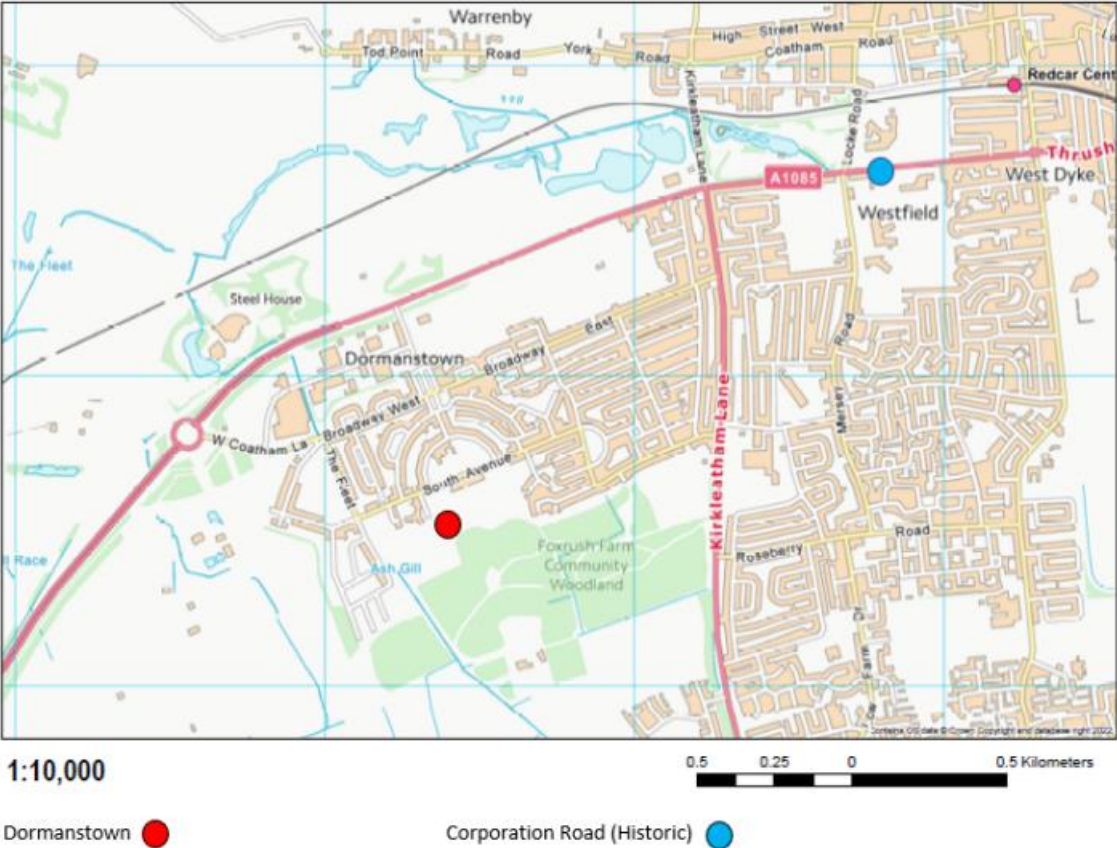**Figure D.2 Automatic Monitoring Location and Historic Monitoring Site**

1:10,000

Dormanstown 🔴   Corporation Road (Historic) 🔵

Figure D.3 – Map of Guisborough Area Non-Automatic Monitoring Sites

1:10,000

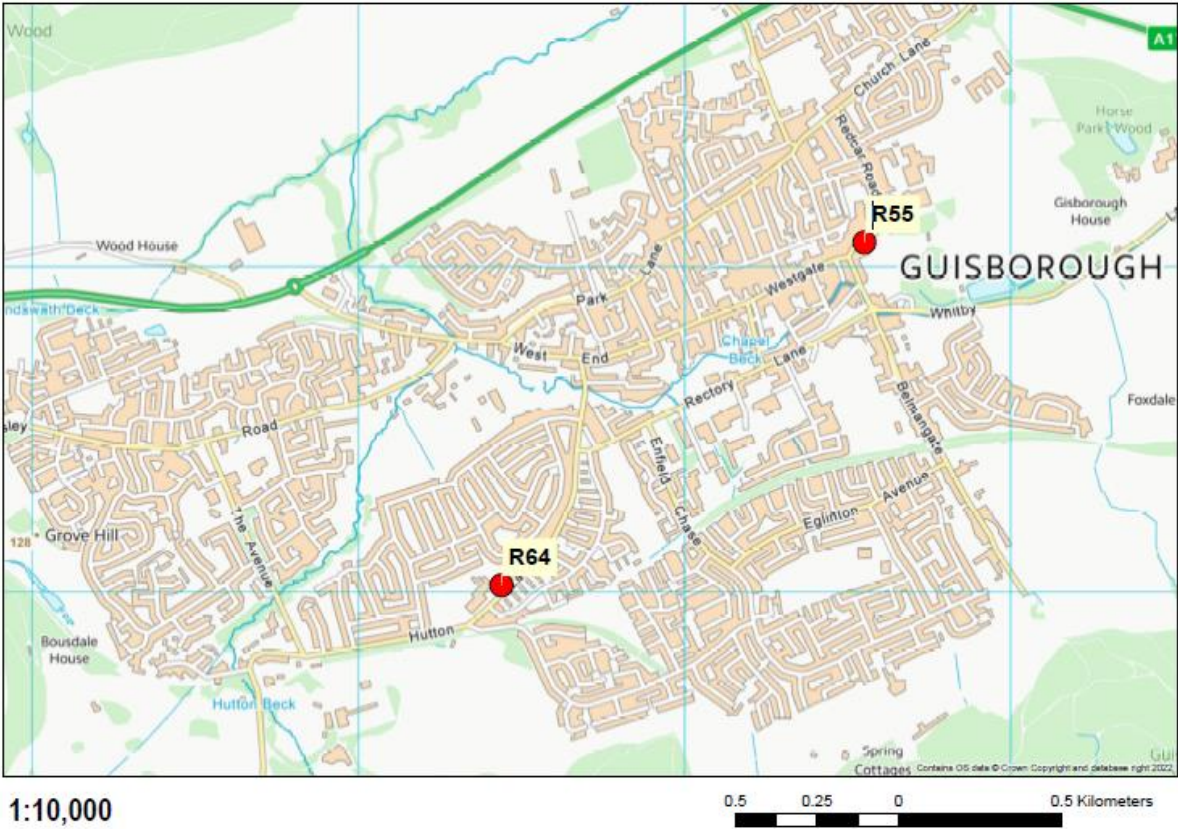0.5   0.25   0   0.5 Kilometers

Figure D.4 – Map of Redcar Area Non-Automatic Monitoring Sites
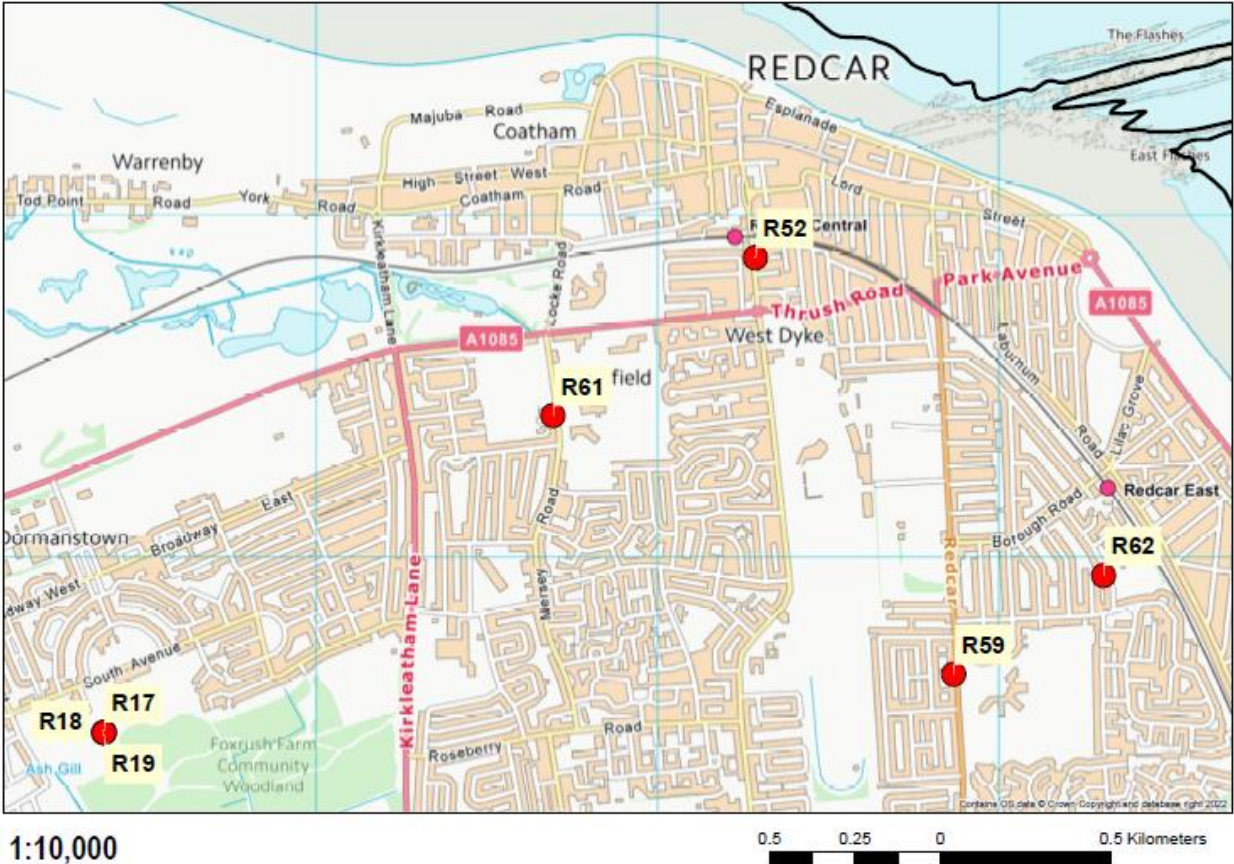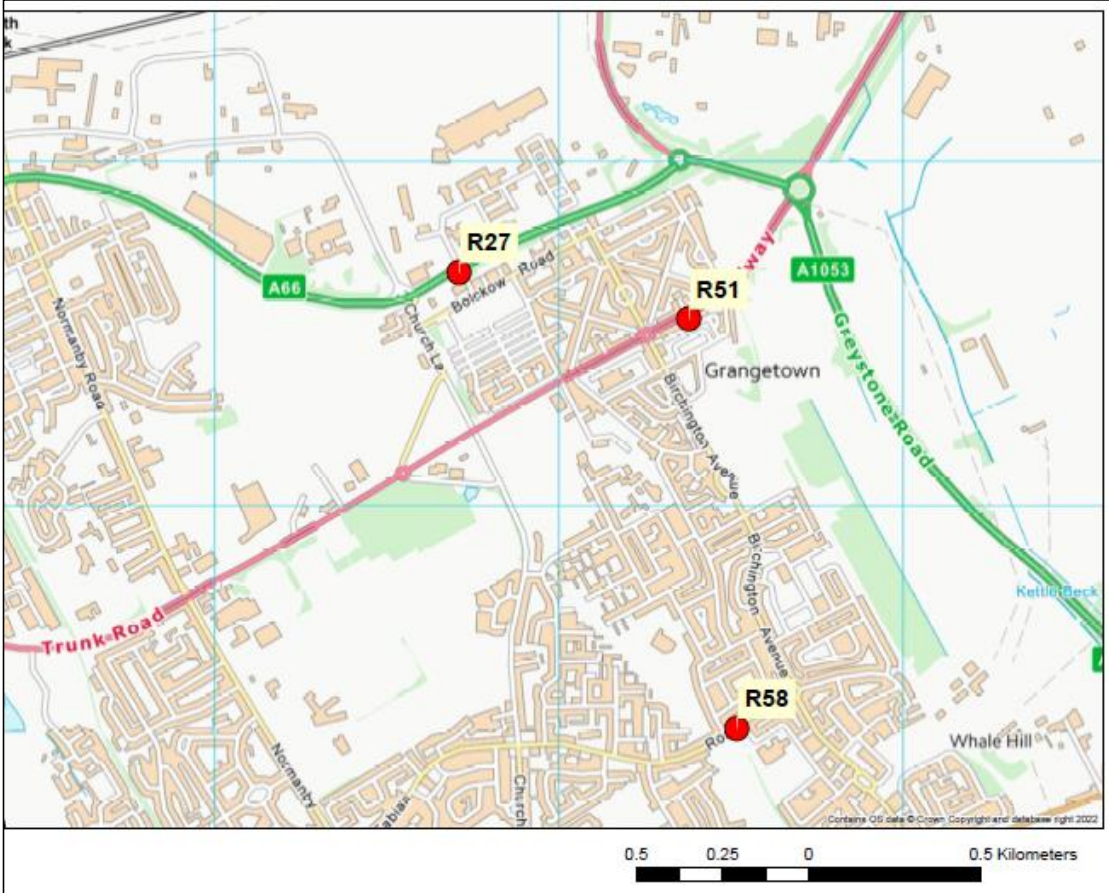

1:10,000

Figure D.5 – Map of Grangetown and South Bank Area Non-Automatic Monitoring Sites

Scale 1: 10,000

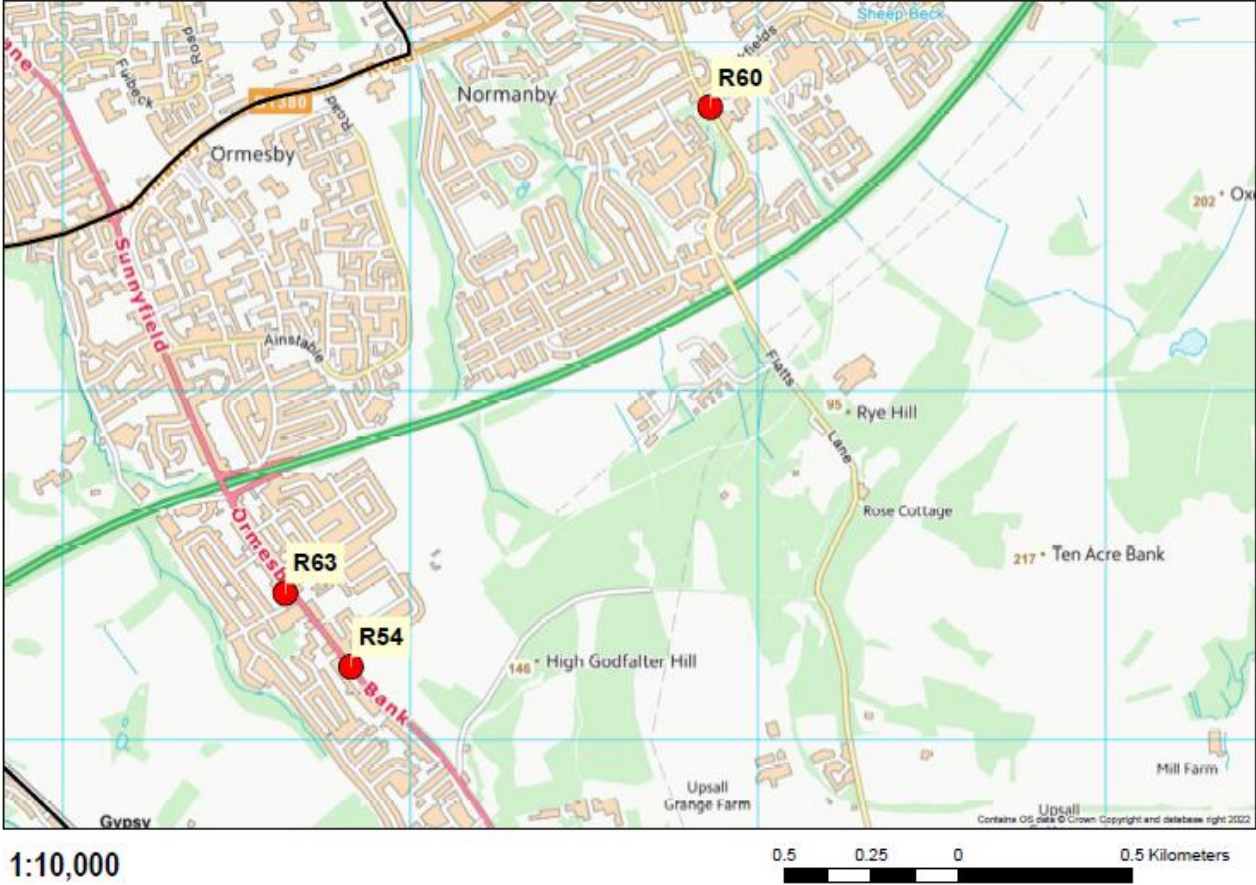**Figure D.6 – Map of Ormesby and Normanby Non-Automatic Monitoring Sites**

1:10,000

Figure D.7 – Map of Redcar and Cleveland Smoke Control Areas

Figure D.8 - Map of South Tees Area

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

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

[7] 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	Annual Status Report
DAQI	Daily Air Quality Index
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
EVC	Electric Vehicle Charging
FDMS	Filter Dynamics Measurement System
HVO	Hydrotreated Vegetable Oil
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
O_3	Ozone
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
SCA	Smoke Control Area
SO_2	Sulphur Dioxide
TEA	Trimethylamine
TVCA	Tees Valley Combined Authority
VOC	Volatile Organic Compounds

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.