

# North Lincolnshire Council

## 2020 Air Quality Annual Status Report (ASR)

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

June 2020

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## Executive Summary: Air Quality in Our Area

### Air Quality in North Lincolnshire

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>.

The principal town within North Lincolnshire, Scunthorpe, is home to an Integrated Iron and Steel Works, employing over 3,000 people directly and supports over 20,000 jobs in the supply chain. The site covers over 2,400 acres and is located directly to the east of Scunthorpe. Emissions of PM<sub>10</sub> (particulate matter with a diameter of 10 microns or less) from this site and neighbouring operators have contributed to the exceedance of legal air quality targets, leading to the declaration of Air Quality Management Areas (AQMA). There are a number of different operators on the site and particulate matter arises from a variety of sources, including point source emissions, for example: stacks, vents and chimneys and fugitive emissions from roads, stockpiles and material handling operations.

The Council has been working with Industry, Health Professionals and the Environment Agency for a number of years to implement actions on the Integrated Steelworks Site.

North Lincolnshire Council continues to monitor air pollution across the area, including within the Air Quality Management Area (AQMA) and on behalf of the National

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<sup>1</sup> Environmental equity, air quality, socioeconomic status and respiratory health, 2010

<sup>2</sup> Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

<sup>3</sup> Defra. Abatement cost guidance for valuing changes in air quality, May 2013

Networks. This includes pollutants such as Sulphur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), PM<sub>10</sub> (Particulate Matter with a diameter of 10 microns or less), PM<sub>2.5</sub> (Particulate Matter with a diameter of 2.5 microns or less), Heavy Metals (HM), PAH (Benzo(a)pyrene (B[a]P)) and Benzene.

Recent improvements in the level of PM<sub>10</sub> are analysed in detail in the Detailed Assessment of the Scunthorpe PM<sub>10</sub> Air Quality Management Area 2016 Report. This led to the revocation of the Low Santon Air Quality Management Area (declared for exceedances of Annual PM<sub>10</sub> objective) and the amendment of the Scunthorpe Town Air Quality Management Area (declared for exceedances of the 24 hour mean PM<sub>10</sub> objective) in March 2018. The reduction of the Scunthorpe Town AQMA boundary resulted in the removal of approximately 5,000 residential properties from within the AQMA. Details of the past and present AQMAs in North Lincolnshire can be found at the following links: <http://www.nlincsair.info/home/text/336> and <http://uk-air.defra.gov.uk/aqma/list>.

For the year 2019, both the Annual Mean PM<sub>10</sub> Air Quality Objective and the 24 Hour Mean Air Quality Objective were complied with at all monitoring locations across North Lincolnshire. In addition, all Air Quality Objectives relating to SO<sub>2</sub>, NO<sub>2</sub> and PM<sub>2.5</sub> were also complied with at all monitoring locations across North Lincolnshire.

For the year 2019, the levels of PAH (Benzo(a)pyrene (B[a]P) in ambient air) remain elevated at both the Scunthorpe Town and Low Santon monitoring sites. The current levels at Low Santon are in breach of the National Air Quality Objective of 0.25ng/m<sup>3</sup> and compliant with the European Community Air Quality Target value within the Fourth Air Quality Daughter Directive of 1ng/m<sup>3</sup>. PAH (Benzo(a)pyrene (B[a]P)) concentrations at Scunthorpe Town exceeds both the National Air Quality Objective and the European Community Air Quality Target Value.

Compliance with PAH (Benzo(a)pyrene (B[a]P)) Air Quality requirements is not the responsibility of the local authority; this is overseen by DEFRA (Department of Environment, Food and Rural Affairs). Further information can be found at <https://uk->

[air.defra.gov.uk/networks/network-info?view=pah](http://air.defra.gov.uk/networks/network-info?view=pah). North Lincolnshire Council continues to support further improvement in regards to PAH (Benzo(a)pyrene (B[a]P)) concentrations and will support action to improve concentrations for local residents as part of the National Network.

### **Actions to Improve Air Quality**

The main pollutant of concern within North Lincolnshire is PM<sub>10</sub>. Although, the PM<sub>10</sub> 24 hour mean objective was not breached within North Lincolnshire during 2019, concentrations at monitoring sites within the Scunthorpe Town Air Quality Management Area (AQMA) remain elevated. In addition to PM<sub>10</sub>, North Lincolnshire Council continually strives to improve air quality across the district in relation to all pollutants, some of these measures are outlined below.

The Council applied for DEFRA Air Quality Grant Funding in 2017-18. The Council's bid included the provision to upgrade existing air quality monitoring equipment, a public engagement campaign for PM<sub>2.5</sub> reduction and a tree planting scheme along Brigg Road, Scunthorpe. Unfortunately, the grant bid was unsuccessful, however the Council will consider applying for future bids when these become available. During 2019, the NO<sub>x</sub> analyser at Scunthorpe Town AURN site was upgraded by the Environment Agency. This was due to the previous Monitor Labs (ML) analyser being at risk of failure due to lack of spare parts and its age. In addition, the monitoring site at Low Santon had a new roof installed due to deterioration of the original structure, this work was completed successfully but did result in some data loss.

The North Lincolnshire Council website will be continuously updated to include more information on air quality. This includes information on idling of vehicles, how to report smoky vehicles and the requirements of living within a Smoke Control Area. In addition, previous Annual Status Reports are uploaded onto the website to provide up to date information to the Public. Further information can be found at the following website: <https://www.northlincs.gov.uk/planning-and-environment/environmental-crime/smoke-control/smoke-control-guidance/#1536232941547-44290cfe-a96b>.

North Lincolnshire Council is now a supporter of the Clean Air Day initiative. Clean Air Day is the UK's largest annual air pollution campaign, with a day of public engagement, enabling the public to improve air quality and their health. This campaign involves groups from NHS Trusts, Local Authorities, Health Charities and Universities. Within North Lincolnshire Council the event is organised in collaboration with the council's Public Health Department.

During 2019, North Lincolnshire Council and the Environment Agency started to produce monthly reports regarding air quality within the Scunthorpe Town AQMA. The intention of providing a monthly report is to make local industry aware of the current air quality and to seek their continued cooperation in bringing about improvements.

Other measures to improve air quality relate to the Environmental Protection Teams role within Development Management. Traffic congestion is directly linked to air pollution with the most polluting vehicles being those with older diesel engines. This contributes to increased NO<sub>2</sub> emissions. The Climate Change Act 2008, committed the UK to reducing greenhouse gas emissions by at least 80% by 2050. In order to meet this target, the Government has committed for nearly every car and van in the UK to be zero emissions by 2050, as set out in their Road to Zero Strategy 2018. The strategy sets out how this will be achieved:

- The UK will end the sale of all new conventional petrol and diesel cars/vans in 2040.
- The UK will 'develop one of the best Electric Vehicle Charging Point (EVCP) networks in the World.

More recently, in November 2020, the UK Government announced the phase out date for the sale of new petrol and diesel cars and vans will be brought forward to 2030. Furthermore all new cars and vans will be fully zero emission at the tailpipe from 2035.

With this in mind, it is essential that new development should seek to deliver high standards of sustainability in accordance with local and national Planning Policy. The Environmental Protection Team act as consultees for planning applications and require

developers within North Lincolnshire to demonstrate that they are making all reasonable efforts to minimise total emissions from development sites, during both construction and operational phases. This will include the requirement to promote and incentivise the use of low emission vehicles, to reduce the overall emission impact of development related traffic.

In addition to the above measure, North Lincolnshire Council are currently in the process of updating their Local Plan. A Local Plan sets out the vision and objectives for the future development of the area, addressing needs and opportunities in relation to housing, the economy, community facilities and infrastructure. It will outline the policies and proposals that will be used to guide planning decisions and investment on regeneration up to 2036. The Environmental Protection Team reviewed the proposed land allocations for the Local Plan and provided feedback in relation to the suitability of the proposed land use. This included feedback in relation to air quality generally and more specifically development within the Air Quality Management Area. This feedback discouraged residential development within the Scunthorpe Town AQMA and identified that developments that are likely to contribute to local air quality (i.e. B2 General Industrial) would be subject to further investigation. The Environmental Protection Team have provided useful feedback to enable North Lincolnshire Council to draft a Preferred Options Local Plan that has taken into account the health implications of air quality and land use. The Environmental Protection Team have also assisted in reviewing the current Local Plan Policies and provided updates and amendments where these are considered necessary; some of these Policies relate specifically to air quality.

Dust and smoke complaints across North Lincolnshire are investigated and those within the AQMA are investigated as a priority due to increased emissions of PM10. It is an offence under Section 2 of the Clean Air Act 1993 for dark smoke to be emitted from any industrial or trade premises. It is also an offence under Section 33 (1C) of the Environmental Protection Act 1990 to treat, keep or dispose of controlled waste in a manner likely to cause pollution or harm to human health. The burning of waste produces pollutants that are both harmful to human health and the environment, this includes particulate matter, heavy metals and polycyclic aromatic hydrocarbons

(PAHs). North Lincolnshire Council investigate a significant number of incidents reported by officers of the Council and members of public. The burning of controlled waste at commercial premises has resulted in five prosecutions and several cautions in recent years. It is the intention of North Lincolnshire Council to continue to pursue commercial offenders in line with our enforcement policy to protect human health and improve local air quality.

The Air Quality Action Plan (AQAP) for the Scunthorpe Town AQMA is currently being drafted. It is intended that this will be circulated for consultation in the near future. The timing of this AQAP has been delayed as a result of uncertainty over the future of the Scunthorpe Steelworks during 2019-2020. The AQAP will outline in detail the Council's objectives to improve local air quality.

In 2019 the Council continued to work closely with Industry, Health Professionals and the Environment Agency to initiate improvements and to share best practice. This included the distribution of reports detailing pollutant exceedances of air quality objectives on a weekly basis and for individual events. It also included the distribution of air quality warnings on days where concentrations are particularly high. This is a proactive method of advising industry in the area to take preventative action to avoid exceedances of air quality objectives.

## Conclusions and Priorities

North Lincolnshire Council has continued to operate an extensive air quality monitoring network. This has identified that all Air Quality Objectives have been met with the exceptions of the following:

- National Air Quality Objective for PAH (Benzo(a)pyrene (B[a]P)) at Low Santon
- National Air Quality Objective and the European Community Air Quality Target value for PAH (Benzo(a)pyrene (B[a]P)) at Scunthorpe Town

All other air quality objectives were complied with during 2019.



The air quality monitoring instrument at Low Santon (FDMS Filter Dynamics Measurement System) has not recorded a breach of the PM<sub>10</sub> annual mean objective since it was sited. The other air quality monitoring equipment (TEOM Tapered Element Oscillating Microbalance) has not recorded a breach of this objective since 2008. The Low Santon AQMA was therefore revoked in March 2018.

Despite the PM<sub>10</sub> 24-hour mean objective not being exceeded at any sites during 2019, some areas still experience high concentrations of this pollutant. This includes the area immediately around the Scunthorpe Integrated Steelworks site including Low Santon and the East Common Lane area to the west of the site.

The PM<sub>2.5</sub> levels recorded by the air quality monitors did not breach the European Union (EU) Annual Mean objective of 25 µg/m<sup>3</sup>. It would be beneficial in the future for more locations within North Lincolnshire to monitor for this pollutant, to provide a more detailed understanding of concentrations in the area.

North Lincolnshire continues to record some of the highest levels of PAH (Benzo(a)pyrene (B[a]P)) in the United Kingdom, although significant improvements have been made on the annual concentrations of this pollutant. This is partly due to the closure of the Dawes Lane Coke Ovens in March 2016 and improvements to the Appleby Coke Ovens. Having said this, despite a downward trajectory in concentrations over recent years, the current levels at Scunthorpe Town breach both the National Air Quality Objective of 0.25ng/m<sup>3</sup> and the European Community Air Quality Target value of 1ng/m<sup>3</sup>. PAH (Benzo(a)pyrene (B[a]P)) concentrations have decreased further at the Low Santon Site (CM3) and currently comply with the European Community Air Quality Target value. It is anticipated that continued liaison with Industry, Health Professionals and the Environment Agency will see further improvements.

There are a number of challenges the Council faces in achieving improvements in air quality:

- Within Scunthorpe and the Integrated Steel Works site there are a number of companies which contribute towards emissions of PM<sub>10</sub>. Some of these companies are regulated for emissions to air by North Lincolnshire Council and others by the Environment Agency. Air pollutants from multiple sources create a greater challenge than if it was from a single source and therefore collaborative working between the Environment Agency, North Lincolnshire Council, local industry and other relevant parties is vital to bring about continued improvements.
- The majority of the Integrated Steelworks site is regulated by the Environment Agency rather than the Council. The Council therefore has minimal regulatory control of emissions into the atmosphere. As stated above collaborative working helps towards addressing this constraint.
- The Council has no regulatory control over the monitoring and reduction at source of PAH (Benzo(a)pyrene (B[a]P)) emissions. They are not part of the Local Air Quality Management regime and the operations largely responsible for them, the Coke Ovens, are not regulated by the Council. The closure of the Dawes Lane Coke Ovens and improvements to Appleby Coke Ovens has however seen a significant reduction of PAH (Benzo(a)pyrene (B[a]P)) emissions in recent years.
- In North Lincolnshire the wind direction is predominantly from the south west direction, as shown in Figure 1. These winds impact directly upon local residents in Santon as the Integrated Steel Works is located upwind of these south westerly winds. In cooperation with local industry the Council has, and continues to encourage operators to predict in advance the weather conditions, so that alterations can be made to their operational practices. This reduces the impact upon local residents, but relies to some extent upon management practices which can be difficult to control and monitor.

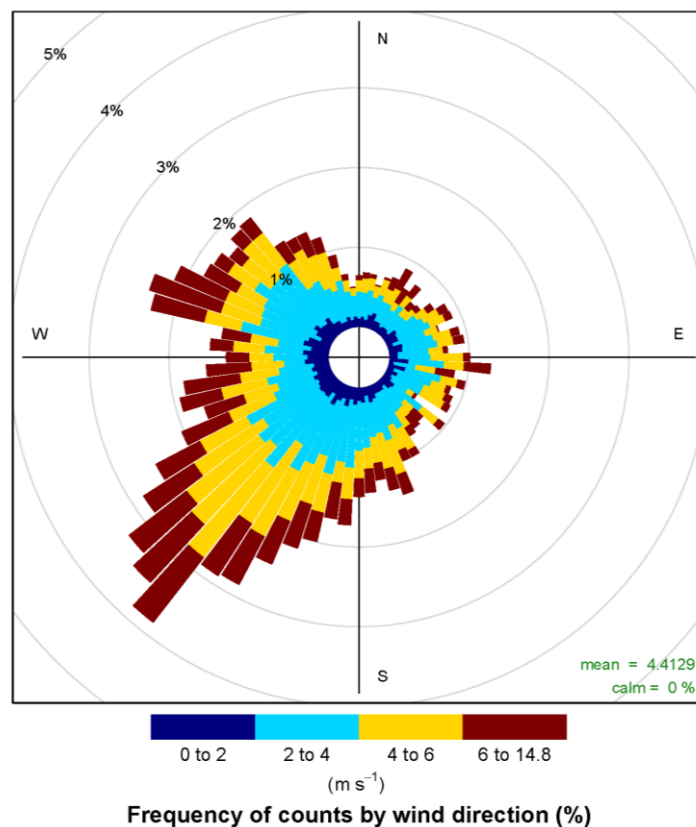


Figure 1 – Wind direction and velocity for 2019

In 2020 North Lincolnshire Council aims to:

- Continue operation of the air quality network and website, with associated data analysis and ratification
- Work closely with Industry, Stakeholders and the Environment Agency to obtain continued air quality improvements for local residents
- Complete the Air Quality Action Plan to include new initiatives which will bring about these continued improvements
- Improve the existing mechanisms in place to influence and control on-site management practices to control dust emissions via the Air Quality Action Plan.
- Evaluate the potential costs and benefits of source apportionment work within the AQMA
- Apply for Grant Funding if suitable bids become available

- Put in place a public engagement strategy that will deliver key messages about ongoing improvements to air quality within North Lincolnshire
- To continue to provide planning consultation responses which takes into consideration local air quality such as the implementation of electric vehicle charging infrastructure
- Act as a consultee in relation to updates to North Lincolnshire Council’s Local Plan to ensure the impact of development on air quality is considered

## Local Engagement and How to get Involved

North Lincolnshire Council continues to engage with a variety of different parties, including for example, local schools and businesses in relation to air quality and actions they can take to help bring about improvements.

North Lincolnshire Council operate a dedicated website with real-time air quality data which is available to the general public and can be found at the following link: <http://www.nlincsair.info>. In addition to this, North Lincolnshire Council’s main website has a section on air quality, which can be found at the following link: <https://www.northlincs.gov.uk/planning-and-environment/environmental-health/>

**Air Quality in North Lincolnshire**

Home About air quality Monitoring data FAQs Reports Reports and Guidance Links About the website Login

### Latest air quality levels in North Lincolnshire

**Current Air Quality Index**

1 2 3 4 5 6 7 8 9 10  
Low

[Find out more & get health advice >>](#)

[Monitoring Site Summary](#)  
[Current levels](#)  
[24 hour summary](#)

ANDROID APP ON Google Play  
Available on the App Store

This website provides information about air quality in North Lincolnshire. It aims to inform you about the causes of poor air quality and what is being done about it. You can also use the site to see local air quality, current levels, 24 hour summary and monitoring site summary.

There are a number of air quality monitoring sites in North Lincolnshire. Select a site from the map above to view the latest data, graphs, photographs and site information.

## Figure 2. Air Quality in North Lincolnshire Website

Members of the public are welcomed to contact the Council regarding Local Air Quality Management in North Lincolnshire using the contact details below:

Email: [environmental.health@northlincs.gov.uk](mailto:environmental.health@northlincs.gov.uk)

Telephone: 01724 297000

There are several things that the general public can do to help improve air quality within North Lincolnshire, some of these are listed below:

### Transportation

- Where possible, it is encouraged that members of the public use public transport, such as local bus services. If the individual is able to, they are also encouraged to cycle or walk, giving a boost to both air quality and the health of the individual.
- The type of vehicle that is driven also has an impact on air quality; low emission or electric vehicles contribute less pollution than older petrol or diesel vehicles.
- Vehicle idling also contributes to air pollution. The public are advised to avoid idling to warm up their engine and if it is safe to do so, switch off their engine in traffic that is likely to be stationary for long periods.
- Poor driving habits also contribute to increased air pollution. Smooth acceleration and deceleration is recommended to reduce fuel consumption and air pollution.

### While at Home

- Domestic burning is a major source of air pollution. Residents should look to minimise the use of fire pits, log burners and other polluting activities
- Changing to LED or low energy lightbulbs within the home and fully insulating the home to reduce fuel needed for heating, can also help to improve local air quality.

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## 1 Local Air Quality Management

This report provides an overview of air quality in North Lincolnshire during 2019. 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 North Lincolnshire Council to improve air quality and any progress that has been made.

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



## 2 Actions to Improve Air Quality

### 2.1 Air Quality Management Areas

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

A summary of AQMAs declared by North Lincolnshire Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at [https://uk-air.defra.gov.uk/aqma/local-authorities?la\\_id=178](https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=178) with a full list at <http://uk-air.defra.gov.uk/aqma/list>. Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides a map of air quality monitoring locations in relation to the AQMA.

The Council revoked the Low Santon AQMA for PM<sub>10</sub> annual mean in March 2018, this was due to continued compliance with the air quality objective. The Council amended the boundary of the Scunthorpe Town AQMA for PM<sub>10</sub> 24 hour mean in March 2018, this was due to continued compliance with the air quality objective. Further information in relation to this can be found in the Detailed Assessment of the Scunthorpe PM<sub>10</sub> Air Quality Management Area 2016 report. In addition, during March/April 2018 several sites were removed due to continued compliance, this included CM4 Redbourn Club, CM5 Lakeside and CM8 Appleby.

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
Scunthorpe Town AQMA	Declared 01/11/05, Amended 19/03/18	PM <sub>10</sub> 24 Hour Mean	Scunthorpe	An area encompassing the integrated steelworks site and a number of properties to the east of Scunthorpe	NO	95	Exceedances	40	Exceedances	Action Plan for the Scunthorpe Town AQMA	2012	<a href="http://www.nlincsair.info/home/text/358">http://www.nlincsair.info/home/text/358</a>

**Table 2.1 – Declared Air Quality Management Areas**

☒ North Lincolnshire Council confirm the information on UK-Air regarding their AQMA(s) is up to date

## 2.2 Progress and Impact of Measures to address Air Quality in North Lincolnshire

Defra's appraisal of last year's ASR concluded the report is well structured, detailed, and provides the information specified in the Guidance. DEFRA also concluded that the report is a good source for members of the public to find out about air quality in their area, with lots of information on how to get involved.

North Lincolnshire Council has taken forward a number of direct measures during the current reporting year of 2019, in pursuit of improving local air quality. Details of all measures completed, in progress or planned, are set out in Table 2.2.

More detail on these measures can be found in their respective Action Plans. The current Air Quality Action Plan (AQAP) for the Scunthorpe Town AQMA is currently being updated to include new initiatives, some of which are detailed below and to take into account the amendment to the AQMA boundary in March 2018. The AQAP relies on the input from many different stakeholders including local industry. The process of updating the Action Plan is underway and internal and external Steering Groups met in early June 2018. It is anticipated that the updated AQAP will be published for consultation in the near future.

Key completed measures are:

- The NO<sub>x</sub> analyser at Scunthorpe Town AURN site was upgraded by the Environment Agency. This was due to the previous Monitor Labs (ML) analyser being at risk of failure due to lack of spare parts and it's age. In addition, the monitoring site at Low Santon had a new roof installed due to deterioration of the original structure
- The SIM cards have recently been replaced (March 2019) for all continuous monitoring sites to ensure the reliability of service in line with the North Lincolnshire Council Policy
- The Air Quality Website contract has been extended to ensure sufficient data management, ratification and reporting services

- Air pollution forecasting and exceedance reporting continues to be used to inform the activities of the operators on the Integrated Steel Works site
- Local Industry Forum meetings continue to be held, with participation from stakeholders and other interested bodies
- The Council continue to investigate complaints relating to emissions including dust and smoke and enforce as appropriate
- Environmental Permits will continue to be enforced and reviewed as required
- Development within the AQMA or affecting the AQMA continues to be reviewed
- The Environmental Protection Team continues to act as a consultee in relation to updates to North Lincolnshire Councils Local Plan and planning applications
- North Lincolnshire Council and the Environment Agency continue to produce monthly reports regarding air quality within the Scunthorpe Town AQMA

North Lincolnshire Council expects the following measures to be completed over the course of the next reporting year:

- The continued operation of the air quality monitoring network, making up to date data available for the public, regulators and industry for information purposes
- Analyse the data and target areas where improvements are needed
- To actively engage with regulators and industry to seek improvements in air quality
- To produce monthly air quality reports in collaboration with the Environment Agency and distribute them to relevant stakeholders.
- Provide comments and input in relation to air quality and proposed development for the revised Local Plan
- Provide comments and input in relation to air quality and proposed development for planning consultations
- Undertake a cost benefit analysis of source apportionment and on-site monitoring of fugitive dust emissions in relation to the Scunthorpe Steelworks
- Apply for DEFRA Grant funding where appropriate

- Complete the Air Quality Action Plan for the Scunthorpe Town AQMA

These measures will ensure monitoring of air quality objectives is ongoing, with opportunities for improvements continually reviewed.

Any future Action Plan will use the format provided by DEFRA. Previous measures have not been assigned Key Performance Indicators or targets for a predicted pollution reduction; therefore, these are not reported in this report. In contrast to traffic related emissions, due to the sheer variety of sources, coupled with the unpredictable effect of meteorological conditions, it is extremely difficult to quantify the effectiveness of single proposed measures. Experience shows that it takes the coordinated impact of a number of actions to produce demonstrable improvements.

The principal challenges and barriers to implementation that North Lincolnshire Council anticipates facing are:

- The wind direction is predominantly from the south west direction as shown in Figure 1 of the Executive Summary. These winds impact directly upon local residents in Santon, as the Integrated Steel Works is located upwind of these south westerly winds. In cooperation with local industry the Council has, and continues to, encourage operators to predict in advance the weather conditions so that alterations can be made to their operational practices. This reduces the impact upon local residents, however this method relies to some extent upon management practices which are difficult to control.
- There are a number of emission sources and a number of different companies operating on the Integrated Steelworks Site rather than one single source. This requires collaboration on the part of local businesses and the Council.
- The majority of the Integrated Steel Works Site is regulated by the Environment Agency and therefore the Council has minimal regulatory control over these local businesses.
- The Council have no regulatory control over the monitoring and reduction of PAH (Benzo(a)pyrene (B[a]P)) emissions. They are not part of the Local Air

Quality Management regime and the operations largely responsible for them (the Coke Ovens) are not regulated by the Council.

North Lincolnshire Council anticipates that the measures stated above and in [Table 2.2](#) will achieve compliance in the Scunthorpe Town AQMA.

Whilst the measures stated above and in [Table 2.2](#) will help to contribute towards compliance, North Lincolnshire Council anticipates that further additional measures, not yet prescribed, will be required in subsequent years to achieve compliance and enable the revocation of the Scunthorpe Town AQMA.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
A1	Maintain network of PM10 analysers	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2004 - present	NLC	NLC, British Steel			Ongoing	To Continue	The network maintains focus on AQ issues and enables the Council to measure the effectiveness of any schemes. Sites are located and upgraded as appropriate.
A2	Boundary monitoring of PM10, PM2.5, PM1 and Total Suspended Particles at Permitted sites AQMA	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2008 - 2015	NLC	NLC			Complete	Complete	This monitoring, completed in 2015, allowed greater analysis and identification of sources. Subsequent improvements in the level of PM10 at Santon are largely due to actions taken as a result of this monitoring exercise.
A3	Traffic count and visual observations at Santon to assess likely contribution from re-suspended road dust.	Traffic Management	Other	2008	NLC				Complete	Complete	

A4	Environmental Permit Improvement Programme. British Steel to undertake an investigation to monitor and quantify point source and fugitive particulate matter including PM10 and PM2.5 emissions from the BOS Plant, Sinter Plant, Blast Furnaces, Appleby/ Dawes Lane Coke Ovens point source emissions and associated activities.	Environmental Permits	Other measure through permit systems and economic instruments	2008	British Steel, EA			Complete	Complete	
A5	Study into a local TEOM to Partisol correction factor. Consideration of alternative measurements techniques or correction factors as developed.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2008 - 2014	NLC	NLC		Complete	Complete	The Partisol monitor was removed in December 2014. There are no current plans to use this monitor again



A6	Environmental Permit Improvement Programme. British Steel shall assess the monitoring data to identify process areas/outside influences making significant contribution (short and/or long term) to the pollutant levels measured.	Environmental Permits	Other measure through permit systems and economic instruments	2008	British Steel, EA			Complete	Complete	
A7	Environmental Permit Improvement Programme. British Steel to review annually the emissions to air impact assessment and amend as necessary following progressive completion of relevant improvement programme requirements.	Environmental Permits	Other measure through permit systems and economic instruments	2008	British Steel, EA			Complete	Complete	

A8	Environmental Permit Improvement Programme. British Steel to formulate an air quality management plan for the installation aimed at reducing the impact of pollutants emitted from the installation and ensuring it does not significantly contribute to breaches of the national Air Quality Strategy standards/objectives or EU Directive Limits.	Environmental Permits	Other measure through permit systems and economic instruments	2009	British Steel, EA			Complete	Complete	
B1	Launch and maintain North Lincolnshire air quality website with: - Access to real time & historical data. - Production of graphs and pollution roses. - Access to air quality reports and latest news updates. - General information.	Public Information	Via the Internet	2008 - present	NLC	NLC		Ongoing	To continue	The council has operated a dedicated air quality website since 2008, a new contract has been awarded to ensure it continues
B2	Review existing methods of communication of real time data to the public and consider	Public Information	Other	2008 - present	NLC			Complete	Complete	Internet remains the preferred communication method for air quality information

	alternatives to internet access.									
B3	Investigate the potential for air pollution forecasting in Scunthorpe	Environmental Permits	Other measure through permit systems and economic instruments	2009 - present	NLC			Ongoing	To continue	Pollution forecasting is undertaken by operators on the integrated steelworks site. Currently there are no plans for this to be extended for the public to utilise.
B4	Provide information to the public through publicity campaigns about how they can improve air quality from domestic situation e.g. bonfires and heating fuels	Public Information	Other	2008 - present	NLC	NLC		Ongoing	To continue	Issue-specific campaigns have previously been undertaken using the internet, local press and council publications. Further campaigns will be developed as appropriate.
C1	Raise profile & encourage attendance at organised community bonfire celebrations rather than individual bonfires	Public Information	Other	2008	NLC	NLC		Ongoing	To continue	

C2	Conduct a publicity campaign advising commercial organisations about their legal obligations in relation to their waste, with particular reference to burning of trade waste	Public Information	Via leaflets	2008 - present	NLC	NLC			Complete	Complete	The Council has produced a leaflet and delivered it to businesses, including all within the Scunthorpe AQMA. These leaflets are still used on an ad hoc basis.
C3	Complaints in respect of dust and smoke from commercial premises (not regulated under the Environmental Permitting regime) will be investigated as a priority and enforcement action taken in accordance with the enforcement policy.	Policy Guidance and Development Control	Other policy	Ongoing	NLC				Ongoing	To continue	Enforcement action is taken against those contravening the Environmental Protection Act 1990 and Clean Air Act 1993
C4	Identify current road sweeping schedules within the Scunthorpe AQMA and realign schedules as appropriate to minimise re suspended dust emissions from areas such as Brigg Road.	Transport Planning and Infrastructure	Other	2009	NLC				Complete	Complete	

C5	Conduct a publicity campaign advising local residents the implications of living in a domestic smoke control area and encourage people to complain if they are affected by smoke from domestic chimneys.	Public Information	Via the internet	2008	NLC	NLC			Ongoing	To continue	A publicity campaign was launched authority-wide in 2008. This information is currently available on the council's website and residents are advised as required
C6	Complaints in respect of domestic smoke control will be investigated as a priority and enforcement action taken in accordance with the enforcement policy.	Policy Guidance and Development Control	Other policy	Ongoing	NLC				Ongoing	To continue	Enforcement action is taken against those contravening legislation

D1	The Council will organise strategic air quality management meeting with other relevant organisations with an interest in air quality issues, including the Health Protection Agency, Primary Care Trust and the Environment Agency. The purpose of the group will be to identify key air quality issues and agree measures for reduction.	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2008	NLC, HPA, PCT, EA				Ongoing	To continue	
D2	Set up a Local Industry Forum involving the Environment Agency, North Lincolnshire Council and Local Industry representatives with the potential to emit PM10. The purpose of the group is to identify key issues, agree measures for reduction of PM10	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2007 - present	NLC, Local Industry				Complete	To continue	

D3	Formulate an industry overview for the integrated steelworks site. Identifying process areas, haul routes, vehicle flows and operating hours to consider in conjunction with monitoring data. Identify areas of responsibility within general areas of the steelworks site, areas outside the permit regime and regulatory responsibility for the same.	Environmental Permits	Other	2010	NLC			Complete	Complete	
D4	Continue to lobby central government in relation to permitting of mobile plants and look to identify improved mechanisms of regulation and enforcement.	Environmental Permits	Other measures through permit systems and economic instruments	2008	NLC			Complete	Complete	

D5	Ensure that the requirements of the Environmental Permitting regime are appropriately enforced with inspections prioritised on a risk basis taking account of PM10 emissions.	Environmental Permits	Other measures through permit systems and economic instruments	2008 - present	NLC			Ongoing	To continue	
D6	Ensure permits issued under the Environmental Permitting Regulations are reviewed in accordance with guidance, with particular attention to processes within the AQMA with the potential to emit PM10.	Environmental Permits	Other measures through permit systems and economic instruments	2008 - present	NLC			Ongoing	To continue	
D7	Work with local industry and EA towards the development of relevant measurable indicators of changes in significant emissions of PM10.	Environmental Permits	Other	2009	NLC, EA, Industry			Ongoing	To continue	Data is reviewed by the Technical Working Group to analyse trends and determine areas for improvement. Daily pollution episodes are identified and action is taken to review the cause and analyse the process contribution.



D8	Work with local industry and EA to develop targets for the reduction of the area covered by the AQMA so that the number of properties affected will be reduced.	Environmental Permits	Other	2008 - present	NLC, EA, Industry			Ongoing	To continue	The Low Santon AQMA (PM10 annual mean) was revoked in 2018. The Scunthorpe Town AQMA was reduced in size in 2018. This was as a result of the 2016 Detailed Assessment.
E1	The impact of development within the Air Quality Management Area shall be considered in relation to air quality. Exposure of new receptors or the introduction of significant new sources of PM10 will need to be appropriately addressed until such time as action E2 has been completed.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Ongoing	NLC			Ongoing	To continue	The Environmental Protection Team reviews all planning applications. Advice is given to applicants and Development Control colleagues based on current air quality data.
E2	Develop a Supplementary Planning Document (SPD), which identifies the constraints and mitigation to development within the Air Quality	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2017	NLC			Ongoing		A draft SPD has been prepared, however this will need reviewing to reflect the proposed AQMA changes. It is likely that the SPD will be completed following the Action Plan review.

	Management Area									
F1	Review new and existing development sites, to monitor the impact of road, rail, air and water traffic and their emission levels.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Ongoing	NLC			Ongoing	To continue	The Environmental Protection Team reviews all planning applications. These are looked at on a case by case basis and impact upon local air quality and residential amenity are examined.
F2	Implementing bus priority measures as appropriate at new residential developments to help ensure that public transport is a quicker and more direct transport than the car	Traffic Management	Strategic highway improvements	2012	NLC			Stopped	N/A	This requirement is considered by other departments within the Council as part of the Planning regime.

F3	Improving facilities for pedestrians and cyclists, school and workplace travel planning, implementation of school safety zones, bus and infrastructure enhancements and simplification of the network, ticketing in Scunthorpe and the main rural routes and managing our car parks and tariff structure.	Traffic Management	Strategic highway improvements	2011-2026	NLC			Ongoing	To continue	The implementation of this action is incorporated within the Council's current Local Transport Plan. Full details are available at the following website: <a href="https://www.northlincs.gov.uk/transport-and-streets/roads-highways-and-pavements/local-transport-plan-2011-2026/">https://www.northlincs.gov.uk/transport-and-streets/roads-highways-and-pavements/local-transport-plan-2011-2026/</a>
F4	Implementation of an urban traffic control (UTC) system to assist the traffic manager in delivering a smoother flow of traffic in the urban area of Scunthorpe and reduce levels of congestion.	Traffic Management	UTC, Congestion management, traffic reduction	2012	NLC	NLC		Stopped	N/A	This scheme is not currently being pursued.

F5	Reducing incidents of dangerous driving and enforcing compliance with speed limits to maintain a smooth flow of traffic and minimise sudden braking acceleration	Traffic Management	Other	2012	NLC			Ongoing	To continue	The North Lincolnshire Road Safety Partnership was established to; Significantly reduce the numbers of people killed and seriously injured on roads in North Lincolnshire, raise public awareness of road safety issues, encourage safer driving behaviour.
F6	Continued enforcement of speed limits and driving standards	Traffic Management	Other	Ongoing	NLC			Ongoing	To continue	
F7	Working with operators to encourage the replacement of vehicles to the latest European emission standards wherever possible	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	Ongoing	NLC	NLC, Operators		Ongoing	To continue	North Lincolnshire Council and local bus operators are part of a Quality Partnership. Operators are encouraged to use vehicles that meet these standards. The two largest operators in the Authority area currently use vehicles that meet the latest standards and it is also a contractual obligation for school bus routes.

F8	<p>The council will aim to:</p> <ul style="list-style-type: none"> <li>- Reduce traffic flows through promotion of sustainable travel and demand management measures.</li> <li>- Reduce transport related emissions by reducing traffic flows and making more efficient use of the network</li> </ul>	Traffic Management	UTC, Congestion management, traffic reduction	Ongoing	NLC				Ongoing	To continue	<p>The implementation of this action is incorporated within the Council's current Local Transport Plan.</p>
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## 2.3 PM<sub>2.5</sub> – 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<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Due to the proportion of PM<sub>2.5</sub> contained within the PM<sub>10</sub> suspension, a reduction in PM<sub>10</sub> should see a reduction in PM<sub>2.5</sub>. In addition, North Lincolnshire Council is taking the following measures to address PM<sub>2.5</sub>:

- Maintaining a network of particulate analysers, including monitoring of PM<sub>2.5</sub> at three locations across North Lincolnshire during 2019 including South Ferriby, Killingholme and East Common Lane which is within the Scunthorpe AQMA.
- Environmental Permit improvement programmes.
- Campaigns to discourage waste burning and bonfires.
- Liaison with Industry, Health Professionals and the Environment Agency to initiate improvements and share good practice.
- Transport improvement schemes.
- Public transport and fleet improvements, such as encouraging uptake of electric vehicles to replace older more polluting vehicles.

Operators on the Integrated Steelworks site actively participate in a number of measures that would reduce particulate emissions, including PM<sub>2.5</sub>:

- Reduction of speed limits.
- A targeted road sweeping scheme.
- Improved dust mitigation methods, such as dampening down of roadways and the closure of external doors when not in use.

- Road surfacing and landscaping improvements.
- Improvements in manual handling and storage methods.
- Email notification to site operators when a high particulate emission day is predicted to allow changes in activities.

North Lincolnshire Council applied to DEFRA for Grant Funding for the Air Quality Grant 2017-18. The application included a public engagement campaign for the 16 Smoke Control Orders in North Lincolnshire declared between 1959 – 1981. The following areas are assigned as Smoke Control Areas and are home to approximately 35,000 residential properties: Scunthorpe, Bottesford, Burringham, Flixborough and Gunness. The aim of the campaign was to provide information to over 35,000 residents living within the Smoke Control Areas. The campaign will highlight the methods of reducing the environmental impact whilst using wood burning stoves with reference to DEFRA's recently published information leaflet entitled 'Open fires and Wood Burning Stoves – A practical guide'. It will also include information relating to the legal duty of using authorised fuels in an exempt appliance and where information on what fulfills this requirement can be found. Unfortunately, the grant bid was unsuccessful and current financial constraints are likely to prevent progression of this scheme. However, North Lincolnshire Council has provided up to date advice on our website, in relation to wood burning stoves, Smoke Control Areas and air pollution. In addition, information has been circulated to residents in a local publication (News Direct), to raise awareness in relation to the use of wood burning stoves and how best practice, such as burning dry wood and having chimneys swept can reduce air pollution.

The updated Air Quality Action Plan will target reductions in PM<sub>10</sub> concentrations within the Scunthorpe Town AQMA. This will therefore also incorporate measures to reduce PM<sub>2.5</sub> within the area.

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

#### 3.1 Summary of Monitoring Undertaken

##### 3.1.1 Automatic Monitoring Sites

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

North Lincolnshire Council undertook automatic (continuous) monitoring at 8 sites during 2019. Table A.1 in Appendix A shows the details of the sites. 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. National monitoring results are available at <https://uk-air.defra.gov.uk/networks/>

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

##### 3.1.2 Non-Automatic Monitoring Sites

North Lincolnshire Council undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 22 sites during 2019. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.



## 3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias<sup>4</sup>, “annualisation” (where the data capture falls below 75%), and distance correction<sup>5</sup>. Further details on adjustments are provided in Appendix C.

### 3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

The main sources of Nitrogen Dioxide (NO<sub>2</sub>) are the burning of fossil fuels from industry and internal combustion of vehicles. Prolonged exposure to nitrogen dioxide can cause lung irritation and lower resistance to upper respiratory diseases. Exposure to excess nitrogen dioxide may cause a higher number of cases of respiratory conditions in vulnerable groups, such as young, elderly or infirm.

For the year 2019 North Lincolnshire Council undertook continuous monitoring for NO<sub>2</sub> at three sites:

- Scunthorpe Town AURN (CM1)
- Low Santon (CM3)
- Killingholme School (CM6)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>. Note that the concentration data presented in Table A.3 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 2019 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.

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<sup>4</sup> <https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html>

<sup>5</sup> Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year. There were no breaches of this objective.

**For 2019, there were no exceedances of the air quality objective for the annual mean(>40µg/m<sup>3</sup>), or of the hourly mean (200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year) for nitrogen dioxide.**

### 3.2.2 Particulate Matter (PM<sub>10</sub>)

Particulate Matter (PM<sub>10</sub>) is fine particles measuring 10 microns in diameter. These particles are from varying sources, these include:

- Combustion from industry and road traffic emissions.
- Secondary sources of the pollutant such as chemical reactions in the atmosphere.
- Coarser particles from tertiary sources, such as, suspended dusts, natural salts, biological particles and construction work.

PM<sub>10</sub> is known to have varied health effects. The size of the particles allow them to enter the lungs and be carried around in the blood to the rest of body. When in the lungs the particles can cause irritation and inflammation, particularly of those with underlying conditions and vulnerable groups. There is also evidence that these fine particles may cause dementia and could carry cancer causing compounds into the body.

A large contributor of PM<sub>10</sub> emissions in Scunthorpe is from the Integrated Steel Works site. These are both fugitive and diffuse emission sources which are both defined in the Iron and Steelmaking BREF document as follows:

- Diffuse emissions occur during regular operation such as coal and coke handling, transport of coal and coke, coal blending beds, ascension pipes, coke pushing, coke quenching; if not captured they can be released by the roof, roof hatch, window or from stored material.
- Fugitive emissions happen during irregular operation from leakages at the battery, e.g. because of leakage of vessels, oven doors, flanges etc. or at the by product plant.

In 2019 the Council monitored PM<sub>10</sub> at 8 sites. At two of these sites, Scunthorpe Town AURN (site ID: CM1) and Low Santon (site ID: CM3) a BAM/FDMS monitor was co-located with a TEOM.

The FDMS monitoring system is a more accurate method of measuring PM<sub>10</sub>, the results for these are reported uncorrected. The Standard TEOM data is required to be corrected to compensate for volatile particulate loss from the higher operating temperatures of the equipment. Details on the correction method are found in Appendix C.

The continued operation of the TEOM monitors at Scunthorpe Town and Low Santon is to allow for data trends at sites with FDMS/BAM monitors.

PM<sub>10</sub> data for Osiris monitors located at South Ferriby (site ID: CM7) and Killingholme East Halton Road (site ID: CM8) is included within this report, however Osiris monitors do not meet the standard for the European reference method for particulate monitoring within the UK and the results should be treated with caution. The Council deploys Osiris monitors to monitor PM<sub>10</sub> for a specific project: the South Ferriby Monitor has been located at the request of a Local Environmental Liaison Committee to monitor emissions from a cement plant which local residents believe is responsible for spikes of PM<sub>10</sub>. Similarly, the Osiris monitor at Killingholme East Halton Road was deployed to monitor emissions from a local industrial estate due to concerns from local residents. The Osiris monitor at Killingholme East Halton Road was removed in March 2019. There have been no breaches of air quality objectives to date.

Table A.5 in Appendix A compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>. Figure A.2 in Appendix A, shows compliance with this objective at the continuous monitoring sites for 2019.

Table A.6 in Appendix A compares the ratified continuous monitored PM<sub>10</sub> 24 hour mean concentrations for the past 5 years with the air quality objective of 50µg/m<sup>3</sup>, not to be exceeded more than 35 times per year. Figure A.3 in Appendix A shows compliance with this objective all sites for 2019.

**In 2019 there were no recorded exceedances of the annual mean (40µg/m<sup>3</sup>) and the 24 hour mean (50 µg/m<sup>3</sup>not to be exceeded more than 35 times a year) air quality objectives for PM<sub>10</sub>.**

### 3.2.3 Particulate Matter (PM<sub>2.5</sub>)

PM<sub>2.5</sub> is particulate matter that is less than 2.5 microns in diameter. The sources for this are similar for the PM<sub>10</sub> pollutant as listed above.

This pollutant was measured using Osiris monitors at East Common Lane (CM2), South Ferriby (CM7) and Killingholme East Halton Road (CM8).

The Council recognises that Osiris monitors do not meet the standard for the European reference method for particulate monitoring within the UK, however data from the Osiris monitors is included within this report as no other PM<sub>2.5</sub> monitoring method is available to the Council at this time.

The Public Health Outcomes Framework (PHOF) is a Department of Health data tool for England; it is intended to focus public health action on increasing healthy life expectancy and reducing the difference in life expectancy between communities. The tool uses indicators to assess improvements. The PHOF includes an indicator, based on the effect of particulate matter (PM<sub>2.5</sub>) on mortality. This is replicated in the table below:

### PHOF Indicator 3.1 Health Protection

Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution (measured as fine particulate matter, PM<sub>2.5</sub>)<sup>19</sup>.

The estimates of mortality burden are based on modelled annual average concentrations of fine particulate matter (PM<sub>2.5</sub>) in each local authority area originating from human activities. Local data on the adult population and adult mortality rates is also used. Central estimates of the fraction of mortality attributable to long-term exposure to current levels of human-made particulate air pollution range from approx. 2.5% to 5% in some local authorities in rural areas, to over 8% in some London boroughs<sup>20</sup>.

**Table 3.1: PHOF Indicator**

For North Lincolnshire the fraction of mortality attributable to long term exposure to current levels of human-made particulate air pollution is 4.3%. The main objective of the PHOF is to raise awareness of the effect of air pollution on public health. It is intended to encourage promotion of the need for local, regional and national actions to reduce air pollution and to help form a partnership between all delivery partners in pursuit of this goal.

Table A.7 in Appendix A presents the ratified and adjusted monitored PM<sub>2.5</sub> annual mean concentrations for the past 5 years. Figure A.4 in Appendix A shows compliance with the objective at the three monitoring locations for the past 5 years.

**In 2019 there were no recorded exceedances of the annual mean (25µg/m<sup>3</sup>) air quality target value for PM<sub>2.5</sub>.**

#### 3.2.4 Sulphur Dioxide (SO<sub>2</sub>)

UK emissions of SO<sub>2</sub> are dominated by combustion of fuels containing sulphur, such as coal and heavy oils. SO<sub>2</sub>, even in smaller concentrations is known to cause reduced lung function in asthmatics and higher concentrations can cause asthma sufferers to require hospital treatment.

Monitoring of SO<sub>2</sub> was undertaken at the following three sites in North Lincolnshire during 2019:

- Scunthorpe Town AURN (CM1)

- Low Santon (CM3)
- Killingholme School (CM6)

Table A.8 in Appendix A compares the ratified continuous monitored SO<sub>2</sub> concentrations for 2019 with the air quality objectives for SO<sub>2</sub>.

**In 2019 there were no recorded exceedances of the 15 minute mean (266µg/m<sup>3</sup> not to be exceeded more than 35 times a year), 1 hour mean (350µg/m<sup>3</sup> not to be exceeded more than 24 times a year) and 24 hour mean (125µg/m<sup>3</sup> not to be exceeded more than 3 times a year) air quality objectives for sulphur dioxide.**

### 3.2.5 Benzene

Benzene is an elementary petrochemical, mainly sourced from the combustion of petrol with industrial combustion also contributing. Benzene exposure has been linked to increases in the risks of cancer, liver diseases and other conditions.

The annual mean objective for Benzene is 5µg/m<sup>3</sup>. This was not exceeded in 2019 as the annual mean recorded at Scunthorpe Town AURN in 2019 was 1.11µg/m<sup>3</sup>.

Monitoring results are displayed in Table A.9 in Appendix A and Figure A.5.

**In 2019 there were no recorded exceedances of the annual mean (5µg/m<sup>3</sup>) air quality objective for benzene.**

### 3.2.6 PAH (Benzo(a)pyrene (B[a]P))

The local monitoring network is to provide PAH (Benzo(a)pyrene (B[a]P)) concentration information at Scunthorpe Town and Low Santon. Measurement of Solid Phase PAH (Benzo(a)pyrene (B[a]P)) samples are of the PM<sub>10</sub> fraction of ambient air. These concentrations are measured over a period of 24 hours on a filter using Digital

DHA-80 samplers with automatic filter changes. The collection of this data enable the assessment of current concentrations of PAH (Benzo(a)pyrene (B[a]P)) for assessment against the National Air Quality Objective for PAH (annual mean of 0.25 ngm<sup>-3</sup> Benzo(a)pyrene (B[a]P) in ambient air) published in the UK Air Quality Strategy. Also to enable demonstration of the UK's compliance with the Fourth Air Quality Daughter Directive (target value of 1 ngm<sup>-3</sup> for the annual mean concentration of B[a]P), the OSPAR convention and the UNECE Convention on Long Range Transboundary Air Pollutants.

Polycyclic Aromatic Hydrocarbons (PAHs) are persistent organic compounds some of which are proven carcinogens or toxic. These arise due to the incomplete combustions of fossil fuels from vehicles, industry and residential sources.

Historically North Lincolnshire recorded some of the highest levels of PAH (Benzo(a)pyrene (B[a]P)) in the United Kingdom. This was principally due to the two coke ovens on the Integrated Steelworks Site. However, the closure of the Dawes Lane Coke Ovens and improvements at the Appleby Coke Ovens has seen a reduction of PAH (Benzo(a)pyrene (B[a]P)) emissions in recent years. This downward trajectory in PAH (Benzo(a)pyrene (B[a]P)) concentrations has continued for Low Santon, however, during 2019 the concentrations of PAH (Benzo(a)pyrene (B[a]P)) emissions at Scunthorpe Town has increased. It is currently unclear as to why this is the case, the Environment Agency will look to review the data to determine the source of the elevated concentrations and work with the site operator to gain improvements. PAH (Benzo(a)pyrene (B[a]P)) emissions are not part of the Local Air Quality Management regime and the operations largely responsible for them – the coke ovens – are not regulated by the Council.

The European Community's fourth Air Quality Daughter Directive (2005/107/EC) specifies a target value of 1 ng/m<sup>3</sup> for the annual mean concentration of benzo[a]pyrene as a representative PAH (Benzo(a)pyrene (B[a]P)), to be achieved by 2012. The National Air Quality Objective for PAH (Benzo(a)pyrene (B[a]P)) levels is 0.25 ng/m<sup>3</sup>.

In 2019 the annual average for Scunthorpe Town AURN was 1.91 ng/m<sup>3</sup>, and for Low Santon it was 0.76 ng/m<sup>3</sup>. This is an exceedance of both the National Air Quality Objective and EU target Value for Scunthorpe Town. PAH (Benzo(a)pyrene (B[a]P)) concentrations at Low Santon currently exceeds the National Air Quality Objective, however, there has been a significant decline in the emissions at this monitoring site which is now compliant with the EU Target Value.

Table A.10 in Appendix A presents the monthly PAH (Benzo(a)pyrene (B[a]P)) data for the year 2019 at Scunthorpe Town and Low Santon.

Figure A.6 in Appendix A shows the trend in PAH (Benzo(a)pyrene (B[a]P)) annual mean concentrations from 2015 to 2019 at Scunthorpe Town and Low Santon.

### 3.2.7 Heavy Metals

The Heavy Metals network records concentrations of heavy metals in air near industrial sources and areas of population. The Heavy Metals Network now forms the basis of the UK's compliance monitoring for:

- The Air Quality Directive (2008/50/EC) which provides a Limit Value for lead concentration in air of 0.5 µg/m<sup>3</sup>, expressed as an annual mean.
- The 4th Air Quality Daughter Directive (2004/107/EC), which sets target values for arsenic, cadmium, nickel (and polycyclic aromatic hydrocarbons) in the PM<sub>10</sub> particulate fraction of ambient air.

Table A.11 in Appendix A presents the heavy metals data for the year 2019 at Scunthorpe Town and Low Santon.

**In 2019 there were no exceedances of the target or limit values for heavy metals.**



## 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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
CM1	Scunthorpe Town AURN	Industrial	490320	410831	SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub>	YES	Chemiluminescent, Fluorescent, BAM & TEOM	21	7	2
CM2	East Common Lane	Urban background	490663	409789	PM <sub>10</sub> , PM <sub>2.5</sub>	YES	TEOM & Osiris	3	28	1.5
CM3	Low Santon	Industrial	492945	411931	SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub>	YES	Chemiluminescent, Fluorescent, BAM & TEOM	41	5	2
CM4	Amvale	Industrial	491343	408782	PM <sub>10</sub>	YES	TEOM	150	100	1.5
CM5	High Street East	Industrial	490224	411301	PM <sub>10</sub>	YES	TEOM	18	10	1.5
CM6	Killingholme School	Other	514880	416133	SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub>	NO	Chemiluminescent & TEOM	9	N/A	2
CM7	South Ferriby	Other	497931	420993	PM <sub>10</sub> , PM <sub>2.5</sub>	NO	Osiris	10	45	1.5
CM8	Killingholme East Halton Road	Other	514148	417514	PM <sub>10</sub> , PM <sub>2.5</sub>	NO	Osiris	10	14	1.5

**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.2 – Details of Non-Automatic Monitoring Sites**

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
DT1	Frodingham Road	Urban Background	489099	411723	NO2	NO	3	1	NO	2
DT2	Scotter Road (North side of roundabout)	Roadside	487239	411259	NO2	NO	9	2	NO	2
DT3	B & Q	Roadside	486699	411110	NO2	NO	2	15	NO	2
DT4	Hilton Avenue	Roadside	486928	411156	NO2	NO	12	3	NO	2
DT5	Britannia Corner	Urban Background	489190	411285	NO2	NO	4	2	NO	2
DT6	Oswald Road	Urban Background	489209	411118	NO2	NO	4	3	NO	2
DT7	Queensway Pub	Roadside	489172	409926	NO2	NO	20	2	NO	2
DT8	Ashby Road	Roadside	489112	409463	NO2	NO	15	1	NO	2
DT9	Queensway	Roadside	491628	408658	NO2	NO	16	2	NO	2
DT10	Mortal Ash Hill	Roadside	491838	408641	NO2	YES	15	9	NO	1.5
DT11	Front of Ashby Lodge Pub	Roadside	491859	408645	NO2	YES	1	9	NO	2
DT12	Barnard Avenue, Brigg	Roadside	499975	407421	NO2	NO	30	3	NO	2

DT13	Ulceby Road, Killingholme	Roadside	514573	415901	NO2	NO	15	1	NO	2
DT14	School Road, Killingholme	Roadside	514782	415971	NO2	NO	15	1	NO	2
DT15	Humber Road Chip Shop	Urban Background	515452	416107	NO2	NO	2	15	NO	2
DT16	Humber Road, LP 695	Roadside	515279	416085	NO2	NO	5	2	NO	2
DT17	Holydyke, Barton	Suburban	503048	421907	NO2	NO	15	1	NO	2
DT18	Rowland Road AQ Station	Industrial	490316	410837	NO2	YES	21	6	YES	2
DT19	Rowland Road AQ Station	Industrial	490316	410837	NO2	YES	21	6	YES	2
DT20	Rowland Road AQ Station	Industrial	490316	410837	NO2	YES	21	6	YES	2
DT21	ASDA, Station Road	Roadside	490080	411258	NO2	YES	20	1	NO	2
DT22	East Halton Road Killingholme	Roadside	514141	417483	NO2	NO	4	1	NO	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.3 – Annual Mean NO<sub>2</sub> Monitoring Results**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3) (4)</sup>				
							2015	2016	2017	2018	2019
CM1	490320	410831	Industrial	Automatic	N/A	97%	17.6	17	16	18	15
CM3	492945	411931	Industrial	Automatic	N/A	84%	27.1	19	18	20	19
CM6	514880	416133	Other	Automatic	N/A	100%	20.4	17	17	18	15
DT1	489099	411723	Urban Background	Diffusion Tube	N/A	83%	24.5	25	21	19	21
DT2	487239	411259	Roadside	Diffusion Tube	N/A	100%	26.3	28	24	24	24
DT3	486699	411110	Roadside	Diffusion Tube	N/A	100%		20	22	19	18
DT4	486928	411156	Roadside	Diffusion Tube	N/A	100%	22.1	24	22	20	20
DT5	489190	411285	Urban Background	Diffusion Tube	N/A	100%	25.2	25	26	24	24
DT6	489209	411118	Urban Background	Diffusion Tube	N/A	92%	24.2	27	24	23	24
DT7	489172	409926	Roadside	Diffusion Tube	N/A	92%	25.8	27	25	24	22
DT8	489112	409463	Roadside	Diffusion Tube	N/A	92%	26.3	29	27	25	26
DT9	491628	408658	Roadside	Diffusion Tube	N/A	100%	19.4	21	19	19	20
DT10	491838	408641	Roadside	Diffusion Tube	N/A	92%	36.3	38	35	34	34
DT11	491859	408645	Roadside	Diffusion Tube	N/A	100%	22.9	20	22	20	20
DT12	499975	407421	Roadside	Diffusion Tube	N/A	100%	26.1	26	26	20	20
DT13	514573	415901	Roadside	Diffusion Tube	N/A	100%	26.2	31	20	17	17
DT14	514782	415971	Roadside	Diffusion Tube	N/A	92%	33.7	31	27	28	29

DT15	515452	416107	Urban Background	Diffusion Tube	N/A	100%	19.4	21	19	20	18
DT16	515279	416085	Roadside	Diffusion Tube	N/A	100%	27.0	26	25	26	25
DT17	503048	421907	Suburban	Diffusion Tube	N/A	100%	22.4	23	22	20	21
DT18	490316	410837	Industrial	Diffusion Tube	N/A	100%	18.2	17	16	16	15
DT19	490316	410837	Industrial	Diffusion Tube	N/A	100%	17.0	17	15	16	15
DT20	490316	410837	Industrial	Diffusion Tube	N/A	100%	16.5	17	15	15	15
DT21	490080	411258	Roadside	Diffusion Tube	N/A	100%	22.7	23	22	21	22
DT 22	514141	417483	Roadside	Diffusion Tube	N/A	100%				21	21

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

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 adjustment

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

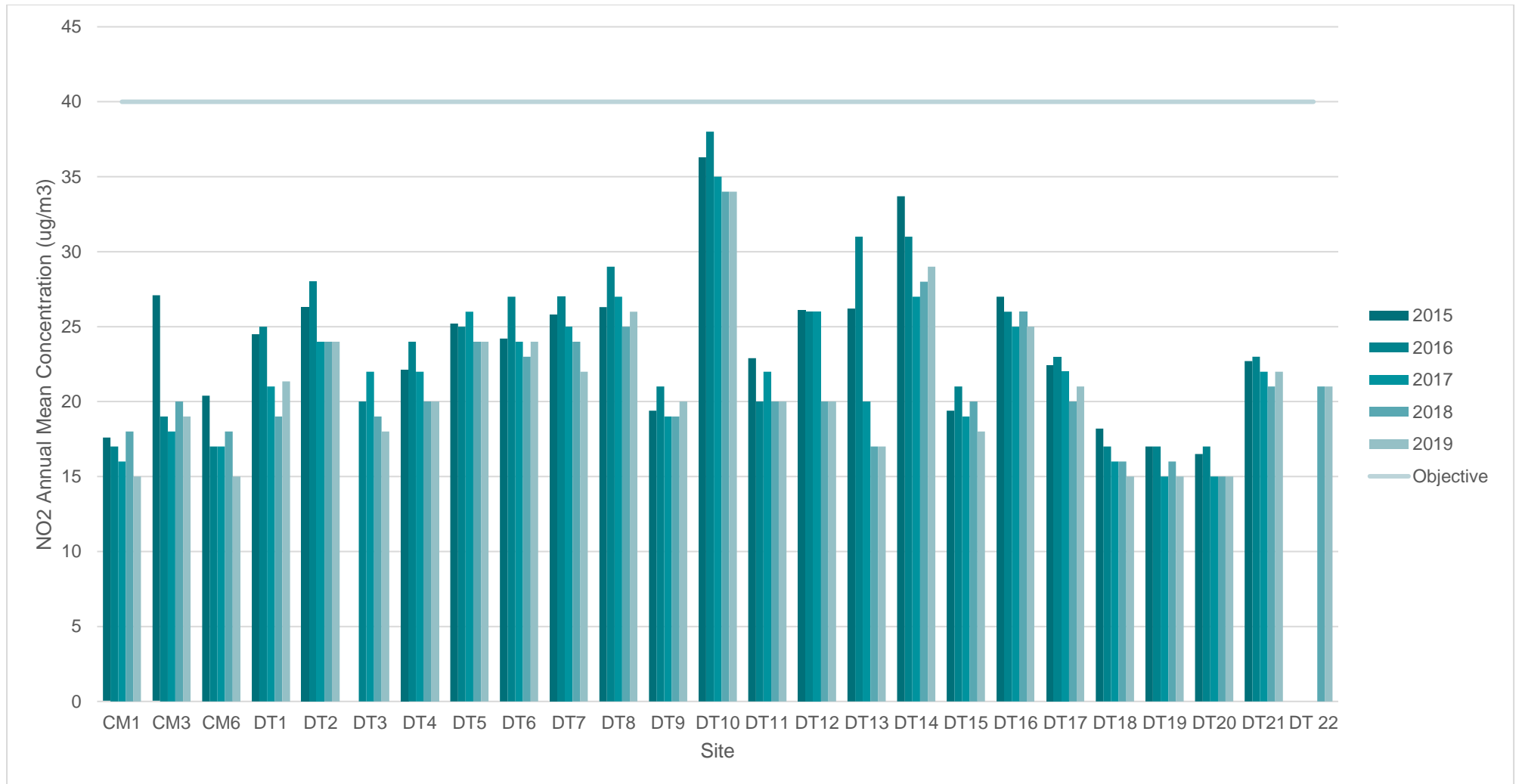
NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

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

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

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

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



**Figure A.1 – Trends in Annual Mean NO<sub>2</sub> Concentrations**

**Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> 1 Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
							2015	2016	2017	2018	2019
CM1	490320	410831	Industrial	Automatic	N/A	97%	0	0	0	0	0
CM3	492945	411931	Industrial	Automatic	N/A	84%	<b>0 (80.3)</b>	0	0	0	0
CM6	514880	416133	Other	Automatic	N/A	100%	0	0	0	0	0

**Notes:**

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

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

**Table A.5 – Annual Mean PM<sub>10</sub> Monitoring Results**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
						2015	2016	2017	2018	2019
CM1 BAM	490320	410831	Industrial	N/A	90%	21.4	17	16	18	20
CM1 TEOM	490320	410831	Industrial	N/A	98%	19.1	17	17	20	22
CM2	490663	409789	Urban Background	N/A	99%	19.3	20	18	21	22
CM3 FDMS	492945	411931	Industrial	N/A	86%	27.7	22	23	25	22
CM3 TEOM	492945	411931	Industrial	N/A	86%	27.8	26	30	31	29
CM4	491343	408782	Industrial	N/A	87%	18.6	17	16	<b>20 (18)</b>	21
CM5	490224	411301	Industrial	N/A	98%	19.7	21	19	<b>22 (20)</b>	21
CM6	514880	416133	Other	N/A	99%	18.0	18	18	19	19
CM7	497931	420993	Other	N/A	94%	23.4	21	18	16	18
CM8	514148	417514	Other	98%	23%				20	31

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

**Notes:**

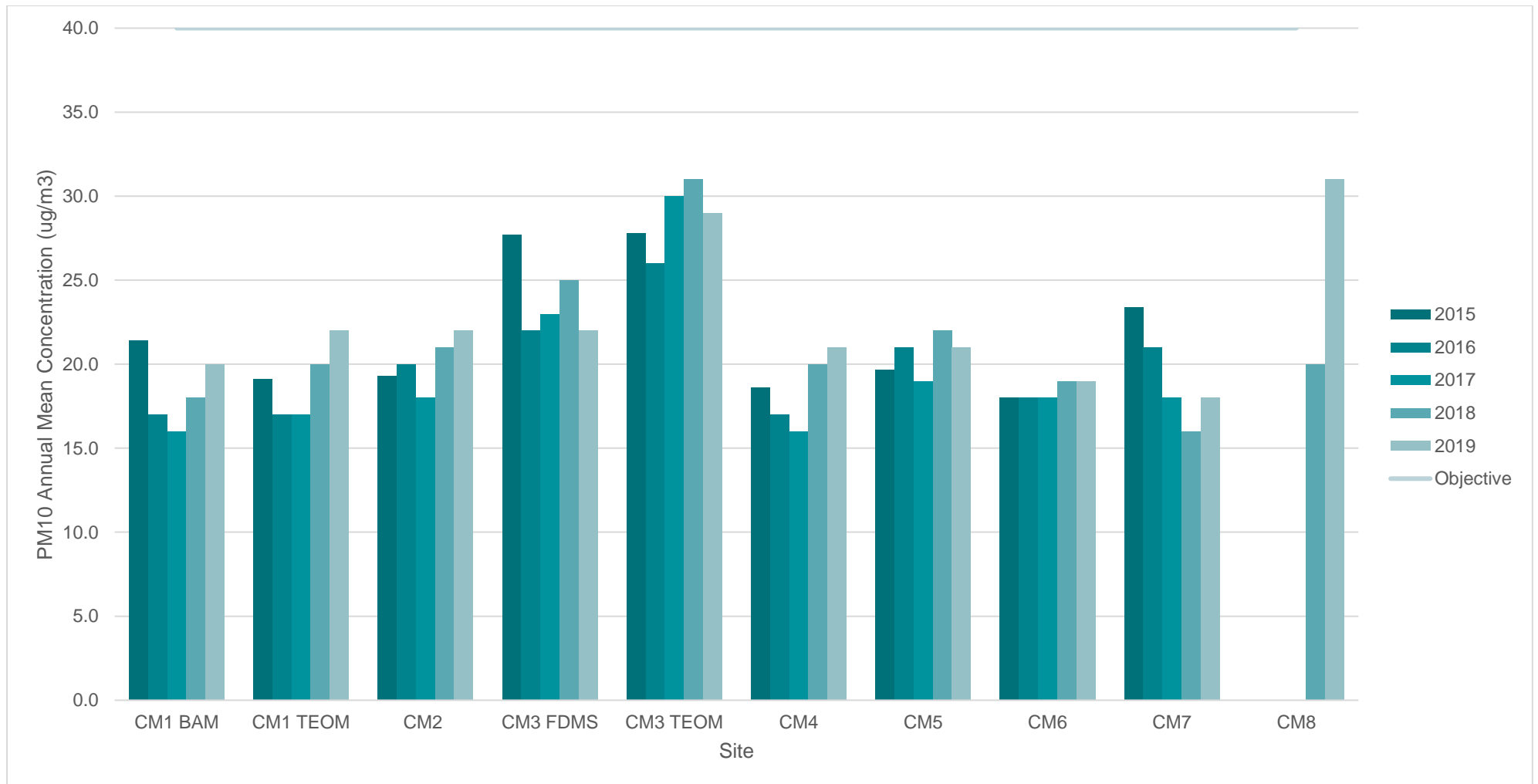
Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

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

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

(3) All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.





**Figure A.2 – Trends in Annual Mean PM<sub>10</sub> Concentrations**

**Table A.6 – 24-Hour Mean PM<sub>10</sub> Monitoring Results**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	PM <sub>10</sub> 24 Hour Means > 50µg/m <sup>3</sup> <sup>(3)</sup>				
						2015	2016	2017	2018	2019
CM1 BAM	490320	410831	Industrial	N/A	90%	15	6	5 (29)	9	18
CM1 TEOM	490320	410831	Industrial	N/A	98%	7	8	5	6	22
CM2	490663	409789	Urban Background	N/A	99%	9	18	9	16	22
CM3 FDMS	492945	411931	Industrial	N/A	86%	21	11	11	22	7
CM3 TEOM	492945	411931	Industrial	N/A	86%	<b>42 (68)</b>	25	<b>40</b>	<b>40</b>	35
CM4	491343	408782	Industrial	N/A	87%	9	15	6	16	15
CM5	490224	411301	Industrial	N/A	98%	12	4	5	2	14
CM6	514880	416133	Other	N/A	99%	2	1	4	3	5
CM7	497931	420993	Other	N/A	94%	8	6	4	4	10
CM8	514148	417514	Other	98%	23%				7	4 (39)

**Notes:**

Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

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

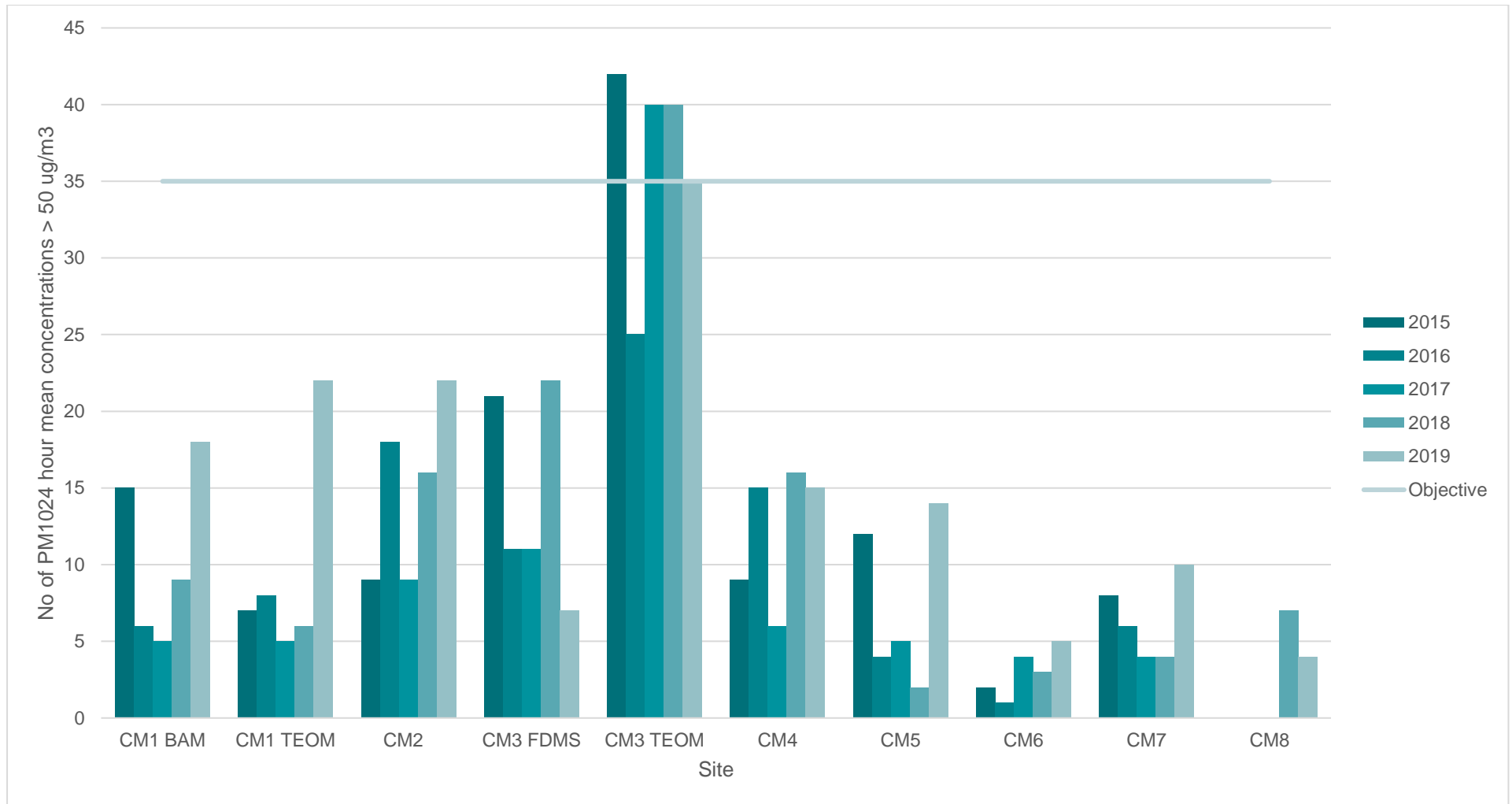


Figure A.3 – Trends in Number of 24-Hour Mean PM<sub>10</sub> Results >50µg/m<sup>3</sup>

**Table A.7 – PM<sub>2.5</sub> Monitoring Results**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	PM <sub>2.5</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
						2015	2016	2017	2018	2019
CM2	490663	409789	Urban Background	N/A	93%		7	6	10	7
CM7	497931	420993	Other	N/A	94%	6.8	7	6	7	9
CM8	514148	417514	Other	98%	23%				7	7

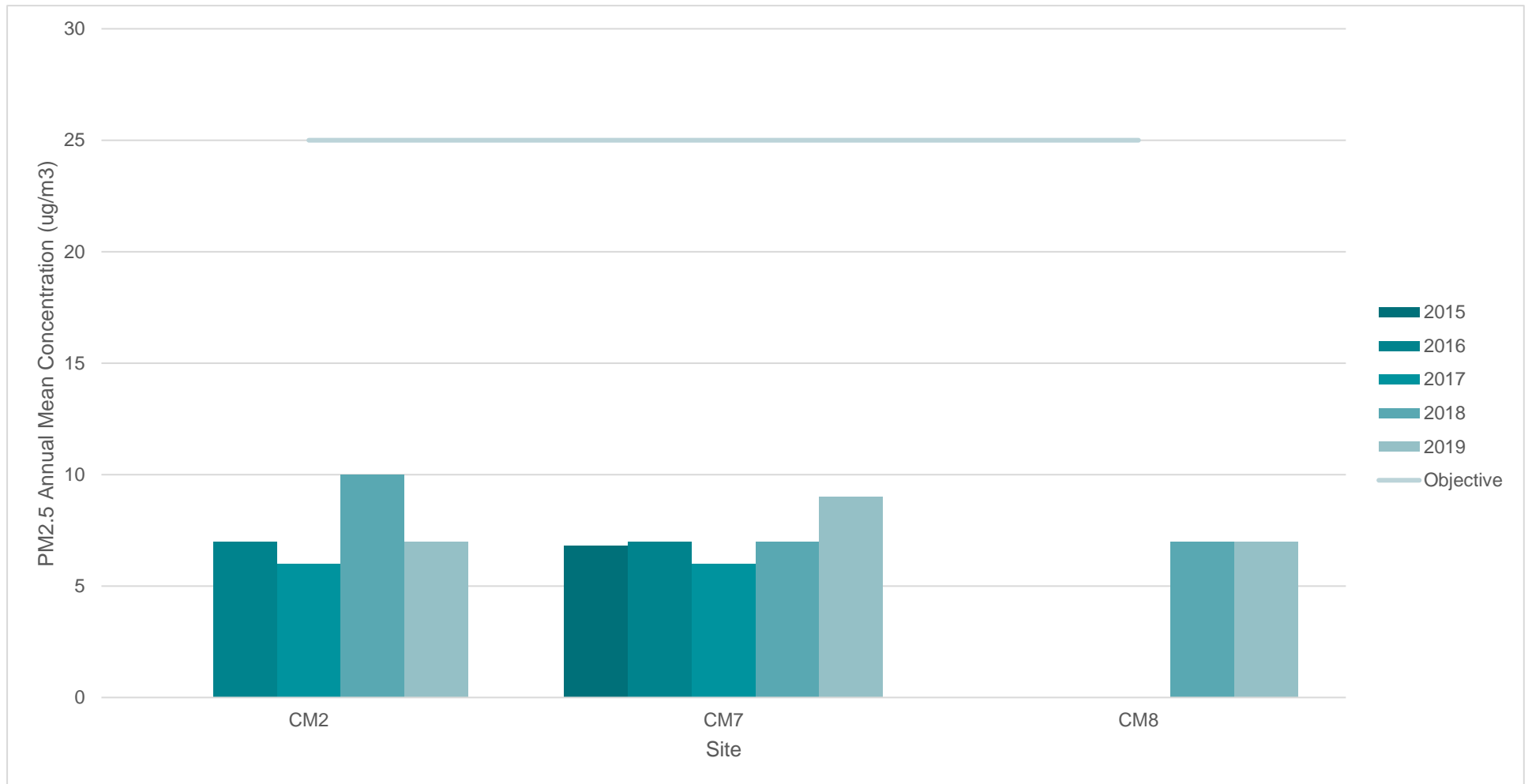
☒ Annualisation has been conducted where data capture is <75%

**Notes:**

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

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

(3) All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.



**Figure A.4 – Trends in Annual Mean PM<sub>2.5</sub> Concentrations**

**Table A.8 – SO<sub>2</sub> Monitoring Results**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	Number of Exceedances 2019		
						(percentile in bracket) <sup>(3)</sup>		
						15 minute Objective (266 µg/m <sup>3</sup> )	1 hour Objective (350 µg/m <sup>3</sup> )	24 hour Objective (125 µg/m <sup>3</sup> )
CM1	490320	410831	Industrial	N/A	100%	0	0	0
CM3	492945	411931	Industrial	N/A	82%	(21)	(11)	(4)
CM6	514880	416133	Other	N/A	100%	0	0	0

**Notes:**

Exceedances of the SO<sub>2</sub> objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

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

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

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

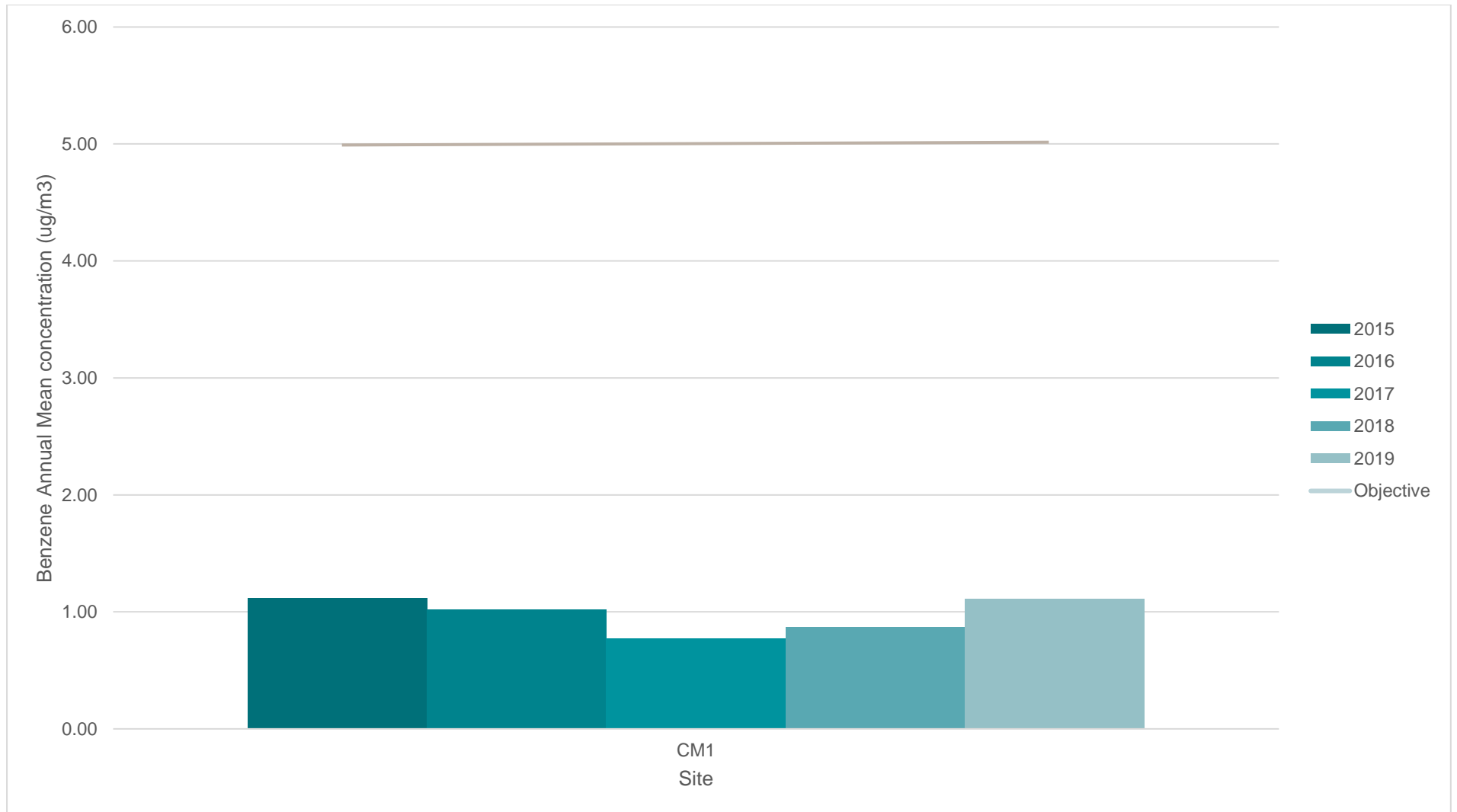
**Table A.9 – Benzene Monitoring Results**

Start Date	End Date	Scunthorpe Town AURN (CM1) Concentration (ug/m3)
24/12/2018	09/01/2019	0.68
09/01/2019	23/01/2019	0.6
23/01/2019	06/02/2019	0.96
06/02/2019	20/02/2019	0.67
20/02/2019	06/03/2019	1.32
06/03/2019	20/03/2019	0.5
20/03/2019	03/04/2019	0.85
03/04/2019	18/04/2019	5.12
18/04/2019	01/05/2019	3.02
01/05/2019	15/05/2019	1.64
15/05/2019	29/05/2019	0.83
29/05/2019	12/06/2019	1.03
12/06/2019	26/06/2019	1.09
26/06/2019	10/07/2019	0.98
10/07/2019	24/07/2019	0.46

24/07/2019	07/08/2019	0.45
07/08/2019	21/08/2019	0.45
21/08/2019	04/09/2019	0.5
04/09/2019	18/09/2019	0.39
18/09/2019	02/10/2019	0.92
02/10/2019	16/10/2019	0.59
16/10/2019	30/10/2019	0.5
30/10/2019	13/11/2019	2.19
13/11/2019	27/11/2019	1.18
27/11/2019	11/12/2019	0.88
11/12/2019	23/12/2019	0.94
23/12/2019	09/01/2020	1.28
Annual Average		1.11

Note: The Benzene annual mean objective is 5ug/m3





**Figure A.5 - Trends in Benzene Monitoring Results**

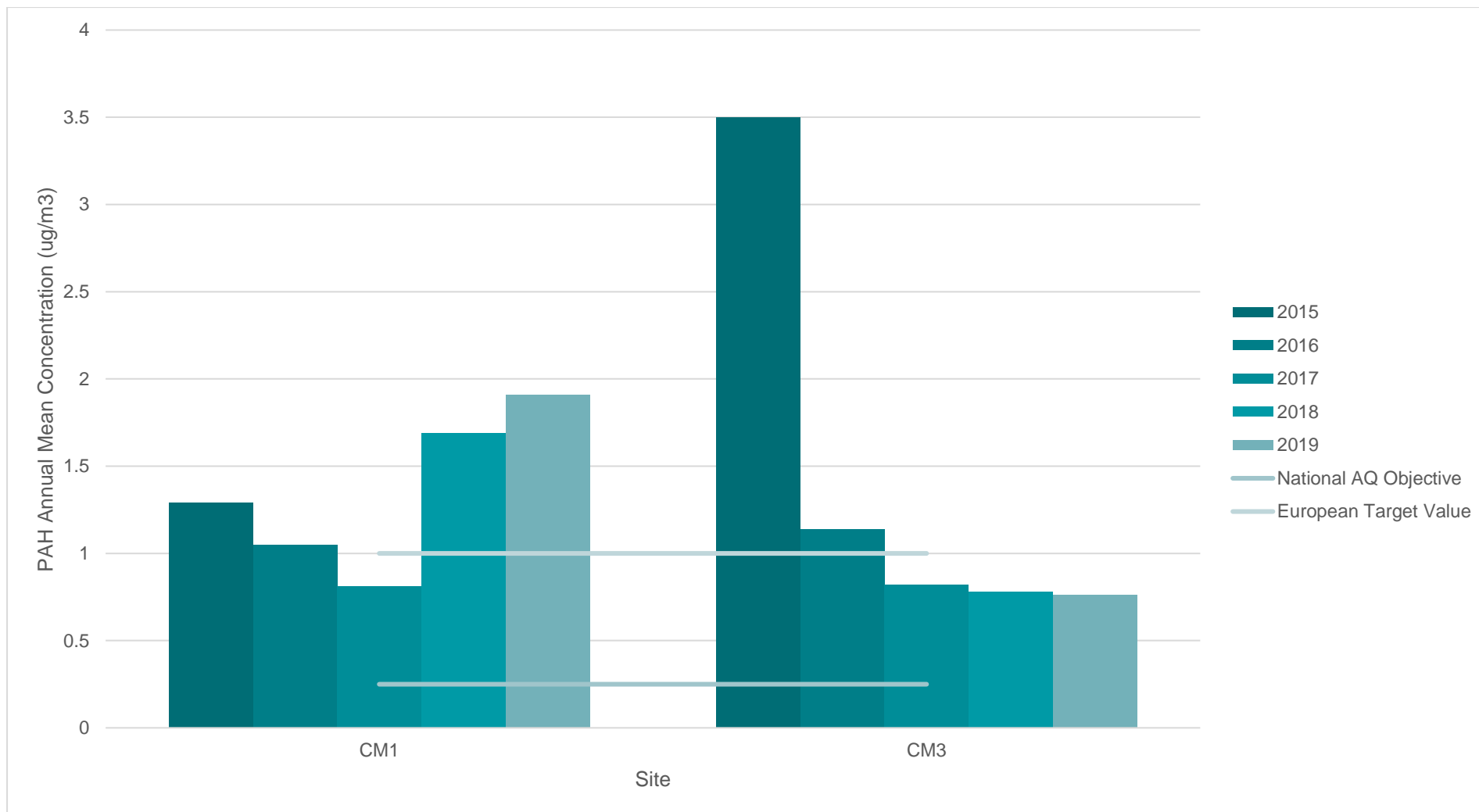
**Table A.10 - PAH (Benzo(a)pyrene (B[a]P)) Monitoring Results**

Concentration ng/m <sup>3</sup>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Time Weighted Average
Scunthorpe Town (CM1)	0.93	0.41	0.65	6	1.1	0.98	0.53	0.44	0.48	1	9.8	0.64	1.91
Low Santon (CM3)	1.2	0.83	0.53	0.085	0.65	0.36	0.38	0.8	1.1	0.76	0.54	1.9	0.76

Notes:

Exceedances of the National Air Quality Objective of 0.25 ng/m<sup>3</sup>

Exceedances of the European Community Air Quality Target value of 1ng/m<sup>3</sup>.



**Figure A.6 – Trends in PAH (Benzo(a)pyrene (B[a]P)) Monitoring Results**

**Table A.11 - Heavy Metal Monitoring Results**

Heavy Metal	Scunthorpe Town AURN (CM1) Annual Mean Concentration ng/m3	Low Santon (CM3) Annual Mean Concentration ng/m3	Target Value ng/m3
Arsenic (As)	0.858	0.783	6
Cadmium (Cd)	0.396	0.652	5
Cobalt (Co)	0.131	0.180	
Chromium (Cr)	2.75	3.86	
Copper (Cu)	5.43	4.80	
Iron (Fe)	747	1571	

Heavy Metal	Scunthorpe Town AURN (CM1) Annual Mean Concentration ng/m3	Low Santon (CM3) Annual Mean Concentration ng/m3	Target Value ng/m3
Manganese (Mn)	24	76	
Nickel (Ni)	1.08	1.27	20
Lead (Pb)	13.8	15.7	500
Selenium (Se)	1.03	1.20	
Vanadium (V)	1.70	7.94	
Zinc (Zn)	28.4	26.2	

## Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO<sub>2</sub> Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.58) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
DT1	489099	411723	10.0	42.5	21.3	25.7		29.0		21.7	29.6	41.7	50.1	42.3	31	21	19.6
DT2	487239	411259	43.2	43.0	36.4	34.5	28.6	31.5	30.6	31.4	31.2	38.3	45.8	32.3	36	24	20.3
DT3	486699	411110	38.1	38.8	28.5	17.6	16.1	18.3	20.3	26.6	23.0	28.4	34.3	34.7	27	18	29.6
DT4	486928	411156	38.9	33.0	31.1	29.6	16.8	22.7	23.5	26.9	27.0	34.0	36.7	32.5	29	20	18.9
DT5	489190	411285	47.0	46.0	32.3	29.2	29.8	30.8	28.6	30.8	30.7	37.1	46.9	35.1	35	24	24.2
DT6	489209	411118	45.2	41.4	29.0	40.3	27.3	30.1	25.1		28.6	33.5	48.6	32.3	35	24	23.4
DT7	489172	409926	43.7		32.4	29.8	28.3	28.9	28.7	27.6	30.8	34.5	47.0	29.0	33	22	18.9
DT8	489112	409463	51.7	41.6	34.9	39.6	31.4	32.8	31.0		32.1	38.7	46.7	35.0	38	26	19.7
DT9	491628	408658	43.6	35.8	26.8	30.8	22.3	22.2	20.8	19.3	22.9	30.3	43.5	30.5	29	20	17.0
DT10	491838	408641	56.1		43.9	46.8	47.5	50.1	47.4	47.4	46.2	55.6	61.3	46.8	50	34	31.1
DT11	491859	408645	37.3	34.7	24.5	29.9	26.8	26.7	25.4	30.7	26.6	31.2	39.0	26.5	30	20	28.7

DT12	499975	407421	38.0	35.0	31.8	26.3	25.0	24.8	23.9	26.1	26.6	30.4	38.8	29.6	30	20	18.3
DT13	514573	415901	35.9	34.7	24.8	25.7	18.4	17.9	16.2	20.7	16.8	24.5	25.2	30.6	24	17	16.0
DT14	514782	415971	48.4	49.5	37.6	52.5	39.3	40.5	33.6	35.9		40.8	50.1	34.7	42	29	20.1
DT15	515452	416107	37.2	21.4	26.5	32.1	24.7	29.3	23.7	21.2	20.7	22.3	34.5	16.2	26	18	25.2
DT16	515279	416085	51.6	40.9	41.1	32.7	33.1	34.4	30.9	31.3	30.7	34.9	47.9	28.2	37	25	22.2
DT17	503048	421907	38.0	29.7	27.7	33.3	26.0	26.1	26.1	23.3	27.3	34.6	44.6	29.3	31	21	16.6
DT18	490316	410837	22.7	26.2	19.8	27.2	14.5	16.7	15.0	15.9	18.4	24.4	40.2	25.5	22	15	16.3
DT19	490316	410837	35.2	25.3	19.9	26.3	15.5	16.7	15.0	14.9	17.8	23.6	37.5	21.8	23	15	16.3
DT20	490316	410837	24.1	28.7	22.2	25.2	15.5	15.5	15.8	14.2	17.8	24.5	37.9	21.9	22	15	16.3
DT21	490080	411258	36.1	36.1	29.3	41.8	25.1	25.7	27.0	25.8	26.7	33.8	48.0	31.3	32	22	20.5
DT22	514141	417483	44.4	39.8	39.0	30.3	20.5	21.2	21.7	26.8	24.6	34.9	43.6	26.8	31	21	18.4

Local bias adjustment factor used

Annualisation has been conducted where data capture is <75%

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

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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

## Diffusion Tube Bias Adjustment Factor

North Lincolnshire Council currently uses Socotec (Didcot) for both supply and analysis of its Nitrogen Dioxide Diffusion Tubes. The tubes are prepared by spiking acetone:triethanolamine (50:50) onto the grids prior to the tubes being assembled. The overall 2019 bias correction factor from the national diffusion tube bias adjustment factor spreadsheet for SOCOTEC Didcot [preparation method 50% TEA in acetone] from 24 studies was 0.75. This is the suggested figure to use for all site types in the absence of any local collocation data.

North Lincolnshire Council had one co location study site in 2019, at CM1: Scunthorpe Town an industrial site:

Site	Analyser Annual Mean	Tube Annual Means	Bias Adjustment Factor
CM1: Scunthorpe Town AURN	15	22	0.68

The decision to use a Bias Adjustment Factor generated from our own co location study was reached due to the complexity of the issues within North Lincolnshire. As the AQMA's declared within North Lincolnshire are predominantly industry related, it was felt that using an average of other authority figures would be unsuitable. Although the tube network is spread over a wide area of North Lincolnshire, the tubes are situated in relatively similar situations, all at the same height and if the tubes are not co-located most are held on roadside lamp posts. This study has been ongoing since 2006 and has presented different adjustment factors each year. We have confidence within our AURN continuous monitor at this location due to its strict calibration programme and ratification procedures undertaken by Ricardo.



## Checking Precision and Accuracy of Triplicate Tubes

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	10/01/2019	05/02/2019	22.7	35.2	24.1	27	6.8	25	17.0
2	05/02/2019	06/03/2019	26.2	25.3	28.7	27	1.8	7	4.4
3	06/03/2019	04/04/2019	19.8	19.9	22.2	21	1.4	7	3.4
4	04/04/2019	01/05/2019	27.2	26.3	25.2	26	1.0	4	2.5
5	01/05/2019	05/06/2019	14.5	15.5	15.5	15	0.6	4	1.4
6	05/06/2019	03/07/2019	16.7	16.7	15.5	16	0.7	4	1.7
7	03/07/2019	07/08/2019	15.0	15.0	15.8	15	0.5	3	1.1
8	07/08/2019	04/09/2019	15.9	14.9	14.2	15	0.9	6	2.1
9	04/09/2019	30/09/2019	18.4	17.8	17.8	18	0.3	2	0.9
10	30/09/2019	04/11/2019	24.4	23.6	24.5	24	0.5	2	1.2
11	04/11/2019	05/12/2019	40.2	37.5	37.9	39	1.5	4	3.6
12	05/12/2019	08/01/2020	25.5	21.8	21.9	23	2.1	9	5.2
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	24.6	Poor Precision	Good
2	20.2	Good	Good
3	14.1	Good	Good
4	15.5	Good	Good
5	10	Good	Good
6	10	Good	Good
7	9	Good	Good
8	8	Good	Good
9	11	Good	Good
10	16	Good	Good
11	24.1	Good	Good
12	17.3	Good	Good

Overall survey -->

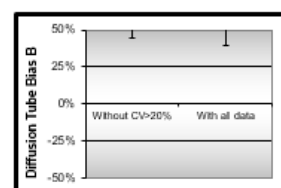
Good precision Good Overall  
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Scunthorpe Town

Accuracy (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.65 (0.61 - 0.7)
Bias B	53% (42% - 64%)
Diffusion Tubes Mean:	22 $\mu\text{gm}^{-3}$
Mean CV (Precision):	5
Automatic Mean:	14 $\mu\text{gm}^{-3}$
Data Capture for periods used:	97%
Adjusted Tubes Mean:	14 (13 - 15) $\mu\text{gm}^{-3}$

Precision 11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.68 (0.62 - 0.74)
Bias B	48% (34% - 61%)
Diffusion Tubes Mean:	22 $\mu\text{gm}^{-3}$
Mean CV (Precision):	6
Automatic Mean:	15 $\mu\text{gm}^{-3}$
Data Capture for periods used:	97%
Adjusted Tubes Mean:	15 (14 - 16) $\mu\text{gm}^{-3}$



Jaume Targa, for AEA  
Version 04 - February 2011

## Diffusion Tube Annualisation

All diffusion tube data capture rates exceeded the 75% threshold and therefore no annualisation was required.

## Diffusion Tube Distance Correction

The vast majority of North Lincolnshire Councils diffusion tubes are located at either kerbside or roadside locations on street furniture such as lampposts. As the annual average objective for NO<sub>2</sub> applies at receptor façade (see Box 1.1 of LAQM.TG(16)), a distance correction methodology as outlined within paragraphs 7.77 to 7.79 of LAQM.TG (16), to account for relevant exposure has been used. With this in mind, the Defra calculator from the LAQM website has been used (<http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>). This methodology requires local NO<sub>2</sub> background concentrations to calculate the falloff, DEFRA's 1 km<sup>2</sup> grid squares have been used for this purpose (Defra background maps <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>).

## PM<sub>10</sub> Monitoring Adjustment

PM<sub>10</sub> measurements from the TEOM instruments are corrected by the Volatile Correction Model (VCM) <http://www.volatile-correction-model.info> as required by the Technical Guidance LAQM (TG16). This corrects for the loss of volatile components of particulate matter that occur due to the high sampling temperatures employed by this instrument. The resulting corrected measurements have been demonstrated as equivalent to the gravimetric reference equivalent. The VCM works by using the volatile particulate matter measurements provided by nearby FDMS instruments (within 130 km) to assess the loss of PM<sub>10</sub> from the TEOM; this value is then added back onto the TEOM measurements. The VCM model used measurements from nearby FDMS instruments (e.g. Scunthorpe Town AURN, Hull Holderness Road AURN and Santon) and other sites within range.

## QA/QC of Automatic Monitoring

Air Quality Data Management (AQDM) performed the QA/QC on the measurements. Each of the gas analysers is calibrated every 2 weeks. The TEOMs were visited at the same frequency, with the filter changed whenever required. All the instruments are audited every 6-months by NPL who are UKAS accredited to AURN standards and serviced every 6 months by Enviro Technology Services Ltd.

Below are the details of the QA/QC procedures which has been provided by AQDM:

### QA/QC of Automatic Air Quality Instruments Use

Air quality measurements from automatic instruments are validated and ratified to the standards described in the Local Air Quality Management – Technical Guidance LAQM TG(16): <http://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf> by Air Quality Data Management (AQDM) <http://www.aqdm.co.uk>

Staff at North Lincolnshire Council attend the site at frequent intervals and follow procedures as set out by the manufacturers in the instrument operating manuals.

### Validation

This process operates on data during the data collection stage. All data is continually screened algorithmically and manually for anomalies. There are several techniques

designed to discover spurious and unusual measurements within a very large dataset. These anomalies may be due to equipment failure, human error, power failures, interference or other disturbances. Automatic screening can only safely identify spurious results that need further manual investigation.

Raw data from the gaseous instruments (e.g. NO<sub>x</sub>, O<sub>3</sub>, SO<sub>2</sub> and CO) are scaled into concentrations using the latest values derived from the manual and automatic calibrations. These instruments are not absolute and suffer drifts. Both the zero baseline (background) and the sensitivity change with time. Regular calibrations with certified gas standards are used to measure the zero and sensitivity. However, these are only valid for the moment of the calibration since the instrument will continue to drift. Raw measurements from particulate instruments (e.g. PM<sub>10</sub> and PM<sub>2.5</sub>) generally do not require scaling into concentrations. The original raw data are always preserved intact while the processed data are dynamically scaled and edited.

### Ratification

This is the process that finalises the data to produce the measurements suitable for reporting. All available information is critically assessed so that the best data scaling is applied and all anomalies are appropriately edited. Generally, this operates at three, six or twelve month intervals. However, unexpected faults can be identified during the instrument routine services or independent audits which are often at 6-monthly intervals. In practice, therefore, the data can only be fully ratified in 12-month or annual periods. The data processing performed during the three and six monthly cycles helps build a reliable dataset that is finalised at the end of the year.

There is a diverse range of additional information that can be essential to the correct understanding and editing of data anomalies. These may include:

- the correct scaling of data
- ignoring calibrations that were poor e.g. a spent zero scrubber
- closely tracking rapid drifts or eliminating the data
- comparing the measurements with other pollutants and nearby sites
- corrections due to span cylinder drift
- corrections due to flow drifts for the particulate instruments

- corrections for ozone instrument sensitivity drifts
- eliminating measurements for NO<sub>2</sub> conversion inefficiencies
- eliminating periods where calibration gas is in the ambient dataset
- identifying periods where instruments are warming-up after a power cut and identification of anomalies due to mains power spikes
- correcting problems with the date and time stamp
- observations made during the sites visits and services

The identification of data anomalies, the proper understanding of the effects and the application of appropriate corrections requires expertise gained over many years of operational experience. Instruments and infrastructure can fail in numerous ways that significantly and visually affect the quality of the measurements. There are rarely simple faults that can be discovered by computer algorithms or can be understood without previous experience.

The PM<sub>10</sub> and PM<sub>2.5</sub> concentrations may require scaling into Gravimetric Equivalent concentration units by use of the Volatile Correction Model (VCM) <http://www.volatile-correction-model.info> or by corrections published by Defra <https://uk-air.defra.gov.uk/networks/monitoring-methods?view=mcerts-scheme> depending in the measurement technique.

Further information about air quality data management, expert data ratification and examples of bad practices are given on the Air Quality Data Management (AQDM) website <http://www.aqdm.co.uk>.

## **Annualising of PM<sub>10</sub> Data for site CM8**

### **PM<sub>10</sub> Annual Mean Objective**

Site CM8 was removed on the 28<sup>th</sup> March 2019 due to continued compliance with Air Quality Objectives and financial constraints on the local authority. The period of valid data capture was therefore less than the desired 85%.

As a result, the data was annualised in accordance with the methodology outlined in LAQM TG-16. Two continuous monitoring sites with data collection over 85% were used, these are detailed in the table below. These were used to work out the average ratio between the two. Using the ratio of the annual mean to the period mean (January – March). Then the average ratio of these were used to annualise the data for the annual PM<sub>10</sub> results.

Site	Annual Mean (Am)	Period Mean (Pm)	Ratio (Am/Pm)
Hull Holderness Road AURN	21	26	0.807
Scunthorpe Town AURN	20	20	1
Average Ratio (Ra)			1.404

With this in mind the following annualisation was applied to site CM8.

CM8: Period mean (M) x Average Ratio (Ra)

$M \times Ra = 22 \times 1.404$

Annual Mean for CM8 = 30.8ug/m<sup>3</sup>

### PM<sub>10</sub> 24-Hour Mean Objective

Site CM8 was removed on 28<sup>th</sup> March 2019 due to continued compliance with Air Quality Objectives and financial constraints on the local authority. The period of valid data capture was therefore less than the desired 85%.

To annualise the data the method outlined in LAQM TG-16 was used. The data capture for these sites was under the required 85% as mentioned above. The 90.4<sup>th</sup> percentile should be reported. This was calculated using the following method, the available 24 hour mean data was in Column B of an Excel spreadsheet, then the Excel formula =PERCENTILE(B:B,0.904) was used to produce the 24-Hour Mean >50mg/m<sup>3</sup> result. This was then used to produce the below table:

Site	90.4 <sup>th</sup> percentile
CM8	39

### Annualising of PM<sub>2.5</sub> Data for site CM8

Site CM8 was removed on the 28<sup>th</sup> March 2019 due to continued compliance with Air Quality Objectives and financial constraints on the local authority. The period of valid data capture was therefore less than the desired 75%.

As a result, the data was annualised in accordance with the methodology outlined in LAQM TG-16. Two continuous monitoring sites with data collection over 85% were used, these are detailed in the table below. These were used to work out the average ratio between the two. Using the ratio of the annual mean to the period mean (January – March). Then the average ratio of these were used to annualise the data for the annual PM<sub>10</sub> results.

Site	Annual Mean (Am)	Period Mean (Pm)	Ratio (Am/Pm)
East Common Lane	7	8.01	0.87
South Ferriby	9	10.92	0.82
Average Ratio (Ra)			0.85

With this in mind the following annualisation was applied to site CM8.

CM8: Period mean (M) x Average Ratio (Ra)

$$M \times Ra = 8 \times 0.85$$

Annual Mean for CM8 = 6.8ug/m<sup>3</sup>

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

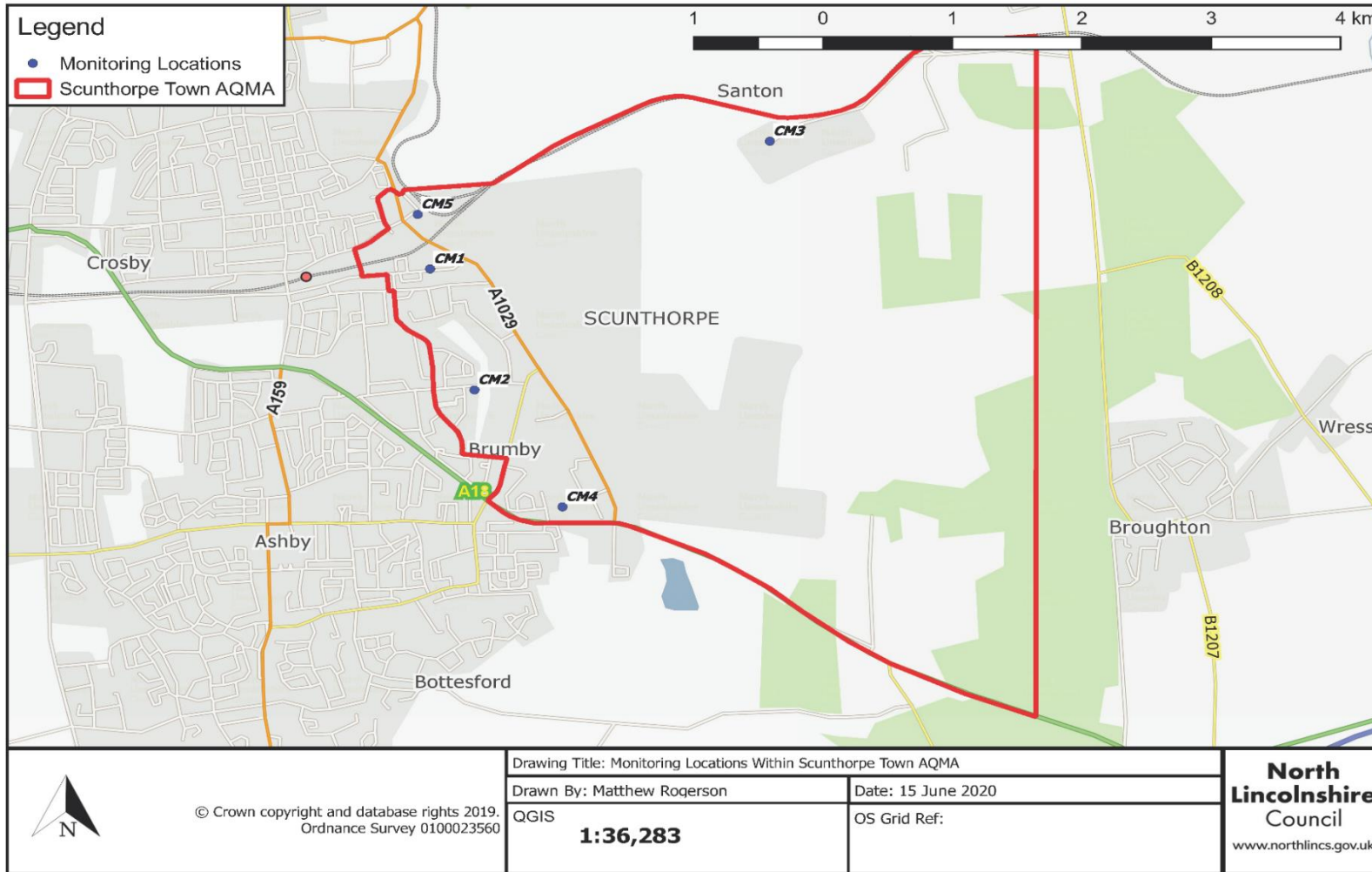
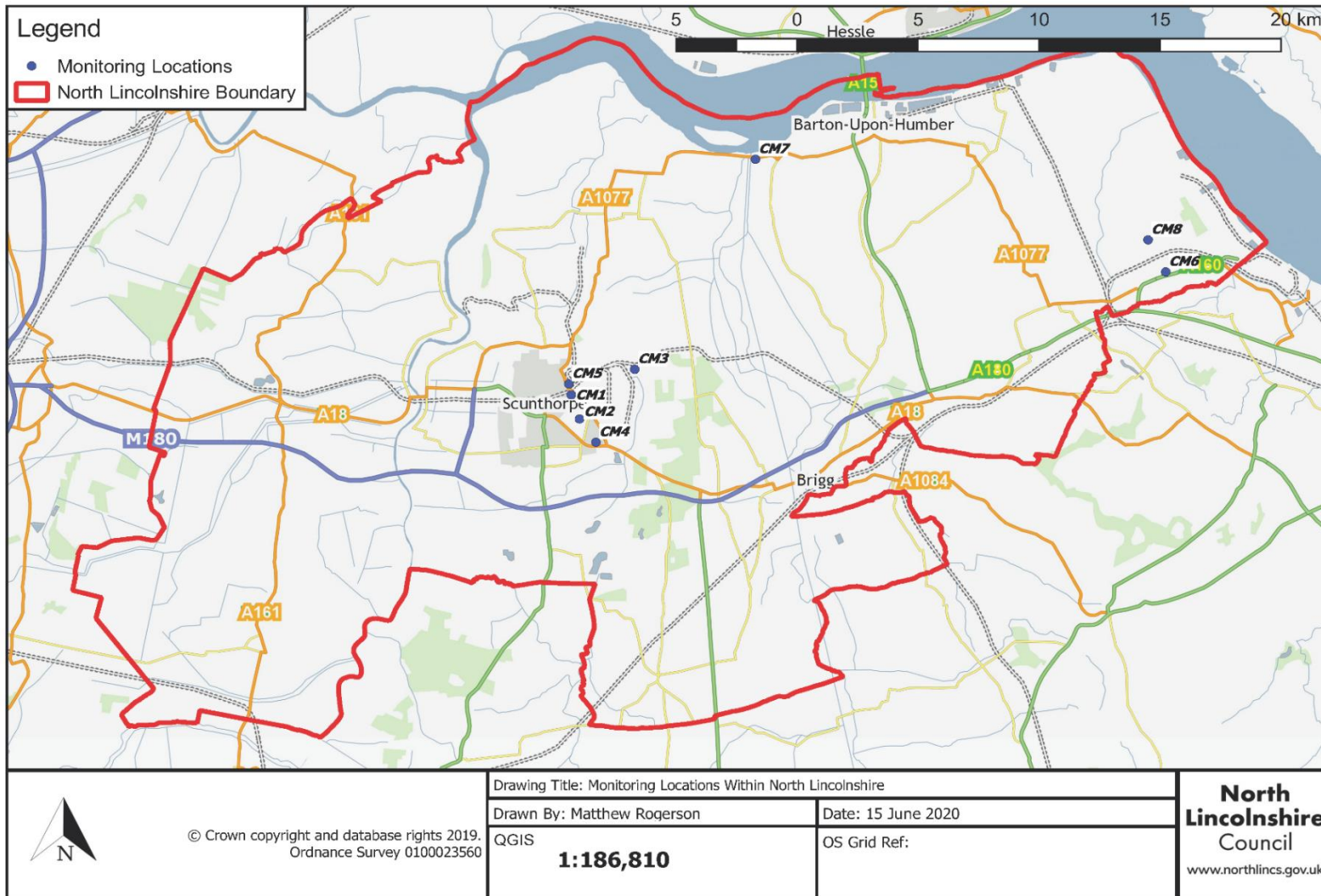


Figure D.1 – Monitoring locations within the Scunthorpe Town AQMA



**Figure D.2 - Monitoring locations within North Lincolnshire**



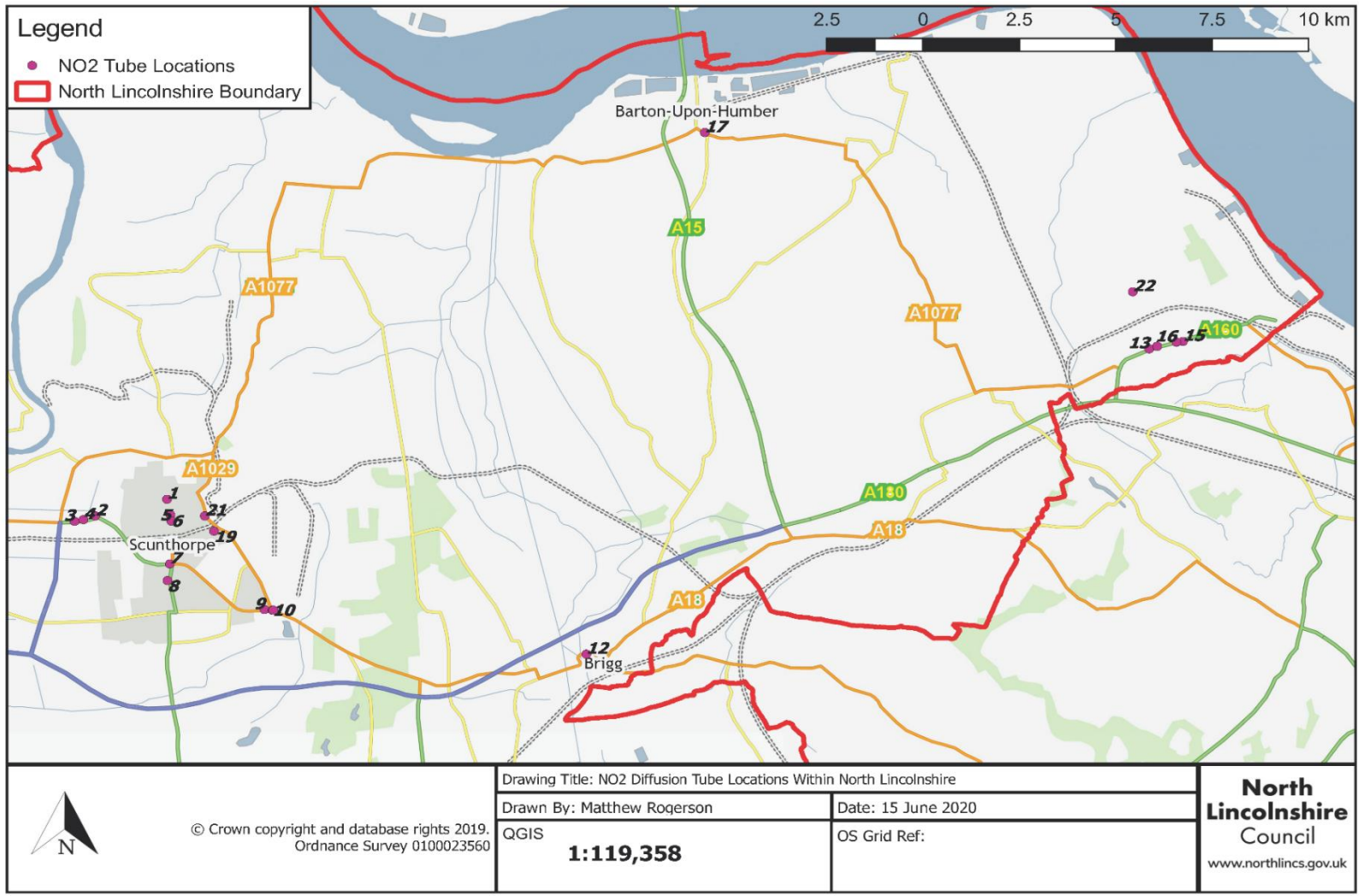


Figure D.3 - Diffusion tube monitoring locations within North Lincolnshire

## Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective <sup>6</sup>	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

## Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs

<sup>6</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide
TEOM	Tapered Element Oscillating Microbalance
UK	The United Kingdom
VCM	Volatile Correction Model – A method used to correct TEOM PM10 monitoring data

## References

- DEFRA Local Air Quality Management Technical Guidance (TG16)
- DEFRA Local Air Quality Management Policy Guidance (PG16)