



2018 Air Quality Annual Status Report (ASR)

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

June 2018

Local Authority Officer	Annie Ward
Department	Environmental Health (Commercial)
Address	Church Square House, Scunthorpe
Telephone	01724 297611
E-mail	annie.ward@northlincs.gov.uk
Report Reference number	ASR 2018 – FINAL
Date	June 2018

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 also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

The principle town within North Lincolnshire, Scunthorpe, is home to an Integrated Iron and Steel Works, employing over 4000 people directly and supports over 2000 jobs in contractor companies. The site covers over 2400 acres and is located directly to the East of the town of Scunthorpe. Emissions of PM₁₀ (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, for example: 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. Monitoring data shows that the level of PM₁₀ and PAH (Polycyclic Aromatic Hydrocarbons) has reduced.

Recent improvements in the level of PM₁₀ are analysed in detail in the Detailed Assessment of the Scunthorpe PM₁₀ Air Quality Management Area 2016 Report. This

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

led to the revocation of the Low Santon Air Quality Management Area (declared for exceedances of Annual PM₁₀) and the amendment of the Scunthorpe Town Air Quality Management Area (declared for exceedances of Daily PM₁₀) in March 2018. 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>.

Levels of PAH continue to exceed the UK Objective (0.25ng/m³), however the European Community Target Value (1ng/m³) has been complied with. A significant decline in PAH concentrations has been recorded in 2017 due to the closure of the Dawes Lane Coke Ovens in March 2016 and improvements to the Appleby Coke Ovens. These improvements have been brought about via collaborative working and financial investment of industry. Compliance with PAH limits is not the responsibility of local authorities and is overseen by Defra. More information can be obtained on the PAH National Network on the following link: <https://uk-air.defra.gov.uk/networks/network-info?view=pah>. North Lincolnshire Council continues to analyse data and support improvement measures that will benefit local residents as part of this National Network of monitoring PAH's.

The Council continues to monitor airborne pollutants at a number of locations throughout North Lincolnshire both for the Local Air Quality Management regime and for National Networks. These pollutants include sulphur dioxide (SO₂), nitrogen dioxide (NO₂), PM₁₀ (particulate matter with a diameter of 10 microns or less), PM_{2.5} (particulate matter with a diameter of 2.5 microns or less), heavy metals (HM), polycyclic aromatic hydrocarbons (PAH) and benzene.

Actions to Improve Air Quality

In 2016 a comprehensive review of the two AQMAs was undertaken to establish if it was appropriate to retain them, and if so, whether the boundary was appropriate. The review involved the analysis of a number of years data from all of the particulate monitors. This review forms the basis of the Detailed Assessment of the Scunthorpe PM₁₀ Air Quality Management Area 2016 report.

The PM₁₀ 24-hour mean objective is not being breached in all the areas within the Scunthorpe Air Quality Management Area (AQMA) boundary. In March 2018, the boundary of this AQMA was formally amended in geographical area which resulted in the removal of approximately 5,000 residential properties from within the AQMA.

The PM₁₀ annual mean objective is no longer being breached at Low Santon and this AQMA was formally revoked in March 2018.

The decision to amend the Scunthorpe Town AQMA and revoke the Low Santon AQMA was made possible by the continued work of the Council, Industry, Health Professionals and the Environment Agency to initiate improvement actions and to share best practice.

The Council applied for the DEFRA Grant Funding for the Air Quality Grant 2017-18. The Council's bid included the provision to upgrade existing air quality monitoring equipment, a public engagement campaign for PM_{2.5} 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.

In 2016 the Council continued to work closely with Industry, Health Professionals and the Environment Agency to initiate improvement actions 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 there has been one breach of the PM₁₀ 24 hour air quality objective in 2017. This was at Low Santon which is inside the AQMA declared

for exceedances of the PM₁₀ 24 hour air quality objective. All other air quality objectives were complied with.

The air quality monitoring instrument at Low Santon (FDMS Filter Dynamics Measurement System) has not recorded a breach of the PM₁₀ 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 has therefore been revoked.

Despite there being only one exceedance of the PM₁₀ 24-hour mean objective in 2017, some areas still experience high concentrations of this pollutant. This include the area immediately around the Scunthorpe Integrated Steelworks site including Low Santon and the East Common Lane area to the West of the site. Some of the monitoring locations within the Scunthorpe Town AQMA are not likely to breach this objective and have demonstrated continued compliance and have therefore been removed from this AQMA. This includes monitoring sites at Redbourn Club, Appleby and Lakeside. This revision of the boundary and reduction in size of the AQMA has resulted in the removal of around 5,000 residential properties.

The Council's PM_{2.5} monitors did not record a breach of the EU (European Union) annual mean objective, however further monitoring at locations most affected by PM₁₀ would be beneficial.

North Lincolnshire continues to record some of the highest levels of PAH's in the United Kingdom, although significant improvements have been made on the annual concentrations of this pollutant. The closure of the Dawes Lane Coke Ovens and improvements at Appleby Coke Ovens has reduced the levels of PAH's in the area significantly. It is also 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:

- 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 up wind of these South Westerly winds. Particulate emissions therefore mostly affect the Santon area. 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. This relies to some extent upon management practices which can be difficult to control and monitor.

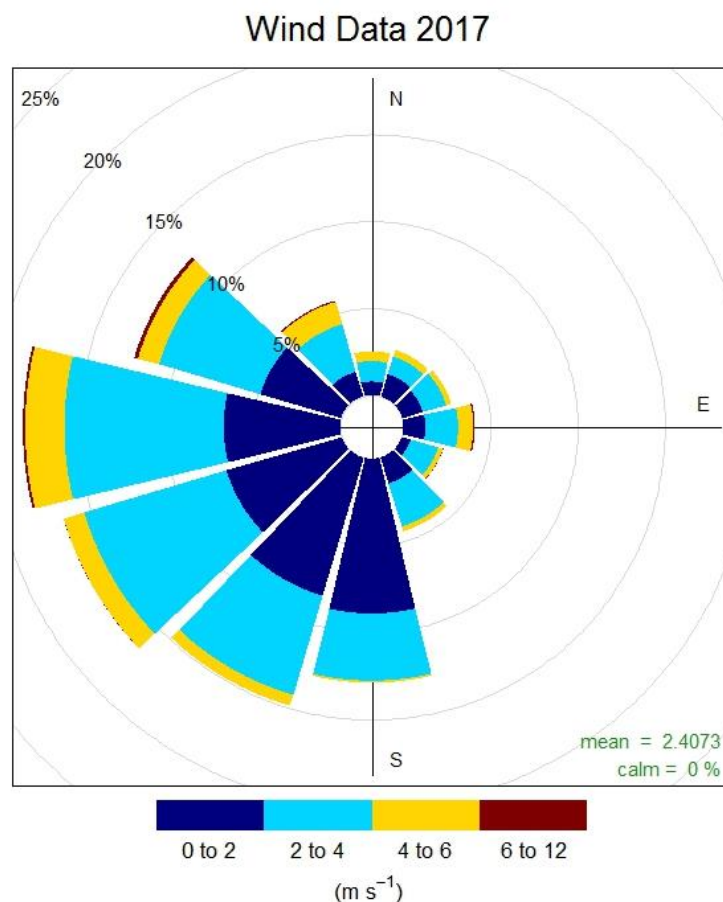


Figure 1: Wind direction and velocity for 2017

- 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. This collaborative working is ongoing via the councils Air Quality Action Plan and is an essential mechanism to bring about improvements.

- The majority of the site is regulated by the Environment Agency rather than the Council. The Council therefore has minimal regulatory control over these local businesses. As stated above collaborative working helps towards addressing this constraint.
- The Council has little or no regulatory control over the monitoring and reduction of PAH 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 emissions.

The Council's priorities for 2018 and beyond include:

- Continued operation of the air quality network and website, with associated data analysis and ratification
- Working closely with Industry, Stakeholders and the Environment Agency to gain air quality improvements for local residents
- Update the Air Quality Action Plan to include new initiatives
- 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 to upgrade the council's air quality monitoring network within the AQMA.

Local Engagement and How to get Involved

Further information can be obtained from the air quality pages of North Lincolnshire Council's main website <http://www.northlincs.gov.uk/> or from North Lincolnshire Councils dedicated air quality website <http://www.nlincsair.info/>.

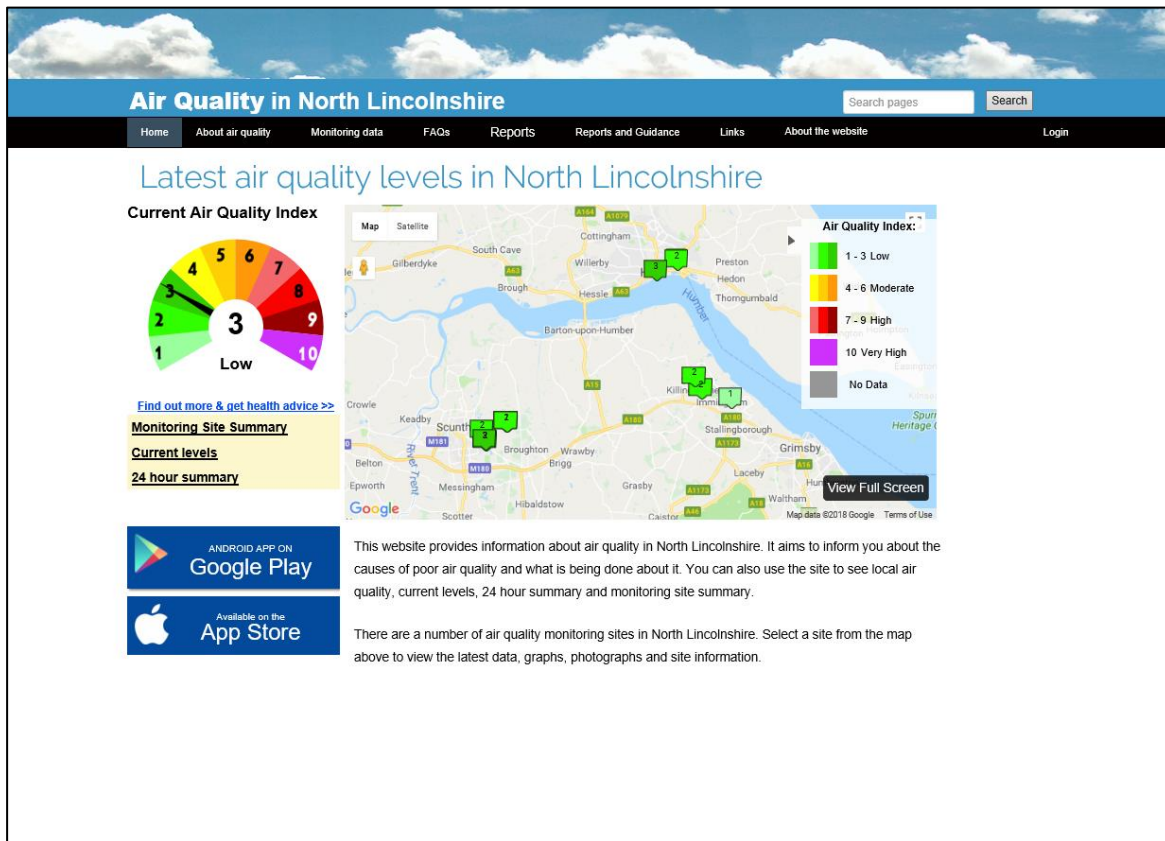


Figure 2: North Lincolnshire Council Air Quality Website

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

Telephone: 01724 297000

Members of the public can help improve air quality by implementing any of the following measures.

Transport

- Where possible avoid using a car for short journeys. Alternatives such as walking, cycling or public transport are better for the environment and local air quality. This is because the car engine and catalysts do not reach optimal operating temperatures and their performance is reduced.

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- Vehicle idling also contributes to air pollution. Avoid idling to warm up your engine and if it is safe to do so, switch off your engine in traffic that is likely to be stationary for long periods.
- The manner in which you drive can also have an impact on local air pollution. Rapid acceleration and deceleration increases air pollution and poor fuel consumption. It is also acknowledged that driving faster than 55mph increases fuel consumption and air pollution.

At Home

- Simple measures such as reducing heating in your home and buying low energy light bulbs contribute to energy efficiency.
- Other measures such as avoiding bonfires when pollution levels are high and avoiding the use of poorly maintained petrol lawnmowers which can contribute to local air pollution.

Concerns about industrial emissions including dust, smoke and fumes should be reported to North Lincolnshire Council for further investigation.

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1 Local Air Quality Management

This report provides an overview of air quality in North Lincolnshire during 2017. 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 current 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 see full list at <http://uk-air.defra.gov.uk/aqma/list>.

The Council revoked the Low Santon AQMA for PM₁₀ 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 PM₁₀ daily 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 PM₁₀ Air Quality Management Area 2016 report.

Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

Table 2.1 – Declared Air Quality Management Areas

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	PM10 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	http://www.nlincsair.info/home/text/358

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

DEFRA's appraisal also concluded that the Low Santon AQMA should be revoked and the boundary of the Scunthorpe Town AQMA should be amended. This action was completed in March 2018 with a Revocation and Amendment Order formally authorised.

The final comment highlighted the need to update the Air Quality Action Plan (AQAP) to include new initiatives and should take account of the amendment to the boundary of the AQMA to focus on measures that will reduce the local populations exposure to particulate matter. Given that the Amendment Order was only formally authorised in March 2018, the publishing of an updated AQAP is still ongoing. The process of updating the Action Plan is underway and internal and external Steering Groups met in early June 2018.

North Lincolnshire Council has taken forward a number of direct measures during the current reporting year of 2017 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. Key completed measures are:

- Air quality monitoring sites have been upgraded, along with provision made for future network expansion
- The installation of updated modems and sim cards at several sites to enhance data management services and maintain the current network
- The Air Quality Website contract has been extended to ensure sufficient data management, ratification and reporting services

- The Air Quality Service Contract has been extended to ensure sufficient data capture and prompt call outs if required
- Air pollution forecasting and exceedance reporting continues to be used to inform the actions and activities of operators on the Integrated Steelworks site
- The Council continue to investigate complaints relating to emissions including dust and smoke and enforce as appropriate
- The Strategic Air Quality AQMA Meetings and Local Industry Forum Meetings continue to be held, with participation from stakeholders
- Environmental Permits are enforced and reviewed as appropriate
- Development within or affecting the AQMAs continues to be reviewed
- The Local Transport Plan continues to be implemented

Actions and improvements undertaken by site operators are discussed in detail in the Detailed Assessment of the Scunthorpe PM₁₀ Air Quality Management Area 2016 Report. This report recommends that, due to an improvement in the level of PM₁₀ at Low Santon, the annual mean AQMA should be revoked, thus making this Action Plan complete.

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; these are therefore 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.

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

- Continue to operate the air quality network and make data available to the public, regulators and industry to inform and update

- To analyse the data to target areas for improvement
- To actively engage with industry and regulators to seek improvements
- Provide comments and input in relation to air quality and proposed development for the revised Local Plan
- Undertake a cost benefit analysis of source apportionment and on site monitoring of fugitive dust emissions in relation to the Scunthorpe Steelworks
- Review the current road sweeping and gully cleaning schedule in relation to the Scunthorpe AQMA

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

North Lincolnshire Council's priorities for the coming year are to review and update the Air Quality Action Plan to enable a targeted approach for local air quality improvements. This process is already underway and internal and external Steering Groups met in early June 2018.

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

- The wind direction is predominantly from the South West direction, these winds impact directly upon local residents in Santon as the Integrated Steel Works is located up wind 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 site is regulated by the Environment Agency rather than the Council. The council therefore has minimal regulatory control over these local businesses.
- The Council has little or no regulatory control over the monitoring and reduction of PAH 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 at Appleby Coke Ovens has however seen a reduction of PAH emissions.

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	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
A1	Maintain network of PM ₁₀ analysers	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	NLC	Implemented	Implemented			Ongoing	To Continue	The network maintains focus on issues and enables the Council measure the effectiveness of air schemes. Sites are located and upgraded as appropriate.
A2	Boundary monitoring of PM ₁₀ , PM _{2.5} , PM ₁ and Total Suspended Particles at Permitted sites AQMA	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	NLC	Implemented	Implemented			Complete	Complete	This monitoring, completed in 2017, allowed greater analysis and identification of sources. Subsequent improvements in the level of PM ₁₀ at Santon are largely due to action taken as a result of this monitoring exercise.
				EA							
A3	Traffic count and visual observations at Santon to assess likely contribution from re-suspended road dust.	Traffic Management	Other	NLC	Implemented	Implemented			Complete	Complete	

A4	PPC Permit Improvement Programme. British Steel to undertake an investigation to monitor and quantify point source and fugitive particulate matter including PM ₁₀ and PM _{2.5} 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	British Steel EA	Implemented	Implemented			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	NLC	Implemented	Implemented			Complete	Complete	The Partisol monitor was removed in December 2014. There are no current plans to use this monitor again

A6	PPC 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	British Steel	Implemented	Implemented			Complete	Complete	
A7	PPC 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	EA	Implemented	Implemented			Complete	Complete	

A8	PPC 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	British Steel	Implemented	Implemented			Complete	Complete	
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				EA							
B1	<p>Launch and maintain North Lincolnshire air quality website with:</p> <ul style="list-style-type: none"> • Access to real time & historical data, • Production of graphs and pollution roses 	Public Information	Via the Internet	NLC	Implemented	Implemented			Ongoing	To continue	The council has operated a dedicated air quality website since 2008, a new contract has been awarded to ensure it continues

	<ul style="list-style-type: none"> • Access to air quality reports and latest news updates 										
	<ul style="list-style-type: none"> • General information 										
B2	Review existing methods of communication of real time data to the public and consider alternatives to internet access.	Public Information	Other	NLC	Implemented	Implemented			Complete	Complete	Internet remains the preferred communication method for air quality information
B3	Investigate the potential for air pollution forecasting in Scunthorpe	Environmental Permits	Other measure through permit systems and economic instruments	NLC	Implemented	Implemented			Ongoing	To continue	Pollution forecasting is undertaken by operators on the integrated steelworks site. Currently there are no plans for this to be extended to 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	NLC	Implemented	Implemented			Ongoing	To continue	Issue-specific campaigns have previously been undertaken using internet, local press and council publications. Further campaigns should be developed as appropriate.

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C1	Raise profile & encourage attendance at organised community bonfire celebrations rather than individual bonfires	Public Information	Other	NLC	Implemented	Implemented			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	NLC	Implemented	Implemented			Complete	Complete	The Council has produced a leaflet and delivered it to businesses, including all within the Scunthorpe AQMA.
C3	Complaints in respect of dust and smoke from commercial premises (not regulated under IPPC regime) will be investigated as a priority and enforcement action taken in accordance with the enforcement policy.	Policy Guidance and Development Control	Other policy	NLC	Implemented	Implemented			Ongoing	To continue	Enforcement action is taken against those contravening legislation

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	NLC	Implemented	Implemented			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	NLC	Implemented	Implemented			Ongoing	To continue	A publicity campaign was launched authority-wide in 2008. This information is currently available on the council's internet site and residents are advised as required.

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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	NLC	Implemented	Implemented			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	<table border="1"> <tr><td data-bbox="795 547 965 592">NLC</td></tr> <tr><td data-bbox="795 592 965 636">HPA</td></tr> <tr><td data-bbox="795 636 965 681">PCT</td></tr> <tr><td data-bbox="795 681 965 1303">EA</td></tr> </table>	NLC	HPA	PCT	EA	Implemented	Implemented			Ongoing	To continue	
NLC															
HPA															
PCT															
EA															

D2	Set up a Local Industry Forum involving the Environment Agency, North Lincolnshire Council and Local Industry representatives with the potential to emit PM ₁₀ . The purpose of the group is to identify key issues, agree measures for reduction of PM ₁₀	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	NLC	Implemented	Implemented			Complete	To continue		
									Ongoing			
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	NLC	Implemented	Implemented						
										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 measure through permit systems and economic instruments	NLC	Implemented	Implemented			Complete	Complete	
D5	Ensure that the requirements of the PPC permitting regime are appropriately enforced with inspections prioritised on a risk basis taking account of PM ₁₀ emissions.	Environmental Permits	Other measure through permit systems and economic instruments	NLC	Implemented	Implemented			Ongoing	To continue	

D6	Ensure permits issued under LA-IPPC are reviewed in accordance with guidance, with particular attention to processes within the AQMA with the potential to emit PM ₁₀ .	Environmental Permits	Other measure through permit systems and economic instruments	NLC	Implemented	Implemented			Ongoing	To continue			
D7	Work with local industry and EA towards the development of relevant measurable indicators of changes in significant emissions of PM ₁₀ .	Environmental Permits	Other	NLC	Implemented	Implemented			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.		
EA	Industry	D8	Work with local industry and EA to develop targets for	Environmental Permits							Other	NLC	Implemented
EA													

	the reduction of the area covered by the AQMA so that the number of properties affected will be reduced.			Industry						the Santon AQMA can be revoked and the Scunthorpe AQMA reduced in size
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<p>E1</p>	<p>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.</p>	<p>Policy Guidance and Development Control</p>	<p>Air Quality Planning and Policy Guidance</p>	<p>NLC</p>	<p>Implemented</p>	<p>Implemented</p>			<p>Ongoing</p>	<p>To continue</p>	<p>The Environmental Health (Commercial) Team reviews all planning applications. For air quality purposes, geographical zones have been identified within the Scunthorpe Town AQMA. Advice is given to applicants and Development Control colleagues based on current air quality data.</p>
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E2	Develop a Supplementary Planning Document (SPD), which identifies the constraints and mitigation to development within the Air Quality Management Area	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	NLC	Implemented	Implemented			Ongoing	2017	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.
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	NLC	Implemented	Implemented			Ongoing	To continue	The Environmental Health (Commercial) 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	NLC	Implemented	Implemented			Stopped	N/A	Implementing bus priority measures in new developments has been extremely difficult to achieve. However, we do encourage existing and potential bus services to be considered as an integral part of developments, particularly at the planning application stage.
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F3	<p>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.</p>	<p>Traffic Management</p>	<p>Strategic highway improvements</p>	<p>NLC</p>	<p>Implemented</p>	<p>Implemented</p>			<p>Ongoing</p>	<p>To continue</p>	<p>The implementation of this action is incorporated within the Council's current Local Transport Plan. Full details are available at the following website: http://www.northlincs.gov.uk/transport-and-streets/roads-highways-and-pavements/highway-documents/local-transport-plan/</p>
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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	NLC	Implemented	Implemented			Stopped	N/A	This scheme is not currently being pursued.
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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	NLC	Implemented	Implemented			Ongoing	To continue	The North Lincolnshire Road Safety Partnership was established to; Significantly reduce the number of people killed and seriously injured on roads in North Lincolnshire, raise public awareness of road safety issues, encourage safer driving behaviour.
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F6	Continued enforcement of speed limits and driving standards	Traffic Management	Other	NLC	Implemented	Implemented			Ongoing	To continue	
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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	MLC	Implemented	Implemented			Ongoing	To continue	North Lincolnshire Council and 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 latest standards and it is also a contractual obligation for school routes.
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<p>F8</p>	<p>A fleet of vehicles that are powered by LPG already operates (predominantly in waste management), we will continue to update and operate our fleet vehicles to use more environmentally friendly forms of fuel. Particulate traps on our vehicles are also used and we will continue to promote their use to reduce particulate matter</p>	<p>Vehicle Fleet Efficiency</p>	<p>Fleet efficiency and recognition schemes</p>	<p>NLC</p>	<p>N/A</p>	<p>Not Implemented</p>			<p>Stopped</p>	<p>N/A</p>	<p>NLC does not operate any LPG fuelled vehicles and there are no plans to introduce any. Particulate traps are also now not required due to the advances made in engine technology and the current Euro VI class engines. The Council used to retrospectively fit these to large goods vehicles when the exhaust PM₁₀ emissions were at 0.15 - 0.02 g/kWh Since the introduction of EURO IV PM₁₀ emissions have reduced to 0.02 g/kWh on the production line. This information will be added to the final report.</p>
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<p>F9</p>	<p>The council will aim to:</p> <ul style="list-style-type: none"> • Reduce traffic flows through promotion of sustainable travel and demand management measures • Reduce transport related emissions by reducing traffic flows and making more efficient use of the network 	<p>Traffic Management</p>	<p>UTC, Congestion management, traffic reduction</p>	<p>NLC</p>	<p>Implemented</p>	<p>Implemented</p>			<p>Ongoing</p>	<p>To continue</p>	<p>The implementation of this action is incorporated within the Council's current Local Transport Plan.</p>
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2.3 PM_{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations

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

Due to the proportion of PM_{2.5} contained within PM₁₀, any initiatives to address PM₁₀ will have a corresponding effect on the reduction of PM_{2.5}. North Lincolnshire Council is taking the following measures to address PM_{2.5}:

- Maintaining a network of particulate analysers, including monitoring of PM_{2.5} at two locations across North Lincolnshire including South Ferriby 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

Operators on the Integrated Steelworks site actively participate in a number of measures that would reduce particulate emissions, including PM_{2.5}:

- Reduction of speed limits on site roads
- Targeted road sweeping
- Improved dust suppression
- Road surfacing and landscaping
- Improved material handling and storage

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, 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 titled 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.

In 2018 the Council intend to review the Action Plan to specifically incorporate measures to address PM_{2.5} emissions.

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 11 sites during 2017. 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. North Lincolnshire Council monitor benzene on behalf of the National Network and therefore further information in relation to this will be reported.

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 NO₂ at 21 sites during 2017. Table A.2 in Appendix A shows the details of the sites.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO₂)

For the general public, the most prominent sources of NO₂ are internal combustion engines burning fossil fuels. Chronic exposure to NO₂ can cause respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma.

In 2017 the Council undertook continuous monitoring of NO₂ at four sites:

- Scunthorpe Town AURN (site ID: CM1)
- Low Santon (site ID: CM3)
- Killingholme School (site ID: CM9)
- Killingholme Roadside (site ID: CM10)

The Killingholme Roadside site was installed in 2013 specifically to measure NO₂ concentrations at properties adjacent to the A160 in South Killingholme as data from NO₂ diffusion tubes suggested there may be elevated concentrations in this area.

Subsequently, data from the continuous monitor was analysed in-depth in the 2015 Detailed Assessment of NO₂ at South Killingholme report, which concluded that an air quality objective was not being breached and an AQMA should not be declared. The Council has continued to review additional air quality data gathered and as a result this site was removed on 1 January 2018 due to continued compliance.

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³. Figure A.1 in Appendix A, shows compliance with this objective for years 2013 to 2017 at the four continuous monitoring sites (Site ID's CM1, CM3, CM9, CM10). All sites show a slight decline in the NO₂ annual mean concentration for 2017.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B. The diffusion tubes did not identify an exceedance of the NO₂ annual mean objective.

Table A.4 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year. There were no breaches of this objective.

In 2017 there were no recorded exceedances of both the annual mean (40µg/m³) and hourly mean (200 µg/m³ not to be exceeded more than 18 times a year) air quality objectives for nitrogen dioxide.

3.2.2 Particulate Matter (PM₁₀)

PM₁₀ is particulate matter less than 10 microns in diameter. These particles are composed of a wide range of materials arising from a variety of sources including industry, road traffic and natural sources such as soil, dust and sea salt. PM₁₀ is of particular importance in terms of health effects because the particles are small enough to be breathed in and carried deep into the lungs where they can cause inflammation and a decline in the condition of people with heart and lung diseases. Children and the elderly are particularly vulnerable. In addition, they may carry cancer causing compounds into the lungs.

The principal source of PM₁₀ emissions in North Lincolnshire is the Integrated Steelworks Site, both from direct sources: chimneys and stacks, and indirect sources: stockpiles and roads.

In 2017 the Council monitored PM₁₀ at 10 sites. At two of these sites, Scunthorpe Town AURN (site ID: CM1) and Low Santon (site ID: CM3) an FDMS monitor was co-located with a TEOM.

The FDMS monitor is a more accurate method of measuring PM₁₀ and the results are reported uncorrected. In contrast, a Standard TEOM requires data to be corrected to compensate for volatile particulates lost by the elevated operating temperatures of the monitor. Further details on data correction are provided in Appendix C.

The Council continue to operate TEOM monitors at the Scunthorpe Town AURN and Low Santon sites for analysis of data trends.

PM₁₀ data for Osiris monitors located at South Ferriby (site ID: CM11) 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 only deploys Osiris monitors to monitor PM₁₀ 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 PM₁₀. There have been no breaches of air quality objectives to date.

Table A.5 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

Figure A.2 in Appendix A, shows compliance with this objective for years 2013 to 2017 at the continuous monitoring sites.

Table A.6 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year.

Figure A.3 in Appendix A shows compliance with this objective for years 2013 to 2017 at all sites except for Low Santon, Site ID CM3. Measures to achieve compliance with the 24 hourly mean objective at this site will be a focus of the Air Quality Action Plan.

In 2017 there were no recorded exceedances of the annual mean (40µg/m³) and the 24 hourly mean (50 µg/m³ not to be exceeded more than 35 times a year) air quality objective for PM₁₀ was exceeded at one site, Low Santon.

3.2.3 Particulate Matter (PM_{2.5})

In 2017 the Council monitored PM_{2.5} at two sites, these included East Common Lane (Site ID:CM2) which is within the Scunthorpe AQMA and South Ferriby (Site ID:CM11) using Osiris monitoring equipment. The Osiris at East Common Lane was installed in August 2016. As previously mentioned, the South Ferriby Osiris has been located at the request of a Local Environmental Liaison Committee to monitor emissions from a cement plant.

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_{2.5} monitoring method is available to the Council at this time.

The Public Health England, Public Health Profiles indicates that for 2016 the annual concentration of human – made fine particulate matter at an area level, adjusted to account for public exposure is 8.9ug/m³ for North Lincolnshire (Public Health England, 2018). This is based on various instruments used to derive estimates including Pollution Climate Mapping model, Automatic Urban and Rural Network and National Atmospheric Emissions Inventory and shows good correlation with the measured data in North Lincolnshire.

Table A.7 in Appendix A presents the ratified and adjusted monitored PM_{2.5} annual mean concentrations for the past 5 years.

Figure A.4 in Appendix A shows compliance with the objective for years 2013 to 2017 for the two monitoring locations.

In 2017 there were no recorded exceedances of the annual mean (25µg/m³) air quality target value for PM_{2.5}.

3.2.4 Sulphur Dioxide (SO₂)

UK emissions of SO₂ are dominated by combustion of fuels containing sulphur, such as coal and heavy oils. Exposure to SO₂ may irritate the airways of the lungs, increasing the symptoms of those suffering from lung diseases.

In 2017 the Council undertook continuous monitoring of SO₂ at four sites:

- Scunthorpe Town AURN (site ID: CM1)
- Low Santon (site ID: CM3)
- Killingholme School (site ID: CM9)

Table A.8 in Appendix A compares the ratified continuous monitored SO₂ concentrations for year 2017 with the air quality objectives for SO₂.

In 2017 there were no recorded exceedances of the 15 minute mean (266µg/m³ not to be exceeded more than 35 times a year), 1 hour mean (350µg/m³ not to be exceeded more than 24 times a year) and 24 hour mean (125µg/m³ not to be exceeded more than 3 times a year) air quality objectives for sulphur dioxide.

3.2.5 Benzene

Benzene is one of the elementary petrochemicals and has a variety of sources, but it primarily arises from domestic and industrial combustion and road transport. Exposure to Benzene increases the risk of cancer and other illnesses.

For Benzene, the annual mean objective is 5 µg/m³. The annual mean recorded at Scunthorpe Town AURN in 2017 was 0.77 µg/m³.

Monitoring results are displayed in Table A.9 in Appendix A.

In 2017 there were no recorded exceedances of the annual mean (25µg/m³) air quality objectives for benzene.

3.2.6 Polycyclic Aromatic Hydrocarbon (PAH)

PAHs are a group of persistent organic compounds, some of which are toxic and/or possible or proven human carcinogens; they are produced via incomplete combustion of carbon containing fuels from industrial, commercial, vehicular and residential sources.

Historically North Lincolnshire recorded some of the highest levels of PAH's 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 emissions. PAH 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/m³ for the annual mean concentration of benzo[a]pyrene as a representative PAH, to be achieved by 2012. The UK objective for PAH's however is an annual average 0.25 ng/m³.

In 2017 the annual average for Scunthorpe Town AURN was 0.81 ng/m³, and for Low Santon it was 0.82 ng/m³. These concentrations meet the EU Target Value, however they are above the UK Objective for PAH. Although these annual averages exceed the UK Objective, there has been a significant decline in the emissions at these monitoring sites.

Table A.10 in Appendix A presents the monthly PAH data for the year 2017 at Scunthorpe Town and Low Santon.

Figure A.5 in Appendix A shows the PAH annual mean concentration for 2017 at Scunthorpe Town and Low Santon.

Figure A.6 in Appendix A shows the trend in PAH annual mean concentrations from 2015 to 2017 at Scunthorpe Town and Low Santon.

3.2.7 Heavy Metals (HM)

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 $0.5 \mu\text{g}/\text{m}^3$, 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_{10} particulate fraction of ambient air.

In 2017 there were no exceedances of the target or limit values. Monitoring results are displayed in Table A.11 in Appendix A.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
CM1	Scunthorpe Town AURN	Industrial	490320	410831	SO ₂ , NO ₂ , PM ₁₀	YES	Chemiluminescent; Flourescent, FDMS & TEOM	21	7	2
CM2	East Common Lane	Urban background	490663	409789	PM ₁₀ , PM _{2.5}	YES	TEOM & Osiris	3	28	1.5
CM3	Low Santon	Industrial	492945	411931	SO ₂ , NO ₂ , PM ₁₀	YES	Flourescent, FDMS & TEOM	41	5	2
CM4	Redbourn Club	Urban background	490002	410069	PM ₁₀	NO	TEOM	15	N/A	1.5
CM5	Lakeside	Urban background	491750	408127	PM ₁₀	NO	TEOM	4	8	1.5
CM6	Amvale	Industrial	491343	408782	PM ₁₀	YES	TEOM	150	100	1.5
CM7	High Street East	Industrial	490224	411301	PM ₁₀	YES	TEOM	18	10	1.5
CM8	Appleby	Rural	495075	414767	PM ₁₀	NO	TEOM	17	N/A	1.5
CM9	Killingholme School	Other	514880	416133	SO ₂ , NO ₂ , PM ₁₀	NO	Chemiluminescent & TEOM	9	N/A	2
CM10	Killingholme Roadside	Roadside	514810	415980	NO ₂	NO	Chemiluminescent	20	10	1
CM11	South Ferriby	Other	497931	420993	PM ₁₀ , PM _{2.5}	NO	Osiris	10	45	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	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
DT1	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	Old Brumby Street	Roadside	489112	409463	NO2	NO	15	1	NO	2
DT9	Dudley Road	Roadside	491628	408658	NO2	YES	80	2	NO	2
DT10	Brigg Road	Roadside	491838	408641	NO2	YES	15	9	NO	1.5
DT11	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	Scunthorpe Town AURN	Industrial	490316	410837	NO2	YES	21	6	YES	2
DT19	Scunthorpe Town AURN	Industrial	490316	410837	NO2	YES	21	6	YES	2
DT20	Scunthorpe Town AURN	Industrial	490316	410837	NO2	YES	21	6	YES	2
DT21	ASDA, Station Road	Roadside	490080	411258	NO2	NO	20	1	NO	2

Notes:

- (1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).
- (2) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
CM1	Industrial	Automatic	N/A	99	26.9	25.2	17.6	17	16
CM3	Industrial	Automatic	N/A	99.5	16.4	16.3	27.1	19	18
CM9	Suburban	Automatic	N/A	98.4	22.4	22.1	20.4	17	17
CM10	Roadside	Automatic	N/A	92.1	27.1	28.5	24.6	23	22
DT1	Urban Background	Diffusion Tube	N/A	91.6	34.6	31.1	24.5	25	21
DT2	Roadside	Diffusion Tube	N/A	91.6	41.0	33.2	26.3	28	24
DT3	Roadside	Diffusion Tube	N/A	100	N/A	N/A	N/A	20	22
DT4	Roadside	Diffusion Tube	N/A	91.6	34.1	29.5	22.1	24	22
DT5	Urban Background	Diffusion Tube	N/A	91.6	41.4	32.2	25.2	25	26
DT6	Urban Background	Diffusion Tube	N/A	100	37.5	31.4	24.2	27	24
DT7	Roadside	Diffusion Tube	N/A	100	37.4	32.1	25.8	27	25
DT8	Roadside	Diffusion Tube	N/A	100	39.4	32.2	26.3	29	27
DT9	Roadside	Diffusion Tube	N/A	100	29.8	24.4	19.4	21	19
DT10	Roadside	Diffusion Tube	N/A	100	60.1	45.4	36.3	38	35
DT11	Roadside	Diffusion Tube	N/A	100	32.7	27.3	22.9	20	22
DT12	Roadside	Diffusion Tube	N/A	100	39.7	30.8	26.1	26	26

DT13	Roadside	Diffusion Tube	N/A	100	51.3	42.9	26.2	31	20
DT14	Roadside	Diffusion Tube	N/A	50	48.0	46.7	33.7	31	27
DT15	Urban Background	Diffusion Tube	N/A	100	30	27.3	19.4	21	19
DT16	Roadside	Diffusion Tube	N/A	91.6	45.3	35.1	27.0	26	25
DT17	Suburban	Diffusion Tube	N/A	100	33.7	25.6	22.4	23	22
DT18	Industrial	Diffusion Tube	N/A	100	26.1	21.5	18.2	17	16
DT19	Industrial	Diffusion Tube	N/A	100	26.4	20.3	17.0	17	15
DT20	Industrial	Diffusion Tube	N/A	100	28.4	21.5	16.5	17	15
DT21	Roadside	Diffusion Tube	N/A	100	33.2	27.9	22.7	23	22

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

Notes:

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

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

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

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

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

Figure A.1 – Trends in Annual Mean NO₂ Concentrations, 2013 - 2017

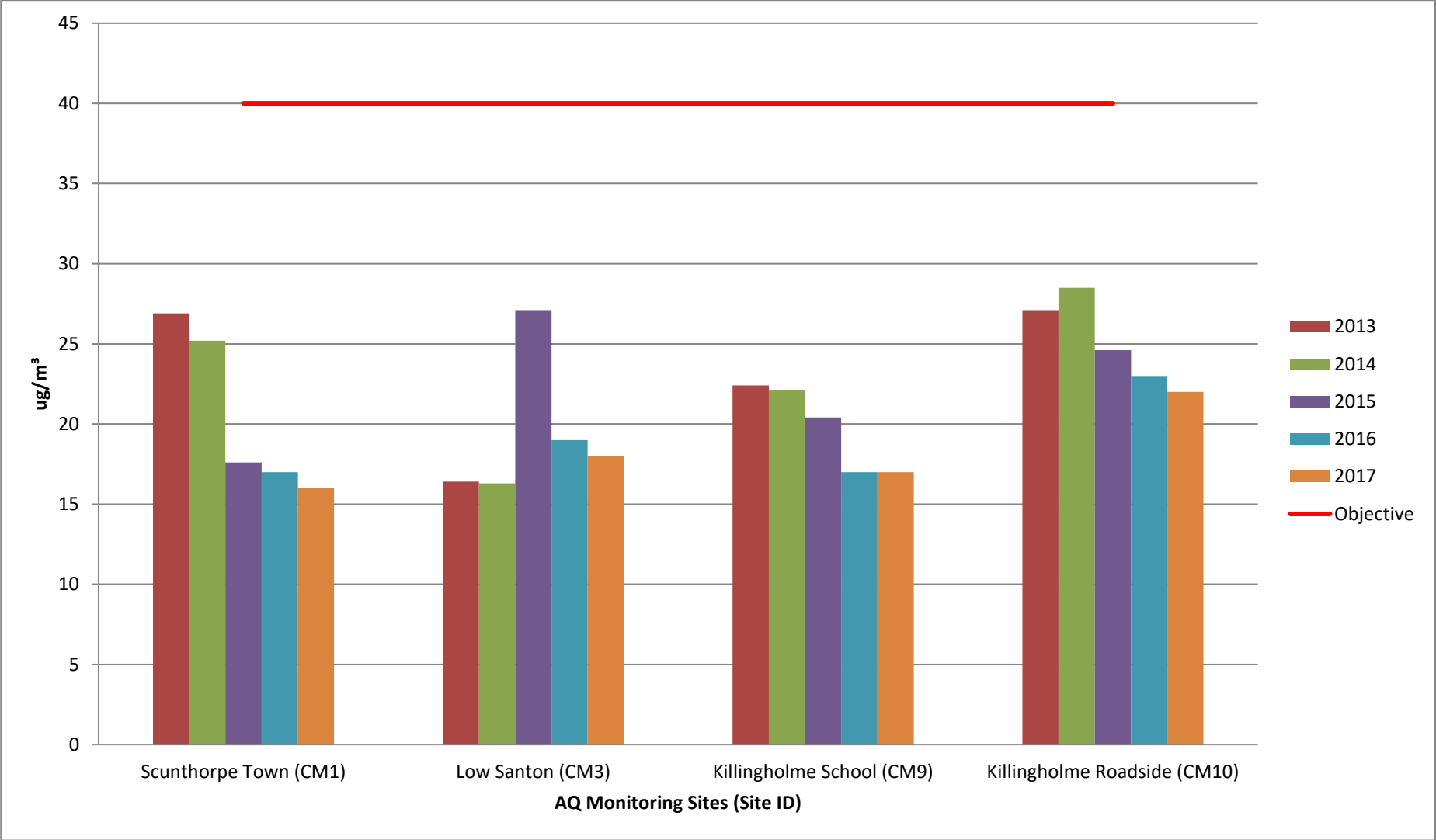


Table A.4 – 1-Hour Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2013	2014	2015	2016	2017
CM1	Industrial	Automatic	N/A	99	2	9	0	0	0
CM3	Industrial	Automatic	N/A	99.5	0	0	0 (80.3)	0	0
CM9	Other	Automatic	N/A	98.4	0	0	0	0	0
CM10	Roadside	Automatic	N/A	92.1	N/A	0	0	0	0

Notes:

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

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

Table A.5 – Annual Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2013	2014	2015	2016	2017
CM1 FDMS	Industrial	N/A	80	22.6	21.2	21.4	17	16
CM1 TEOM	Industrial	N/A	96.9	23.4	21.5	19.1	17	17
CM2	Urban Background	N/A	98.3	25.2	22.9	19.3	20	18
CM3 FDMS	Industrial	N/A	79.6	27.5	25.1	27.7	22	23
CM3 TEOM	Industrial	N/A	97	33.3	29.6	27.8	26	30
CM4	Urban Background	N/A	98.8	21.8	21.3	18.6	17	16
CM5	Urban Centre	N/A	96.2	23.1	21.6	19.7	21	19
CM6	Industrial	N/A	92.3	22.5	20.6	19.7	20	17
CM7	Industrial	N/A	98.4	N/A	21.4	22.0	20	19
CM8	Rural	N/A	98.9	17.5	16.0	18.5	16	17
CM9	Roadside	N/A	97.1	19.3	19.1	18.0	18	18
CM11	Other	N/A	97.5	28.4	15.8	23.4	21	18

Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ 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 PM₁₀ Concentrations

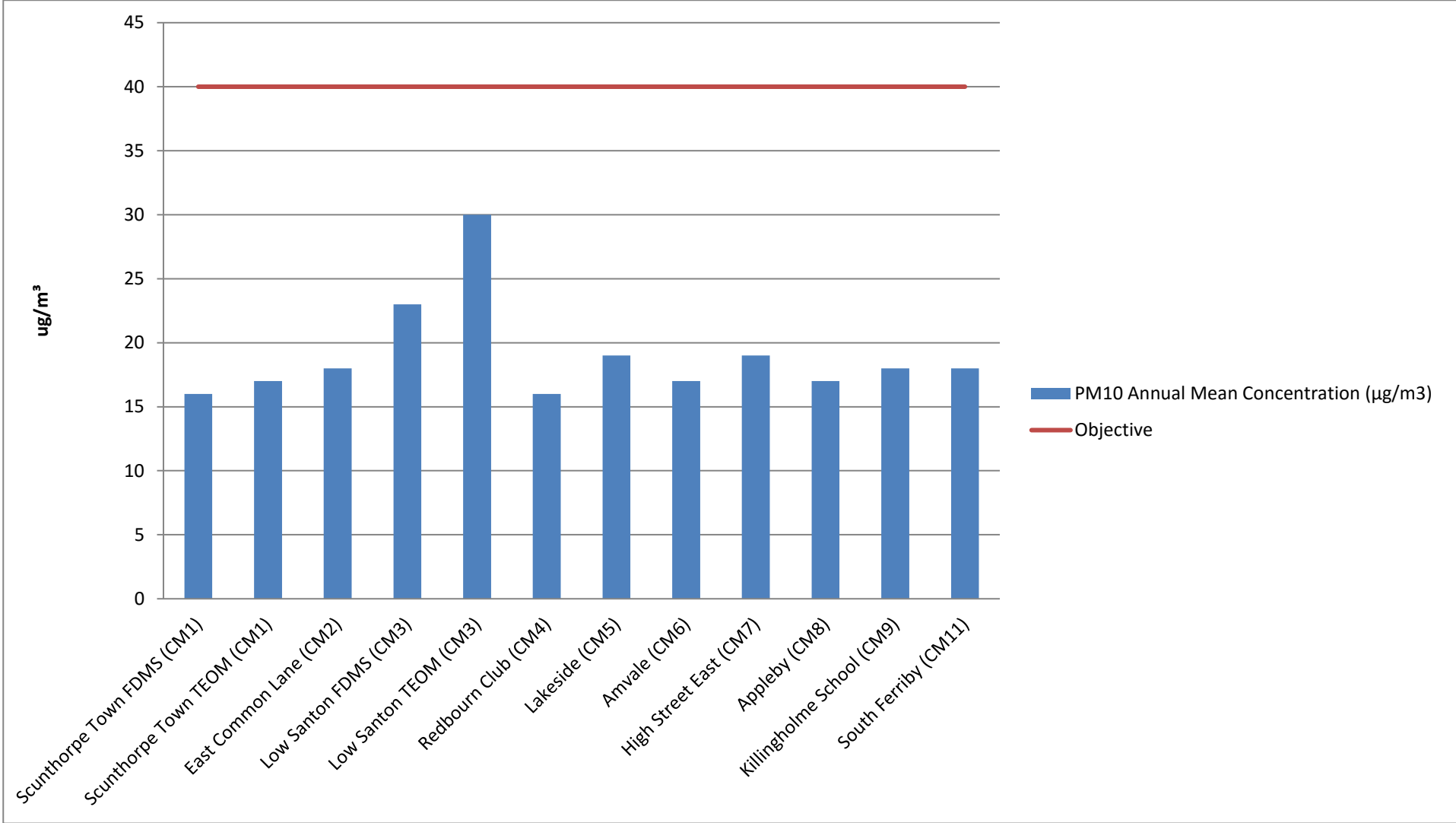


Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
				2013	2014	2015	2016	2017
CM1 FDMS	Industrial	N/A	79.6	20 (40)	17	15	6	5 (29)
CM1 TEOM	Industrial	N/A	96.9	24	18	7	8	5
CM2	Urban Background	N/A	98.3	35	27	9	18	9
CM3 FDMS	Industrial	N/A	79.6	20	18 (47)	21	11	11
CM3 TEOM	Industrial	N/A	97	43	32	42 (68)	25	40
CM4	Urban Background	N/A	98.8	17	18	6	11	5
CM5	Urban Centre	N/A	96.2	12	10	12	11	6
CM6	Industrial	N/A	92.3	9 (46)	13	9	15	6
CM7	Industrial	N/A	98.4	N/A	5 (41)	12	4	5
CM8	Rural	N/A	98.9	6	4	2	1	3
CM9	Other	N/A	97.1	5	6	2	1	4
CM11	Other	N/A	97.5	20	4 (30)	8	6	4

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

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

Figure A.3 – Trends in Number of 24-Hour Mean PM₁₀ Results >50µg/m³

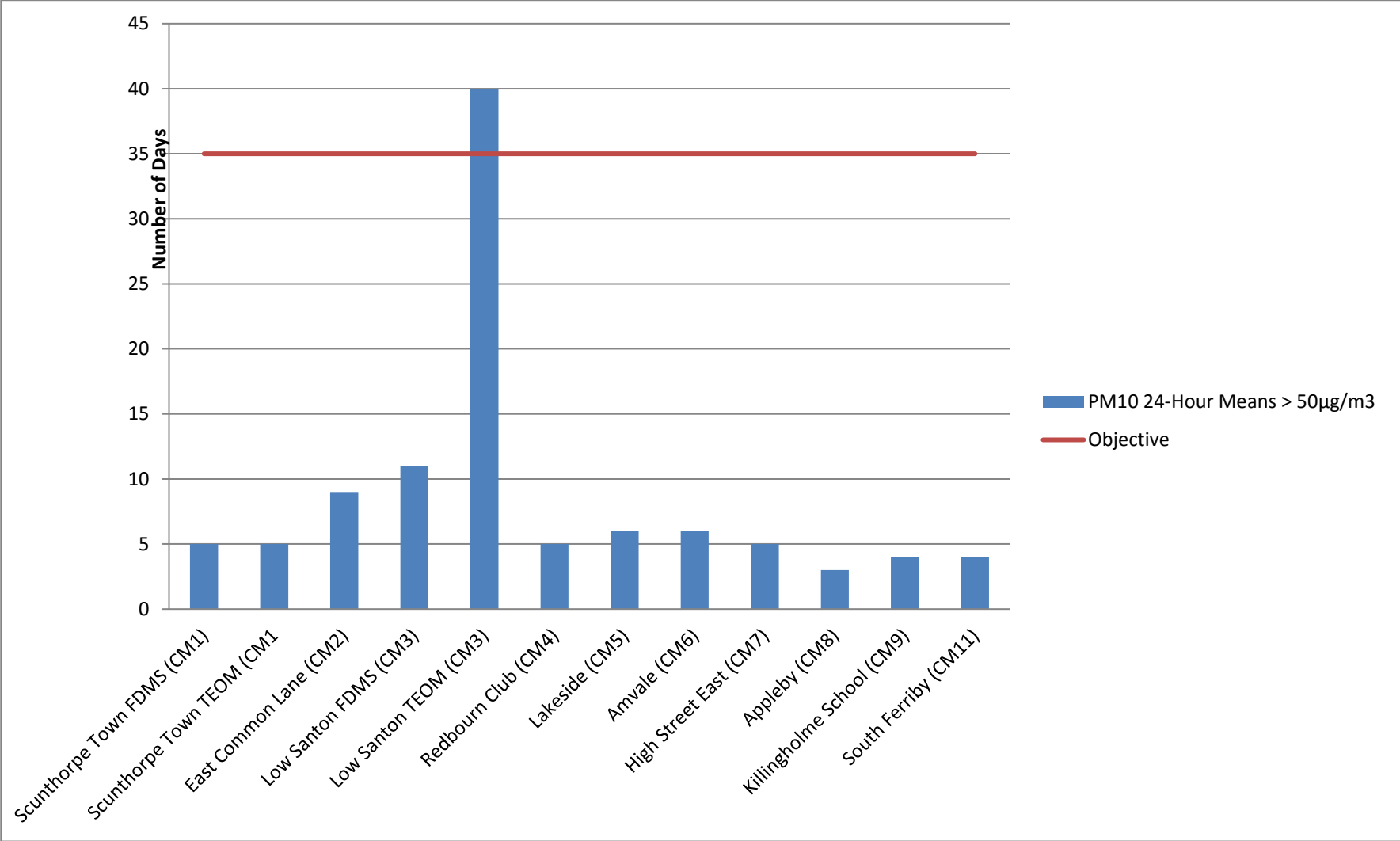


Table A.7 – PM_{2.5} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	PM _{2.5} Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2013	2014	2015	2016	2017
CM2	Urban Background	N/A	95.7	N/A	N/A	N/A	7	6
CM11	Other	N/A	96.5	9.1	5.8	6.8	7	6

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_{2.5} Concentrations

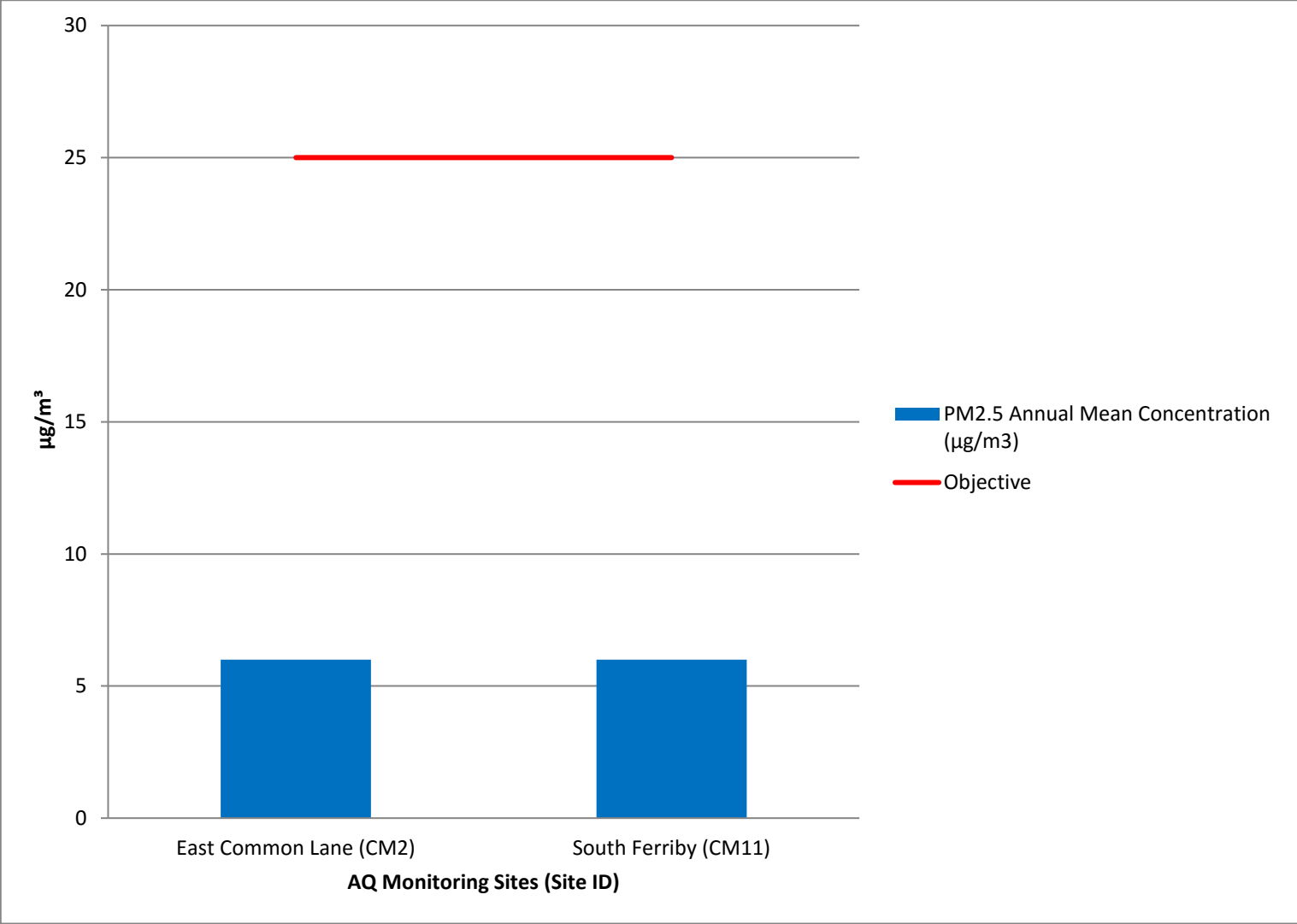


Table A.8 – SO₂ Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	Number of Exceedances 2017 (percentile in bracket) ⁽³⁾		
				15-minute Objective (266 µg/m ³)	1-hour Objective (350 µg/m ³)	24-hour Objective (125 µg/m ³)
CM1	Industrial	N/A	92	0	0	0
CM3	Industrial	N/A	99.3	0	0	0
CM9	Other	N/A	95.1	0	0	0

Notes:

Exceedances of the SO₂ 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 µg/m3
11/01/2017	25/01/2017	1.38
25/01/2017	08/02/2017	1.24
08/02/2017	22/02/2017	2.76
22/02/2017	08/03/2017	0.72
08/03/2017	22/03/2017	0.59
22/03/2017	05/04/2017	1.39
05/04/2017	19/04/2017	0.48
19/04/2017	03/05/2017	1.36
03/05/2017	17/05/2017	0.5

Start Date	End Date	Scunthorpe Town AURN (CM1) Concentration µg/m ³
17/05/2017	31/05/2017	0.7
31/05/2017	14/06/2017	0.2
14/06/2017	28/06/2017	1.08
28/06/2017	12/07/2017	0.33
12/07/2017	26/07/2017	0.95
26/07/2017	09/08/2017	0.19
09/08/2017	23/08/2017	0.3
23/08/2017	06/09/2017	0.4
06/09/2017	20/09/2017	0.28

Start Date	End Date	Scunthorpe Town AURN (CM1) Concentration µg/m3
20/09/2017	04/10/2017	0.83
04/10/2017	18/10/2017	0.32
18/10/2017	01/11/2017	0.68
01/11/2017	15/11/2017	1.07
15/11/2017	29/11/2017	0.57
29/11/2017	13/12/2017	0.71
13/12/2017	27/12/2017	0.72
27/12/2017	10/01/2018	0.3
Annual Average:		0.77

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

Table A.10 PAH Monitoring Results

Concentration ng/m ³	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Time Weighted Average
Scunthorpe Town (CM1)	0.81	3.3	0.71	0.86	1.0	0.53	0.81	0.05	0.44	0.19	0.46	0.59	0.81
Low Santon (CM3)	0.49	0.64	1.10	0.46	0.11	0.39	0.76	0.87	0.26	1.30	1.40	2.10	0.82

Notes: Exceedances of the UK PAH annual mean objective of 0.25 ng/m³ are shown in bold
 Exceedances of the EU Target Value of 1ng/m³ are shown in red

Figure A.5 – Trends in Annual Mean PAH Concentrations

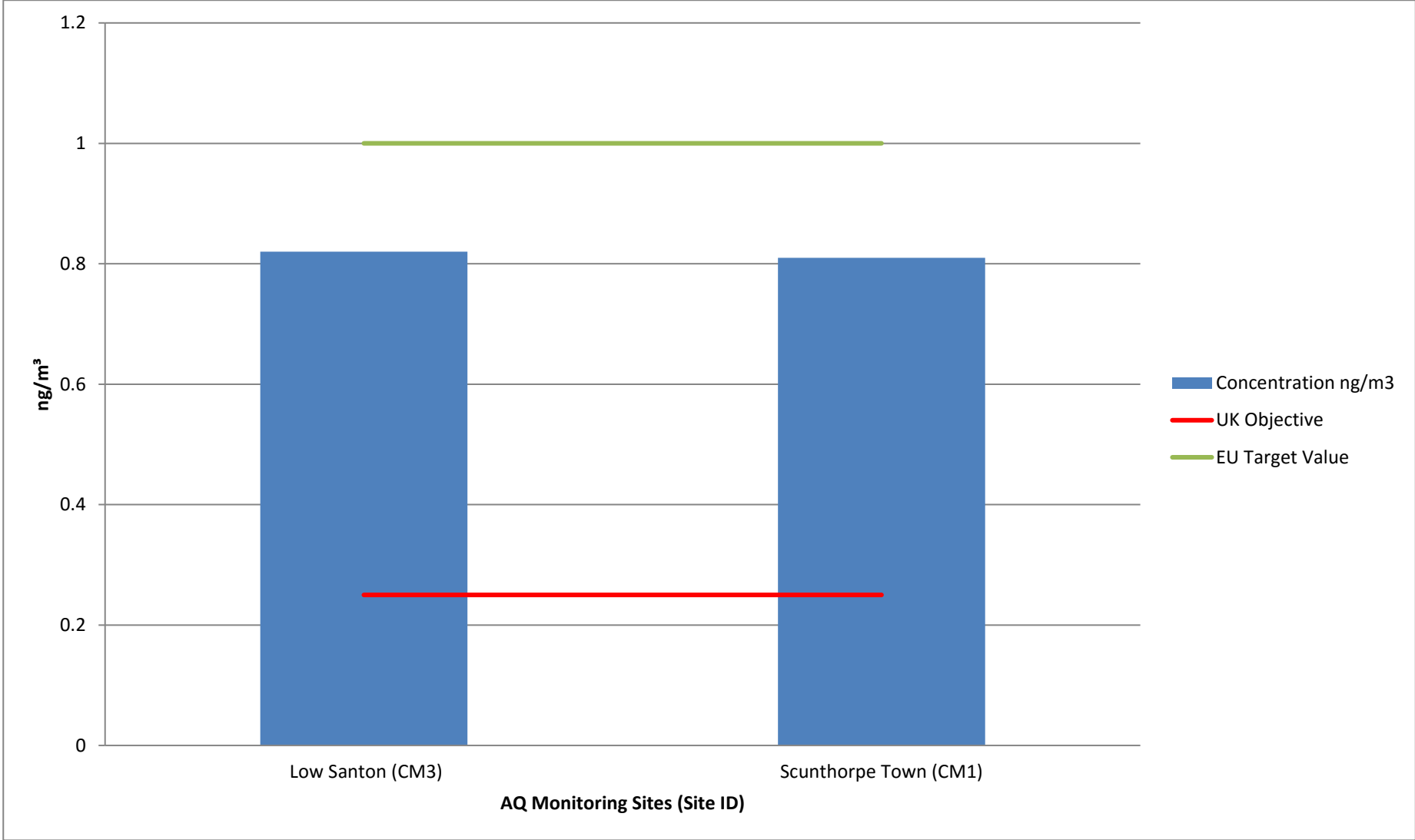


Figure A.6 Trends in Annual Mean PAH Concentrations, 2015 – 2017

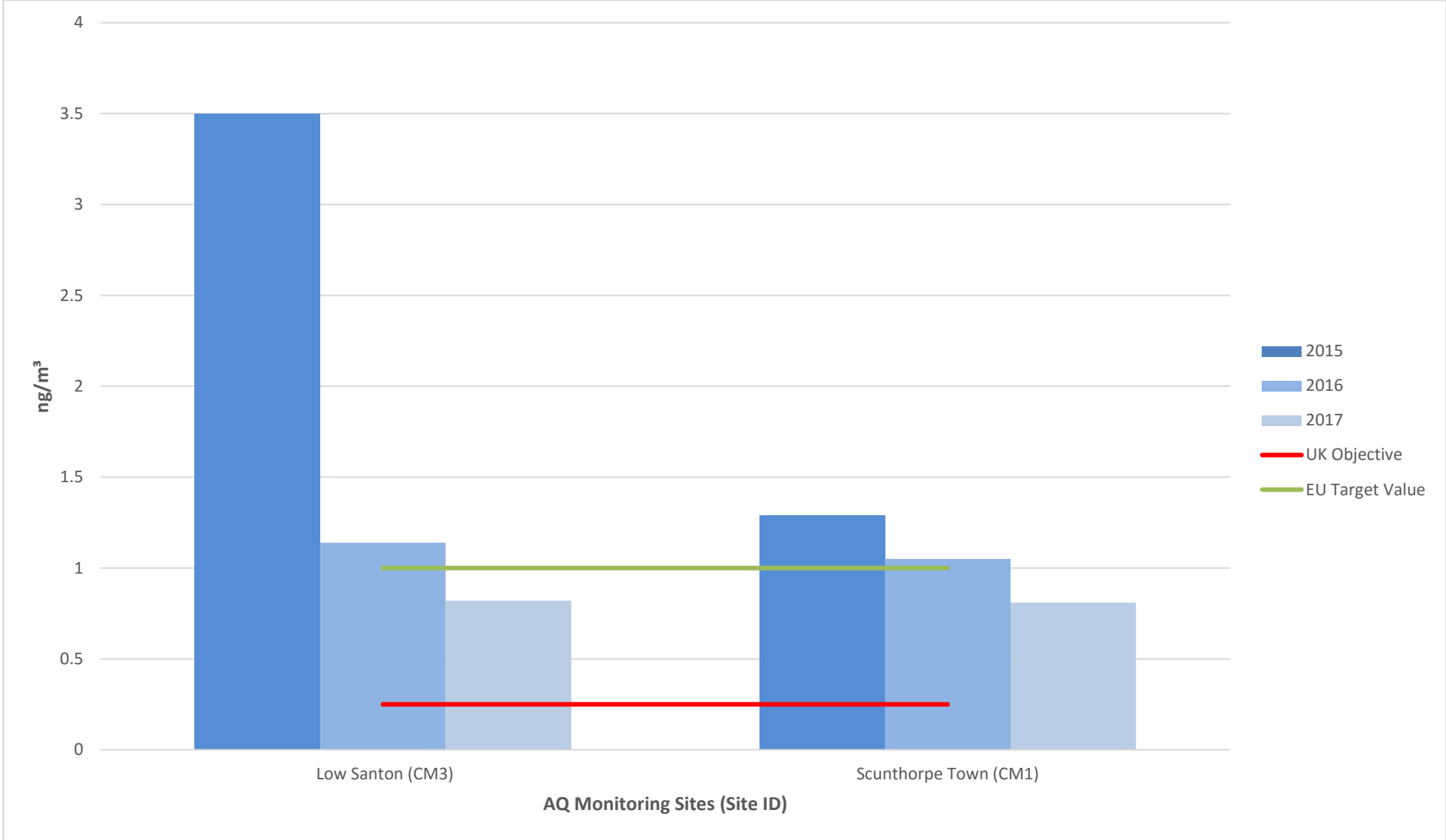


Table A.11 Heavy Metals Monitoring Results

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)	0.8113	0.9815	6
Cadmium (Cd)	0.2796	0.4796	5
Cobalt (Co)	0.1121	0.2087	
Chromium (Cr)	2.0904	3.8555	
Copper (Cu)	5.4917	5.7045	
Iron (Fe)	475.4710	1,940.884	
Manganese (Mn)	17.1375	107.6557	
Nickel (Ni)	0.8850	1.2292	20
Lead (Pb)	14.3440	18.3875	500

Heavy Metal	Scunthorpe Town AURN (CM1) Annual Mean Concentration ng/m3	Low Santon (CM3) Annual Mean Concentration ng/m3	Target Value ng/m3
Selenium (Se)	0.9138	1.2494	
Vanadium (V)	1.2342	12.0074	
Zinc (Zn)	25.9830	32.2247	

Notes: Exceedances of any Target Values are shown in bold

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2017

Site ID	NO ₂ Mean Concentrations (µg/m ³)												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (factor) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
DT1	36.6	40.6	14.4	12.8	28.8	28.2	27.0	31.4	32.9	31.0		36.3	29.1	20.6	20.5
DT2	42.4	40.7		33.5	32.7	21.2	29.7	30.4	33.7	37.4	31.7	39.9	33.9	24.1	20.6
DT3	41.6	38.1	35.2	27.9	22.9	23.4	21.9	24.7	26.5	31.6	37.4	38.0	30.8	21.9	30.6
DT4	49.4	39.1	35.8	27.0	24.9	19.9	23.6	24.0		33.5	34.0	31.2	31.1	22.1	18.6
DT5	48.8	42.7	38.3	40.2	31.3	27.9	31.1	29.4	32.9	33.6	43.9		36.4	25.8	24.9
DT6	44.0	42.7	37.0	33.6	30.8	25.5	27.6	26.5	30.2	30.1	37.4	40.0	33.8	24.0	23.7
DT7	46.5	36.7	37.2	35.3	33.4	27.6	30.2	27.2	29.7	32.2	45.2	36.0	34.8	24.7	20.3
DT8	49.2	43.9	38.7	36.5	35.5	28.0	33.3	28.7	34.8	36.1	45.3	38.2	37.4	26.6	21.2
DT9	41.7	35.8	30.0	26.7	22.8	16.6	19.8	19.1	22.3	25.5	34.6	32.6	27.3	19.4	N/A
DT10	65.1	55.5	54.1	54.6	44.2	49.8	46.6	43.5	47.1	39.8	48.0	41.6	49.2	34.9	31.6
DT11	42.5	36.0	35.3	35.4	27.0	26.6	26.1	26.0	25.8	31.6	37.3	29.9	31.6	22.4	26.9
DT12	45.4	50.1	43.9	31.9	29.7	25.8	28.2	25.0	32.3	36.3	45.7	43.6	36.5	25.9	18
DT13	49.2	36.9	41.1	22.6	21.6	18.9	17.5	21.9	22.0	28.1	30.7	28.1	28.2	20.0	16.4
DT14	50.4			33.3	36.4					47.8	40.2	42.5	41.8	29.7	21
DT15	38.3	29.9	21.8	29.5	31.7	20.2	22.1	28.2	23.4	22.8	32.0	20.5	26.7	19.0	23

North Lincolnshire Council

DT16		38.5	44.2	37.3	30.1	33.4	30.3	28.4	31.3	36.2	45.7	31.9	35.2	25.0	22.8
DT17	44.5	38.2	32.4	33.0	27.9	24.0	25.5	23.3	28.2	28.1	37.3	28.2	30.9	21.9	17.2
DT18	39.3	32.8	23.6	18.3	18.5	13.3	17.6	14.4	19.2	22.8	27.4	28.6	23.0	16.3	16.3
DT19	34.8	33.5	23.7	19.3	8.0	16.6	15.9	13.5	19.6	18.7	25.2	28.1	21.4	15.2	15.2
DT20	37.4	37.5	21.6	19.5	7.6	13.2	14.8	13.2	18.2	20.1	25.0	31.9	21.7	15.4	15.4
DT21	44.7	44.8	35.7	28.0	14.8	24.5	23.7	23.6	26.8	30.7	34.6	35.1	30.6	21.7	20.8

Local bias adjustment factor used

National bias adjustment factor used

Annualisation has been conducted where data capture is <75%

Where applicable, data has been distance corrected for relevant exposure

Notes:

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

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

(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

Annualising Data

NO₂ Annual Mean site DT14

Due to improvements to the A160 road, diffusion tube monitoring location DT14 was temporarily removed and subsequently replaced during 2017 and data is only available for 6 months, resulting in 50% data capture for 2017. This is below the 75% data capture threshold and therefore the data should be annualised. The method to undertake this procedure is presented in Air Quality Technical Guidance TG16.

Start Date	End Date	B1	D1	B1 when D1 is available
28/12/2016	26/01/2017	27.8	50.4	27.8
26/01/2017	22/02/2017	23.0		
22/02/2017	29/03/2017	18.1		
29/03/2017	26/04/2017	14.0	33.3	14.0
26/04/2017	31/05/2017	13.8	36.4	13.8
31/05/2017	29/06/2017	11.3		
29/06/2017	27/07/2017	12.5		
27/07/2017	30/08/2017	14.1		
30/08/2017	26/09/2017	15.3		
26/09/2017	24/10/2017	16.3	47.8	16.3
24/10/2017	05/12/2017	21.4	40.2	21.4
05/12/2017	02/01/2018	20.5	42.5	20.5
Average		17.3	41.76	19.0

B1 = NO₂ data for CM9, Killingholme School

D1 = NO₂ data for DT14

B1 Annual Mean (A_M) = 17.3

B1 Period Mean (P_M) = 19.0

Ratio of B1 Annual Mean to Period Mean (A_M/P_M) = 0.91

Start Date	End Date	B1	D1	B1 when D1 is available
28/12/2016	26/01/2017	28.3	50.4	28.3
26/01/2017	22/02/2017	24.4		
22/02/2017	29/03/2017	20.5		
29/03/2017	26/04/2017	17.3	33.3	17.3
26/04/2017	31/05/2017	14.5	36.4	14.5
31/05/2017	29/06/2017	14.4		
29/06/2017	27/07/2017	13.7		
27/07/2017	30/08/2017	14.3		

North Lincolnshire Council

30/08/2017	26/09/2017	16		
26/09/2017	24/10/2017	18	47.8	18
24/10/2017	05/12/2017	21.5	40.2	21.5
05/12/2017	02/01/2018	21.6	42.5	21.6
Average		18.7	41.76	20.2

B2 = NO₂ data for CM3, Low Santon

D1 = NO₂ data for DT14

B2 Annual Mean (A_M) = 18.7

B2 Period Mean (P_M) = 20.2

Ratio of B2 Annual Mean to Period Mean (A_M/P_M) = 0.93

Start Date	End Date	B1	D1	B1 when D1 is available
28/12/2016	26/01/2017	27.8	50.4	27.8
26/01/2017	22/02/2017	23.8		
22/02/2017	29/03/2017	15.6		
29/03/2017	26/04/2017	13.4	33.3	13.4
26/04/2017	31/05/2017	12.2	36.4	12.2
31/05/2017	29/06/2017	8.9		
29/06/2017	27/07/2017	9.6		
27/07/2017	30/08/2017	10.0		
30/08/2017	26/09/2017	12.7		
26/09/2017	24/10/2017	12.7	47.8	12.7
24/10/2017	05/12/2017	21.5	40.2	21.5
05/12/2017	02/01/2018	21.6	42.5	21.6
Average		15.8	41.76	18.2

B3 = NO₂ data for CM1, Scunthorpe Town

D1 = NO₂ data for DT14

B3 Annual Mean (A_M) = 15.8

B3 Period Mean (P_M) = 18.2

Ratio of B3 Annual Mean to Period Mean (A_M/P_M) = 0.87

Annualisation Factor = average of B1, B2 and B3 A_M/P_M ratios

$$(0.91 \times 0.93 \times 0.87)/3 = 0.9$$

Estimated Annual Mean = period mean x annualisation factor

$$41.76 \times 0.90 = 37.6$$

Estimated Annual Mean x Bias Adjustment Factor

$$37.6 \times 0.71 = 26.7$$

QA:QC Data

Diffusion Tube Bias Adjustment Factors

North Lincolnshire Council currently uses Socotec (Former name ESG) for both supply and analysis of its Nitrogen Dioxide Diffusion Tubes. The Bias Adjustment factor for 2017 was 0.71.

Factor from Local Co-location Studies

North Lincolnshire Council had only 1 co location study site in 2017, at CM1: Scunthorpe Town an industrial site:

Site	Analyser Annual Mean	Tube Annual Means	Bias Adjustment Factor
CM1: Scunthorpe Town AURN	16	22	0.71

Discussion of Choice of Factor to Use

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.

AEA Energy & Environment
From the AEA group

Checking Precision and Accuracy of Triplicate Tubes

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	28/12/2016	26/01/2017	39.3	34.8	37.4	37	2.3	6	5.6	28	98.47	Good	Good
2	26/01/2017	22/02/2017	32.8	33.5	37.5	35	2.5	7	6.3	24	97.92	Good	Good
3	22/02/2017	29/03/2017	23.6	23.7	21.6	23	1.2	5	2.9	16	98.38	Good	Good
4	29/03/2017	26/04/2017	18.3	19.3	19.5	19	0.6	3	1.6	13	99.55	Good	Good
5	26/04/2017	31/05/2017	18.5	15.3	14.5	16	2.1	13	5.3	12	99.76	Good	Good
6	31/05/2017	29/06/2017	13.3	16.6	13.2	14	1.9	13	4.8	9	100	Good	Good
7	29/06/2017	27/07/2017	17.6	15.9	14.8	16	1.4	9	3.5	9	98.96	Good	Good
8	27/07/2017	30/08/2017	14.4	13.5	13.2	14	0.6	5	1.6	10	96.69	Good	Good
9	30/08/2017	26/09/2017	19.5	19.6	17.2	19	1.4	7	3.4	12	99.54	Good	Good
10	26/09/2017	24/10/2017	22.8	18.7	20.1	21	2.1	10	5.2	14	99.4	Good	Good
11	24/10/2017	05/12/2017	27.4	25.2	25.0	26	1.3	5	3.3	22	98.91	Good	Good
12	05/12/2017	02/01/2018	28.6	28.1	31.9	30	2.1	7	5.1	22	99.7	Good	Good
13													

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

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 12 periods of data Bias factor A 0.71 (0.66 - 0.77) Bias B 41% (31% - 51%) Diffusion Tubes Mean: 22 μgm^{-3} Mean CV (Precision): 8 Automatic Mean: 16 μgm^{-3} Data Capture for periods used: 99% Adjusted Tubes Mean: 16 (15 - 17) μgm^{-3}	Precision 12 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 0.71 (0.66 - 0.77) Bias B 41% (31% - 51%) Diffusion Tubes Mean: 22 μgm^{-3} Mean CV (Precision): 8 Automatic Mean: 16 μgm^{-3} Data Capture for periods used: 99% Adjusted Tubes Mean: 16 (15 - 17) μgm^{-3}
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Jaume Targa, for AEA
Version 04 - February 2011

PM₁₀ Monitoring Adjustment

PM₁₀ 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 PM₁₀ 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.

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

QA/QC of Automatic Air Quality Instruments

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_x, O₃, SO₂ 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. PM₁₀ and PM_{2.5}) 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 NO₂ conversion inefficiencies
- eliminating periods where calibration gas is in the ambient dataset
- identifying periods where instruments are warming-up after a power cut 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 PM₁₀ and PM_{2.5} 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.

The table below sets out the PM10 instrumentation Used by North Lincolnshire Council and the requirement for the VCM Correction Model

Instrument	VCM Correction Required
TEOM-FDMS	No
TEOM	Yes
OSIRIS	Yes

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

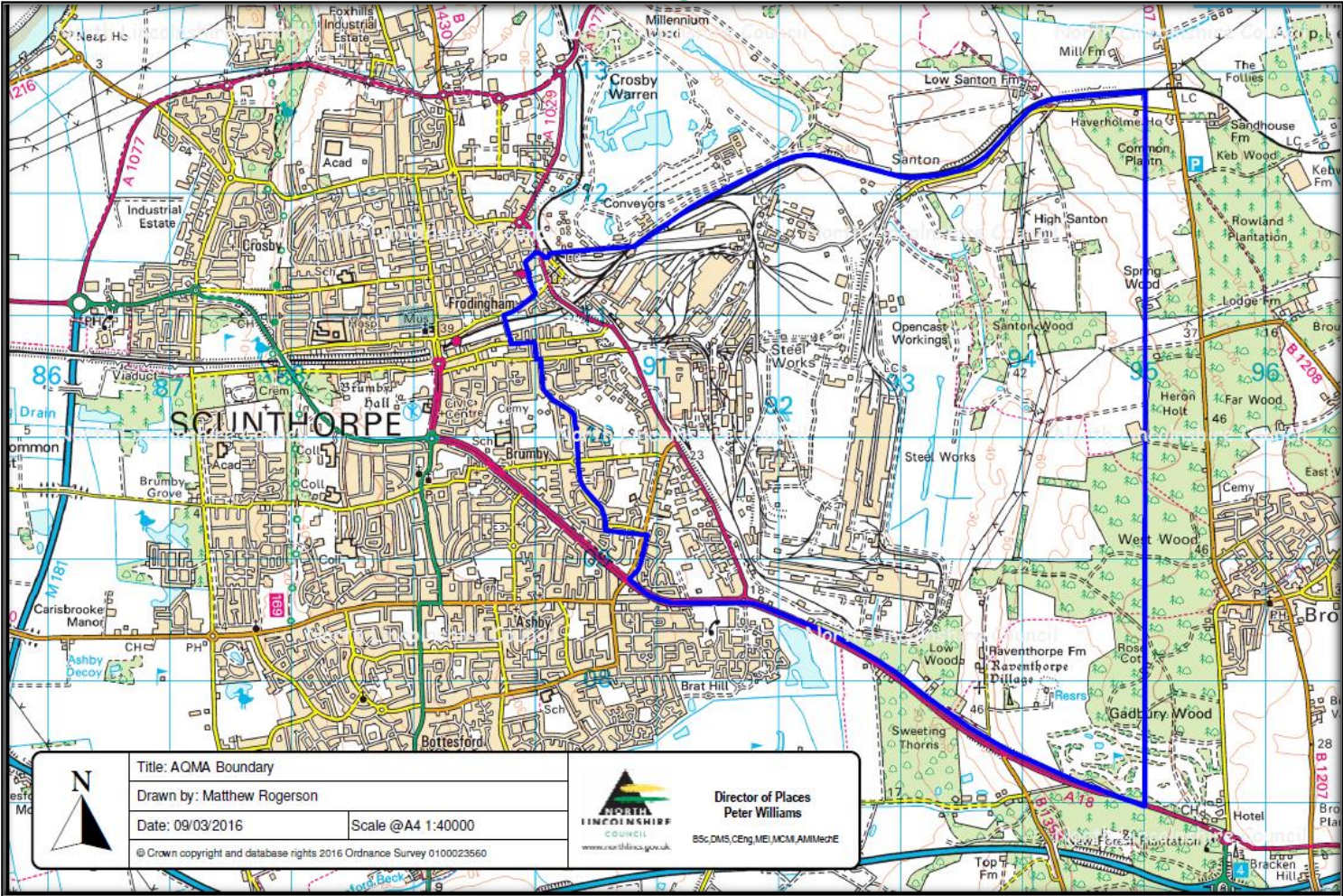


Figure D.1 - The Scunthorpe Town AQMA Boundary for the 24 hour PM10 Air Quality Objective. The boundary is shown in blue.

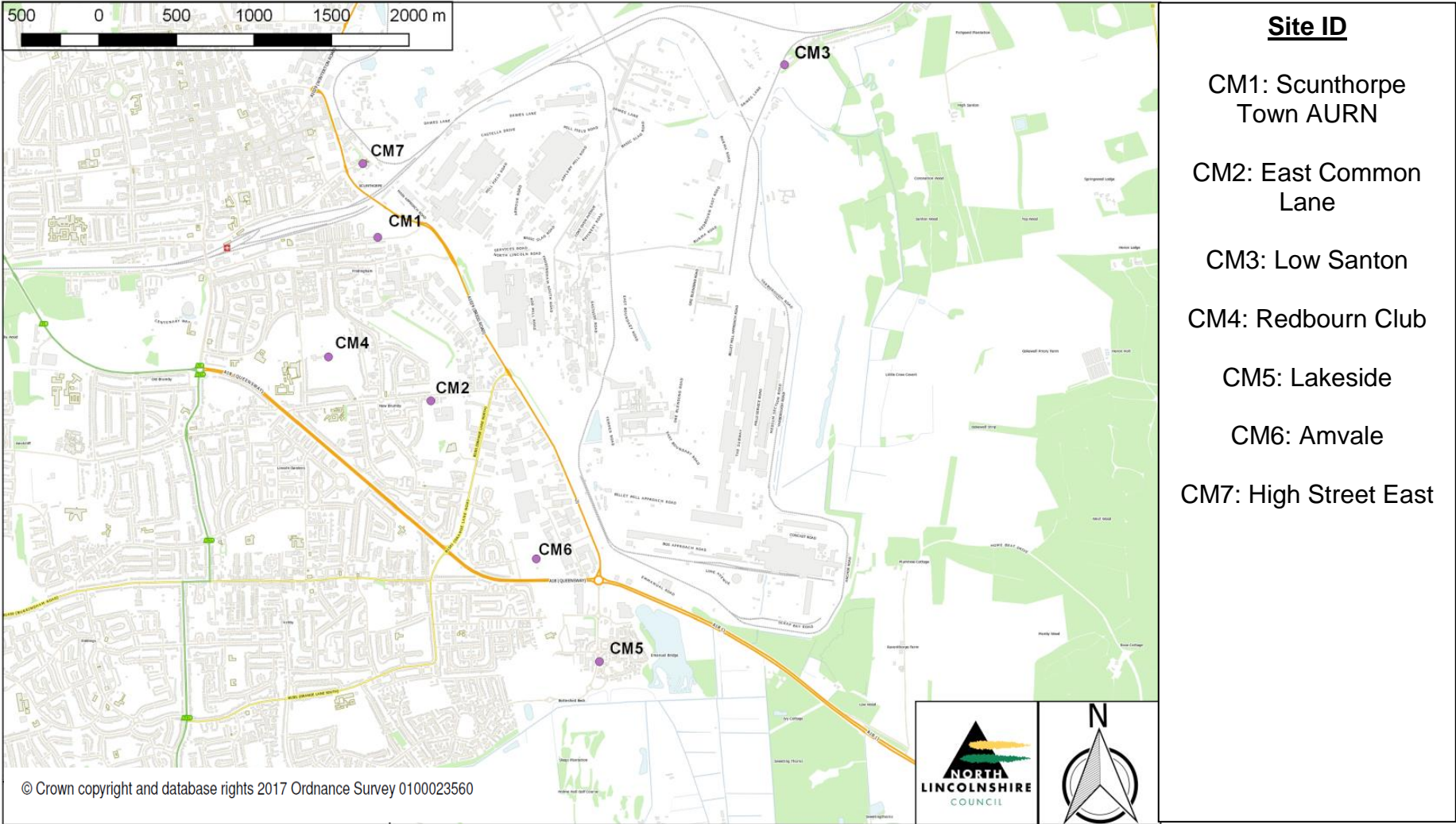


Figure D.2 - Location of continuous monitoring sites in Scunthorpe and Santon



Figure D.3 - Location of the Appleby monitoring site, Site ID: CM8



Figure D.4 - Location of the Killingholme School monitoring site (Site ID: CM9) and the Killingholme Roadside monitoring site (Site ID: CM10)



Figure D.5 - Location of the South Ferriby monitoring site, (Site ID: CM11)

Non-Automatic Monitoring Sites

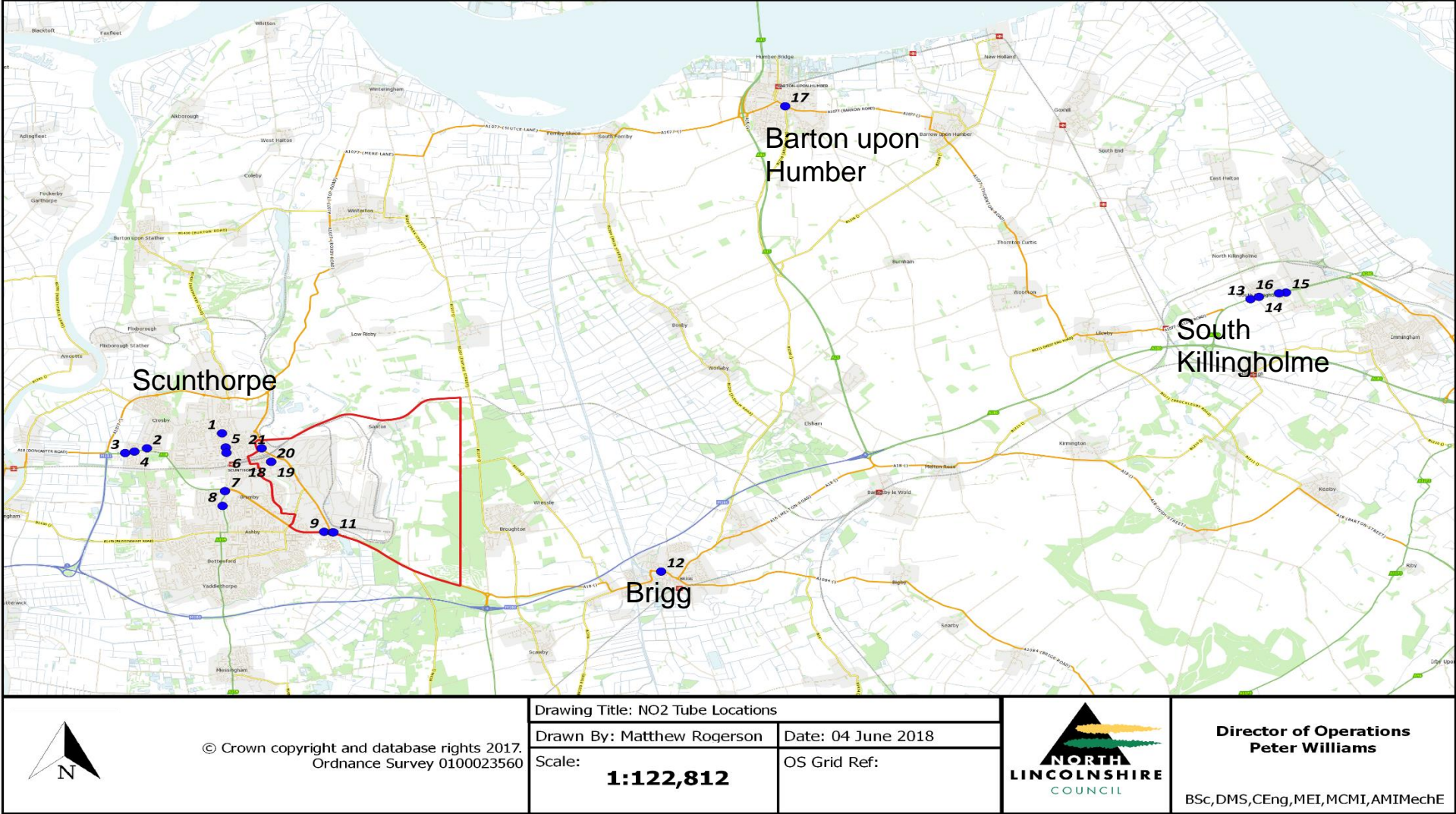


Figure D.6 – Location of diffusion tube monitoring locations, the Scunthorpe Town AQMA boundary is shown in red.

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁴	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁴ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Appendix F: New Local Developments and Planning Applications

Reference	Description of Development	Location
PA/2017/564	Planning permission for the erection of four agricultural buildings for poultry rearing, together with associated feed bins, infrastructure and new highway access	Hall Farm, Bonby
PA/2017/463	Hybrid application for full planning permission for land raising; and outline planning permission with all matters reserved for an industrial park	Singleton Birch Quarry, Melton Ross
PA/2017/286	Planning permission for easterly and westerly lateral extension to the existing Camp Wood Landfill site	Singleton Birch Quarry, Melton Ross
PA/2017/189	Application for prior approval for demolition of Killingholme A Power Station	Killingholme A Power Station, North Killingholme
PA/2017/1199	Outline planning application for up to 302 dwellings with public open space, including demolition of existing buildings, with all matters reserved except for access	RAF Kirton in Lindsey, B1400 from B1398 to B1205, Kirton in Lindsey, DN21 4HZ
PA/2017/1386	Planning permission for highway works to deliver a new terminating junction to the M181 motorway comprising a new at-grade roundabout to access the B1450 Burringham Road from the M181, new B1450 side roads and realignment of the existing B1450, two new additional roundabouts on the realigned B1450, drainage ponds and outfalls, landscaping and associated re-profiling and ancillary works	Lincolnshire Lakes, M181/ B1450 Burringham Road, Burringham
PA/2017/1615	Planning permission for demolition of existing buildings, and erection of plant building for gas reciprocating engines and generators, associated infrastructure, access works and ancillary development	Land west of Brigg Road, Scunthorpe
PA/2017/1713	Planning permission to erect a single storey rear extension to the rear (North elevation) of the existing crematorium building and associated infrastructure	Pet Crematorium, Butterwick Road, Messingham DN17 3AL
PA/2017/2141	Planning permission for a car storage and distribution facility, port related storage, engineering works, pre-delivery inspection facility building, other minor	Land North of Marsh Lane, South Killingholme

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	buildings, lighting columns and other minor works	
PA/2017/311	Planning permission for erection of a waste treatment plant for the neutralisation of waste acids, from the manufacturing of titanium dioxide, using air pollution control residues (APCRs).	Former Quarry, Brigg Road, Melton Ross
PA/2017/2051	Planning permission to retain biomass heating system including ash hopper, four chimneys, pipework and steel container	Hall Farm, Middlegate Lane, Bonby
PA/2017/1948	Planning permission to install biomass boiler within existing boiler room and installation of external wood pellet silo	Riddings Swimming Pool, Enderby Road, Scunthorpe
PA/2017/2100	Planning permission to erect a building to house three biomass boilers and a pellet storage area, to provide up to 150kW energy to the Care Home	Sycamore Lodge Nursing Home, 2 Burringham Road, Scunthorpe
PA/2017/2098	Planning permission to erect a building to house two biomass boilers and a pellet storage area, to provide up to 100kW energy to the Care Home	Rathside Care Home, 41 Gainsborough Lane, Scawby
PA/2017/1383	Application under Section 36C of the Electricity Act 1989 (a Variation Application) to vary the consent granted on 4 November 2016 for the construction and operation of a combined cycle gas turbine generating station with an electrical output of up to 820 megawatts known as Keadby II Power Station	Land next to Keadby Power Station, Keadby North Lincolnshire

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
AURN	Automatic Urban and Rural Network - the main network used for compliance reporting against the Ambient Air Quality Directives
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EA	The Environment Agency
EU	The European Union
FDMS	Filter Dynamics Measurement System
HPA	The Health Protection Agency
LAQM	Local Air Quality Management
NLC	North Lincolnshire Council
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PCT	Primary Care Trust
PHE	Public Health England
PHOF	Public Health Outcomes Framework
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

TEOM	Tapered Element Oscillating Microbalance
UK	The United Kingdom
VCM	Volatile Correction Model – A method used to correct TEOM PM ₁₀ monitoring data

References

- DEFRA Local Air Quality Management Technical Guidance (TG16)
- DEFRA Local Air Quality Management Policy Guidance (PG16)
- Detailed Assessment of the Scunthorpe PM10 Air Quality Management Area 2016
- Public Health England, Public Health Profiles. Available at: <https://fingertips.phe.org.uk/> [Accessed August 2018]