



# 2017 Air Quality Annual Status Report (ASR)

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

June 2017

North Lincolnshire Council

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## Executive Summary: Air Quality in Our Area

### Air Quality in North Lincolnshire

Air pollution is associated with a number of negative 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<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 principle town within North Lincolnshire, Scunthorpe, is home to an Integrated Iron and Steel Works, employing over 5,000 workers on a 2,000 acre site located directly to the East of the town of Scunthorpe. Emissions of PM<sub>10</sub> (particulate matter with a diameter of 10 microns or less) from this site have exceeded 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 PM<sub>10</sub> and PAH (Polycyclic Aromatic Hydrocarbons) has reduced.

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. In 2016 the Council did not identify any breaches of Air Quality Objectives for PM<sub>10</sub>.

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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

Levels of PAH continue to exceed, both The European Community target value and the UK Objective, however a significant decline has been recorded in 2016 due to the closure of the Dawes Lane Coke Ovens. 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 (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), 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 PM<sub>10</sub> Air Quality Management Area 2016 report. The key findings of the report are:

- A great deal of work has been done and continues to be done to improve the air quality in Scunthorpe.
- The PM<sub>10</sub> 24-hour mean objective is not being breached in all the areas within the current Air Quality Management Area (AQMA) boundary. Currently, it is proposed to amend the boundary to reduce the geographical area that it covers. Based on the current assessment this amendment is projected to result in the removal of approximately 5,000 residential properties from within the AQMA.

- The PM<sub>10</sub> annual mean objective is no longer being breached at Low Santon and it is therefore proposed that this AQMA is revoked.

North Lincolnshire Council will undertake public consultation on the proposed revision to the AQMA boundaries for Scunthorpe and Low Santon.

The Council also upgraded its monitoring network to ensure it meets DEFRA (Department for Environment, Food and Rural Affairs) standards relating to air quality monitoring techniques and data capture. The upgraded sites include:

- Scunthorpe Town AURN - (Automatic Urban and Rural Network) obsolete equipment replaced with new technology including SO<sub>2</sub> and NO<sub>2</sub> monitors.
- Low Santon – at this site inoperative and irreparable equipment was replaced with the latest air quality monitoring technology.
- East Common Lane Osiris – in August 2016 an Osiris monitor was installed at this location for the monitoring of PM<sub>2.5</sub> (particulate matter with an diameter of 2.5µm or less).
- The North Lincolnshire Council Air Quality website and data contract was upgraded to ensure accurate data management, ratification and reporting services. Ratification is the process that finalises data to account for anomalies, further details on this can be found in Appendix C.

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.

## **Conclusions and Priorities**

North Lincolnshire Council has continued to operate an extensive air quality monitoring network. This has identified that there have been no breaches of air quality objectives in 2016.

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 could therefore be revoked.

Despite there being no exceedance of the PM<sub>10</sub> 24-hour mean objective in 2016, some areas still experience high concentrations of this pollutant. These areas 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 however are not likely to breach this objective and could be removed from this AQMA.

The Council's PM<sub>2.5</sub> monitors did not record a breach of the EU (European Union) annual mean objective, however further monitoring at locations most affected by PM<sub>10</sub> 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 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.

2016 was an uncertain year for the UK Steel Industry, with a number of redundancies and plant closures. Fortunately, the Scunthorpe site, which has recently been purchased from Tata by Longs Steel UK Ltd (trading as British Steel) has a future and the Council looks forward to working together to gain improvements for local residents.

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 are difficult to control.

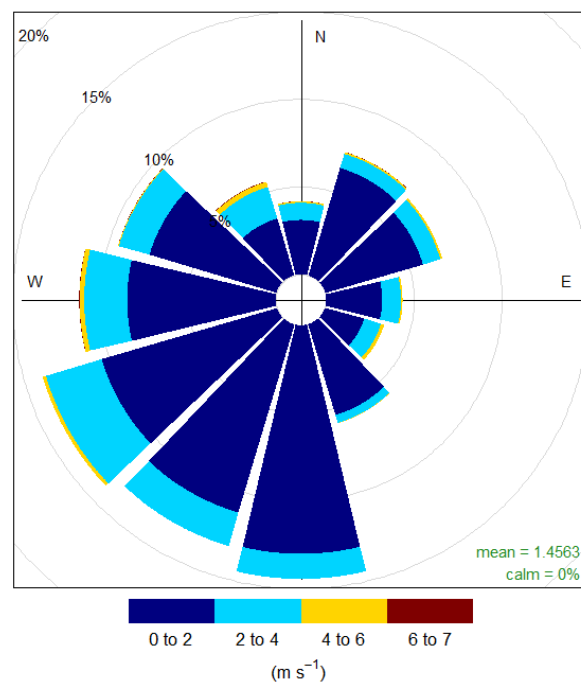


Figure 1 - direction and velocity for 2016

Wind

- 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 has however seen a reduction of PAH emissions.

The Council's priorities for 2017 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
- Review the geographical extent of the AQMA with a view to reduce it

## **Local Engagement and How to get Involved**

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.
- 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



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- 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. Further information on air quality and reports along with air quality data is available at [www.nlincsair.info](http://www.nlincsair.info)

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## 1 Local Air Quality Management

This report provides an overview of air quality in North Lincolnshire during 2016. 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 <http://nlincsair.info/>

Alternatively, see

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

We propose to revoke Low Santon AQMA (see monitoring section).

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 (inc. date of publication)
						At Declaration	Now	
Scunthorpe Town AQMA	01/11/2005	PM10 24 Hour Mean	Scunthorpe	An area encompassing the integrated steelworks site and a number of properties to the east of Scunthorpe	NO	95 days	25 days	Action Plan for the Scunthorpe PM10 AQMA, April 2008. <a href="http://www.northlincs.gov.uk/planning-and-environment/environmental-health/pollution-air-land-and-water/air-quality/">http://www.northlincs.gov.uk/planning-and-environment/environmental-health/pollution-air-land-and-water/air-quality/</a>
Low Santon AQMA	01/12/2008	PM10 Annual Mean	Low Santon	An area encompassing three residential properties	NO	51 µg/m <sup>3</sup>	26 µg/m <sup>3</sup>	Action Plan for Low Santon, January 2012. <a href="http://www.northlincs.gov.uk/planning-and-environment/environmental-health/pollution-air-land-and-water/air-quality/">http://www.northlincs.gov.uk/planning-and-environment/environmental-health/pollution-air-land-and-water/air-quality/</a>

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 the Annual Status Report 2016 concluded that the report was well structured and gives comprehensive conclusions for all sources and pollutants. The appraisal also concluded that the updated Action Plan should include both key performance indicators and estimated pollution reductions. It was also noted that the justification for using the FDMS data at Low Santon to compare to the 24 hourly mean objectives needed to be more robust in any detailed assessment and a clear justification is given before the Low Santon AQMA is revoked.

North Lincolnshire Council has taken forward a number of direct measures during the current reporting year of 2016 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 and awarded to a new provider to ensure sufficient data management, ratification and reporting services
- 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

The Action Plan for Low Santon contained a number of measures for the following regulators and operators:

- The Environment Agency
- Tata Steel
- Tarmac
- Harsco Metals
- North Lincolnshire Council

Actions and improvements undertaken by site operators are discussed in detail in the Detailed Assessment of the Scunthorpe PM<sub>10</sub> Air Quality Management Area 2016 Report. This report recommends that, due to an improvement in the level of PM<sub>10</sub> 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

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 Action Plan will use the format provided by DEFRA.

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 has however seen a reduction of PAH emissions.

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 <sub>10</sub> analysers	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	NLC	Implemented	Implemented			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 PM <sub>10</sub> , PM <sub>2.5</sub> , PM <sub>1</sub> 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 2015, allowed greater analysis and identification of sources. Subsequent improvements in the level of PM <sub>10</sub> at Santon are largely due to actions 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	

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A4	PPC Permit Improvement Programme. British Steel to undertake an investigation to monitor and quantify point source and fugitive particulate matter including PM <sub>10</sub> and PM <sub>2.5</sub> 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  EA	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	Tata UK Ltd EA	Implemented	Implemented			Complete	Complete	
A8	PPC Permit Improvement	Environmental Permits	Other measure through permit	British Steel	Implemented	Implemented			Complete	Complete	

	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.		systems and economic instruments	EA							
B1	<p>Launch and maintain North Lincolnshire air quality website with:</p> <ul style="list-style-type: none"> <li>• Access to real time &amp; historical data,</li> <li>• Production of graphs and pollution roses</li> </ul>	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

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	<ul style="list-style-type: none"> <li>• Access to air quality reports and latest news updates</li> </ul>										
	<ul style="list-style-type: none"> <li>• General information</li> </ul>										
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 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	NLC	Implemented	Implemented			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.

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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



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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	NLC	Implemented	Implemented			Ongoing	To continue	
				HPA							
				PCT							
				EA							

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D2	Set up a Local Industry Forum involving the Environment Agency, North Lincolnshire Council and Local Industry representatives with the potential to emit PM <sub>10</sub> . The purpose of the group is to identify key issues, agree measures for reduction of PM <sub>10</sub> .	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		
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	Environmental Permits	Other	NLC	Implemented	Implemented			Ongoing			
									Complete	Complete		
									Complete			

	permit regime and regulatory responsibility for the same.										
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 <sub>10</sub> 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 <sub>10</sub> .	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 <sub>10</sub> .	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	Environmental Permits	Other	NLC	Implemented	Implemented			Ongoing	To continue	The recent Detailed Assessment report recommends that, due
EA											

	develop targets for the reduction of the area covered by the AQMA so that the number of properties affected will be reduced.			Industry						to improvements in the level of PM <sub>10</sub> , 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 PM<sub>10</sub> 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 new developments, particularly at the planning application stage.
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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	NLC	Implemented	Implemented			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="http://www.northlincs.gov.uk/transport-and-streets/roads-highways-and-pavements/highway-documents/local-transport-plan/">http://www.northlincs.gov.uk/transport-and-streets/roads-highways-and-pavements/highway-documents/local-transport-plan/</a>
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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 numbers 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 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.
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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 given the advances made in engine technology and the current Euro class engines. The Council used to retrospectively fit these to large goods vehicles when the exhaust PM<sub>10</sub> emissions were at 0.15 - 0.1 g/kWh Since the introduction of EURO IV PM<sub>10</sub> emissions have been 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"> <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>	<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<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 PM<sub>10</sub>, any initiatives to address PM<sub>10</sub> will have a corresponding effect on the reduction of PM<sub>2.5</sub>. 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 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

The Action Plan for Low Santon which was principally aimed at the operators on the Integrated Steelworks site contained a number of practical measures that would reduce particulate emissions, including PM<sub>2.5</sub>:

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

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In 2017 the Council intend to review the Action Plan to specifically incorporate measures to address PM<sub>2.5</sub> emissions. It should be noted that an Osiris monitor was located at East Common Lane in August 2016 to monitor the emissions of PM<sub>2.5</sub>. The Council have taken on the responsibility of monitoring PM<sub>2.5</sub> at this location.

## **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 in 2016. Table A.1 in Appendix A shows the details of these sites.

Local authorities are not required to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. No specific issues have been identified within North Lincolnshire except for benzene and therefore no detailed reporting is included in this report for the other pollutants.

National monitoring results for the above pollutants are available at <https://uk-air.defra.gov.uk/data/>

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 21 sites during 2016. Table A.2 in Appendix A shows the details of these sites.

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

## 3.2 Individual Pollutants

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

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

For the general public, the most prominent sources of NO<sub>2</sub> are internal combustion engines burning fossil fuels. Chronic exposure to NO<sub>2</sub> can cause respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma.

In 2016 the Council undertook continuous monitoring of NO<sub>2</sub> 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 NO<sub>2</sub> concentrations at properties adjacent to the A160 in South Killingholme as data from NO<sub>2</sub> 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 NO<sub>2</sub> at South Killingholme report, which concluded that an air quality objective was not being breached and an AQMA should not be declared. The Council will review additional air quality data gathered to date before deciding whether or not the continuous monitor at South Killingholme should be removed.

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>. Figure A.1 in Appendix A, shows compliance with this objective for years 2012 to 2016 at the four continuous monitoring sites (Site ID’s CM1, CM3, CM9, CM10).

All sites, show a slight decline in the NO<sub>2</sub> annual mean concentration for 2016. There is a sharp decline in the reported concentration in Low Santon from 2015 to 2016, this is due to equipment failure at this site in 2015 which resulted in a 55.4% data capture and the result was then annualised. This may account for the reported concentration of 27.1 µg/m<sup>3</sup> in 2015 compared to the 19 µg/m<sup>3</sup> recorded in 2016.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B. The diffusion tubes did not identify an exceedance of the NO<sub>2</sub> annual mean objective.

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.

**In 2016 there were no recorded exceedances of both the annual mean (40µg/m<sup>3</sup>) and hourly mean (200 µg/m<sup>3</sup> not to be exceeded more than 18 times a year) air quality objectives for nitrogen dioxide.**

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

PM<sub>10</sub> 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. PM<sub>10</sub> 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 PM<sub>10</sub> emissions in North Lincolnshire is the Integrated Steelworks Site, both from direct sources: chimneys and stacks, and indirect sources: stockpiles and roads.

In 2016 the Council monitored PM<sub>10</sub> 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 PM<sub>10</sub> 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.

PM<sub>10</sub> 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 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>. 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 for years 2012 to 2016 at the continuous monitoring sites.

Table A.6 in Appendix A compares the ratified continuous monitored PM<sub>10</sub> daily 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 for years 2012 to 2016 for the continuous monitoring sites.

**In 2016 there were no recorded exceedances of both the annual mean ( $40\mu\text{g}/\text{m}^3$ ) and 24 hourly mean ( $50\mu\text{g}/\text{m}^3$  not to be exceeded more than 35 times a year) air quality objectives for  $\text{PM}_{10}$ .**

### **3.2.3 Particulate Matter ( $\text{PM}_{2.5}$ )**

In 2016 the Council monitored  $\text{PM}_{2.5}$  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, the annual mean concentration has therefore been annualised to reflect this. 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  $\text{PM}_{2.5}$  monitoring method is available to the Council at this time.

Table A.7 in Appendix A presents the ratified and adjusted monitored  $\text{PM}_{2.5}$  annual mean concentrations for the past 5 years.

Figure A.4 in Appendix A shows compliance with the objective for years 2012 to 2016 for the two monitoring locations.

Background concentration maps provided by DEFRA for 2011 show an average  $\text{PM}_{2.5}$  concentration for North Lincolnshire of  $11.3\mu\text{g}/\text{m}^3$ .

**In 2016 there were no recorded exceedances of the annual mean ( $25\mu\text{g}/\text{m}^3$ ) air quality target value for  $\text{PM}_{2.5}$ .**

### **3.2.4 Sulphur Dioxide ( $\text{SO}_2$ )**

UK emissions of SO<sub>2</sub> are dominated by combustion of fuels containing sulphur, such as coal and heavy oils. Exposure to SO<sub>2</sub> may irritate the airways of the lungs, increasing the symptoms of those suffering from lung diseases.

Table A.8 in Appendix A compares the ratified continuous monitored SO<sub>2</sub> concentrations for year 2016 with the air quality objectives for SO<sub>2</sub>.

**In 2016 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 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/m<sup>3</sup>. The annual mean recorded at Scunthorpe Town AURN in 2016 was 1.02 µg/m<sup>3</sup>.

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

**In 2016 there were no recorded exceedances of the annual mean (25µg/m<sup>3</sup>) 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 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/m<sup>3</sup> 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/m<sup>3</sup>. Like in previous years both of the North Lincolnshire sites exceeded the objective, in 2016 the annual average for Scunthorpe Town AURN was 1.05 ng/m<sup>3</sup>, and for Low Santon it was 1.14 ng/m<sup>3</sup>. Although these annual averages exceed the objective, there has been a significant decline in the emissions at these monitoring sites. Furthermore it is prudent to note that the emissions at Low Santon have reduced by more than a third from 3.5 ng/m<sup>3</sup> to 1.14 ng/m<sup>3</sup>, this is largely due to the closure of the Dawes Lane Coke Ovens.

Table A.10 in Appendix A presents the monthly PAH data for the year 2016 at Scunthorpe Town and Low Santon.

Figure A.5 in Appendix A shows the PAH annual mean concentration for 2016 at Scunthorpe Town and Low Santon.

Table A.10 in Appendix A presents the monthly PAH data for the year 2016 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  $\text{PM}_{10}$  particulate fraction of ambient air.

In 2016 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) <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; Flourescent, FDMS & 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	Flourescent, FDMS & TEOM	41	5	2
CM4	Redbourn Club	Urban background	490002	410069	PM <sub>10</sub>	YES	TEOM	15	N/A	1.5
CM5	Lakeside	Urban background	491750	408127	PM <sub>10</sub>	YES	TEOM	4	8	1.5
CM6	Amvale	Industrial	491343	408782	PM <sub>10</sub>	YES	TEOM	150	100	1.5
CM7	High Street East	Industrial	490224	411301	PM <sub>10</sub>	YES	TEOM	18	10	1.5
CM8	Appleby	Rural	495075	414767	PM <sub>10</sub>	NO	TEOM	17	N/A	1.5
CM9	Killingholme School	Other	514880	416133	SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub>	NO	Chemiluminescent & TEOM	9	N/A	2
CM10	Killingholme Roadside	Roadside	514810	415980	NO <sub>2</sub>	NO	Chemiluminescent	20	10	1
CM11	South Ferriby	Other	497931	420993	PM <sub>10</sub> , PM <sub>2.5</sub>	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) <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	NO <sub>2</sub>	NO	3	1	NO	2
DT2	Scotter Road (North side of roundabout)	Roadside	487239	411259	NO <sub>2</sub>	NO	9	2	NO	2
DT3	B & Q	Roadside	486699	411110	NO <sub>2</sub>	NO	2	15	NO	2
DT4	Doncaster Road/Hilton Avenue	Roadside	486928	411156	NO <sub>2</sub>	NO	12	3	NO	2
DT5	Britannia Corner	Urban Background	489190	411285	NO <sub>2</sub>	YES	4	2	NO	2
DT6	Oswald Road	Urban Background	489209	411118	NO <sub>2</sub>	YES	4	3	NO	2
DT7	Jct A18/Ashby Road	Roadside	489172	409926	NO <sub>2</sub>	NO	20	2	NO	2
DT8	Ashby Road (Old Brumby Street)	Roadside	489112	409463	NO <sub>2</sub>	NO	15	1	NO	2
DT9	Dudley Road/Queensway	Roadside	491628	408658	NO <sub>2</sub>	YES	80	2	NO	2
DT10	Jct Brigg Road/A18	Roadside	491838	408641	NO <sub>2</sub>	YES	15	9	NO	1.5

DT11	Ashby Lodge	Roadside	491859	408645	NO <sub>2</sub>	YES	1	9	NO	2
DT12	Barnard Avenue, Brigg	Roadside	499975	407421	NO <sub>2</sub>	NO	30	3	NO	2
DT13	Ulceby Road, Killingholme	Roadside	514573	415901	NO <sub>2</sub>	NO	15	1	NO	2
DT14	Killingholme Nox Analyser	Roadside	514782	415971	NO <sub>2</sub>	NO	15	1	NO	2
DT15	Humber Road Chip Shop	Urban Background	515452	416107	NO <sub>2</sub>	NO	2	15	NO	2
DT16	Humber Road, LP 695	Roadside	515279	416085	NO <sub>2</sub>	NO	5	2	NO	2
DT17	Holydyke, Barton	Suburban	503048	421907	NO <sub>2</sub>	NO	15	1	NO	2
DT18	Scunthorpe Town AURN	Industrial	490316	410837	NO <sub>2</sub>	YES	21	6	YES	2
DT19	Scunthorpe Town AURN	Industrial	490316	410837	NO <sub>2</sub>	YES	21	6	YES	2
DT20	Scunthorpe Town AURN	Industrial	490316	410837	NO <sub>2</sub>	YES	21	6	YES	2
DT21	Station Road/Brigg Road	Roadside	490080	411258	NO <sub>2</sub>	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 NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
CM1	Industrial	Automatic	N/A	97.5	19.9	26.9	25.2	17.6	17
CM3	Industrial	Automatic	N/A	99.4	18.6	16.4	16.3	27.1	19
CM9	Other	Automatic	N/A	99.8	21.1	22.4	22.1	20.4	17
CM10	Roadside	Automatic	N/A	92	<b><u>N/A</u></b>	27.1	28.5	24.6	23
DT1	Urban Background	Diffusion Tube	N/A	100	26.7	34.6	31.1	24.5	25
DT2	Roadside	Diffusion Tube	N/A	100	26.2	<b>41.0</b>	33.2	26.3	28
DT3	Roadside	Diffusion Tube	100	83.3	<b><u>N/A</u></b>	<b><u>N/A</u></b>	<b><u>N/A</u></b>	<b><u>N/A</u></b>	20
DT4	Roadside	Diffusion Tube	N/A	100	22.8	34.1	29.5	22.1	24
DT5	Urban Background	Diffusion Tube	N/A	100	30.3	<b>41.4</b>	32.2	25.2	25
DT6	Urban Background	Diffusion Tube	N/A	100	26.6	37.5	31.4	24.2	27
DT7	Roadside	Diffusion Tube	N/A	100	26.9	37.4	32.1	25.8	27
DT8	Roadside	Diffusion Tube	N/A	100	27.9	39.4	32.2	26.3	29
DT9	Roadside	Diffusion Tube	N/A	100	21.7	29.8	24.4	19.4	21
DT10	Roadside	Diffusion Tube	N/A	91.7	<b>43.4</b>	<b><u>60.1</u></b>	<b>45.4</b>	36.3	38
DT11	Roadside	Diffusion Tube	N/A	100	24.8	32.7	27.3	22.9	20
DT12	Roadside	Diffusion Tube	N/A	100	27.1	39.7	30.8	26.1	26
DT13	Roadside	Diffusion Tube	100	58.3	37.6	<b>51.3</b>	<b>42.9</b>	26.2	31
DT14	Roadside	Diffusion Tube	N/A	100	<b><u>N/A</u></b>	<b>48.0</b>	<b>46.7</b>	33.7	31
DT15	Urban Background	Diffusion Tube	N/A	100	20.7	30	27.3	19.4	21

DT16	Roadside	Diffusion Tube	N/A	91.7	30.3	<b>45.3</b>	35.1	27.0	26
DT17	Suburban	Diffusion Tube	N/A	100	25.2	33.7	25.6	22.4	23
DT18	Industrial	Diffusion Tube	N/A	91.7	21.0	26.1	21.5	18.2	17
DT19	Industrial	Diffusion Tube	N/A	91.7	19.9	26.4	20.3	17.0	17
DT20	Industrial	Diffusion Tube	N/A	91.7	19.0	28.4	21.5	16.5	17
DT21	Roadside	Diffusion Tube	N/A	100	20.9	33.2	27.9	22.7	23

- Diffusion tube data has been bias corrected
- Annualisation has been conducted where data capture is <75%
- If applicable, all data has been distance corrected for relevant exposure

**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.

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

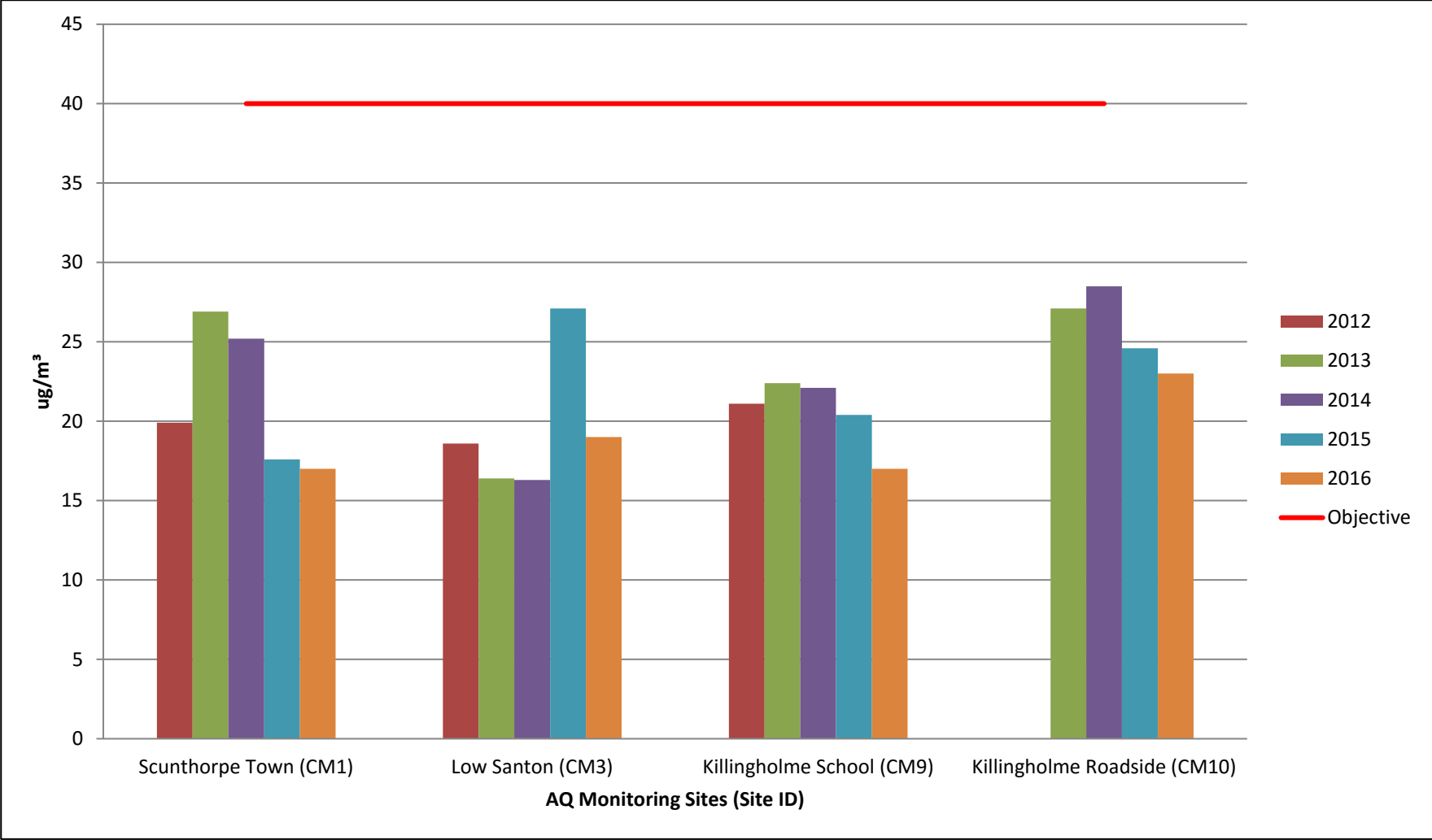




Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
					2012	2013	2014	2015	2016
CM1	Industrial	Automatic	N/A	97.5	<b>0</b>	2	9	0	<b>0</b>
CM3	Industrial	Automatic	N/A	99.4	<b>0</b>	0	0	<b>0</b> <b>(80.3)</b>	<b>0</b>
CM9	Other	Automatic	N/A	99.8	0	0	0	0	0
CM10	Roadside	Automatic	N/A	92	<b>N/A</b>	<b>N/A</b>	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	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2012	2013	2014	2015	2016
CM1 FDMS	Industrial	N/A	82.5	20.8	22.6	21.2	21.4	17
CM1 TEOM	Industrial	N/A	97.6	20.9	23.4	21.5	19.1	17
CM2	Urban Background	N/A	95.7	22.3	25.2	22.9	19.3	20
CM3 FDMS	Industrial	N/A	94.6	26.4	27.5	25.1	27.7	22
CM3 TEOM	Industrial	N/A	97.1	28.5	33.3	29.6	27.8	26
CM4	Urban Background	N/A	97.6	19.7	21.8	21.3	18.6	17
CM5	Urban Centre	N/A	95.3	21.7	23.1	21.6	19.7	21
CM6	Industrial	N/A	97.9	<b>N/A</b>	22.5	20.6	19.7	20
CM7	Industrial	N/A	98.8	<b>N/A</b>	<b>N/A</b>	21.4	22.0	20
CM8	Rural	N/A	84.2	18.0	17.5	16.0	18.5	16
CM9	Other	N/A	93.1	20.2	19.3	19.1	18.0	18
CM11	Other	N/A	93.1	23.3	28.4	15.8	23.4	21

☒ 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

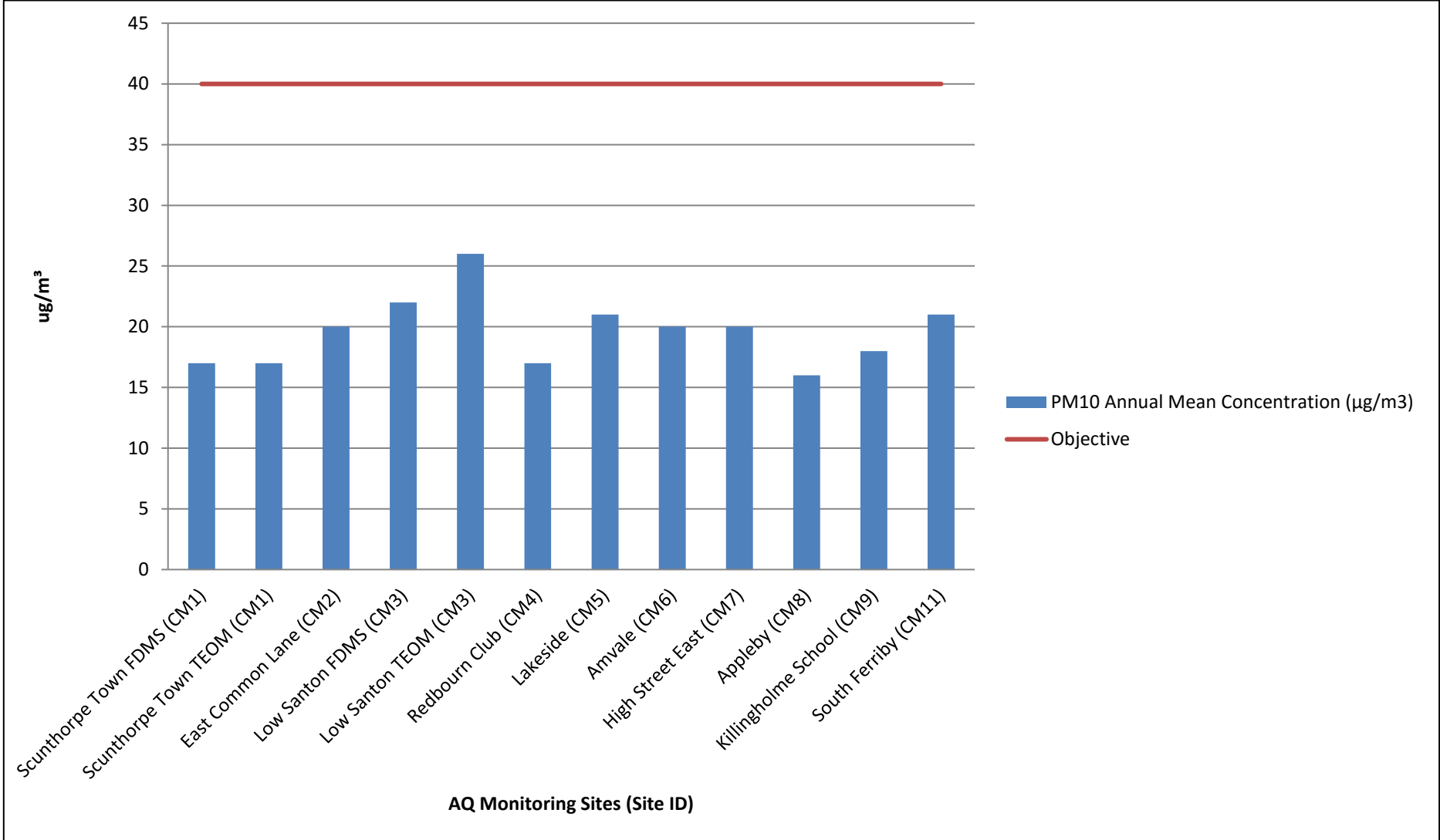


Table A.6 – 24-Hour Mean PM<sub>10</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	PM <sub>10</sub> 24-Hour Means > 50µg/m <sup>3</sup> <sup>(3)</sup>				
				2012	2013	2014	2015	2016
CM1 FDMS	Industrial	N/A	82.5	10 (38)	<b>20 (40)</b>	17	15	6
CM1 TEOM	Industrial	N/A	97.6	16	24	18	7	8
CM2	Urban Background	N/A	95.7	19	35	27	9	18
CM3 FDMS	Industrial	N/A	94.6	16	20	<b>18 (47)</b>	21	11
CM3 TEOM	Industrial	N/A	97.1	21	<b>43</b>	32	<b>42 (68)</b>	25
CM4	Urban Background	N/A	97.6	10	17	18	6	11
CM5	Urban Centre	N/A	95.3	<b>12 (39)</b>	12	10	12	11
CM6	Industrial	N/A	97.9	<b>N/A</b>	<b>9 (46)</b>	13	9	15
CM7	Industrial	N/A	98.8	<b>N/A</b>	<b>N/A</b>	<b>5 (41)</b>	12	4
CM8	Rural	N/A	84.2	1	6	4	2	1
CM9	Other	N/A	93.1	<b>4 (34)</b>	5	6	2	1
CM11	Other	N/A	93.1	10	20	<b>4 (30)</b>	8	6

**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>

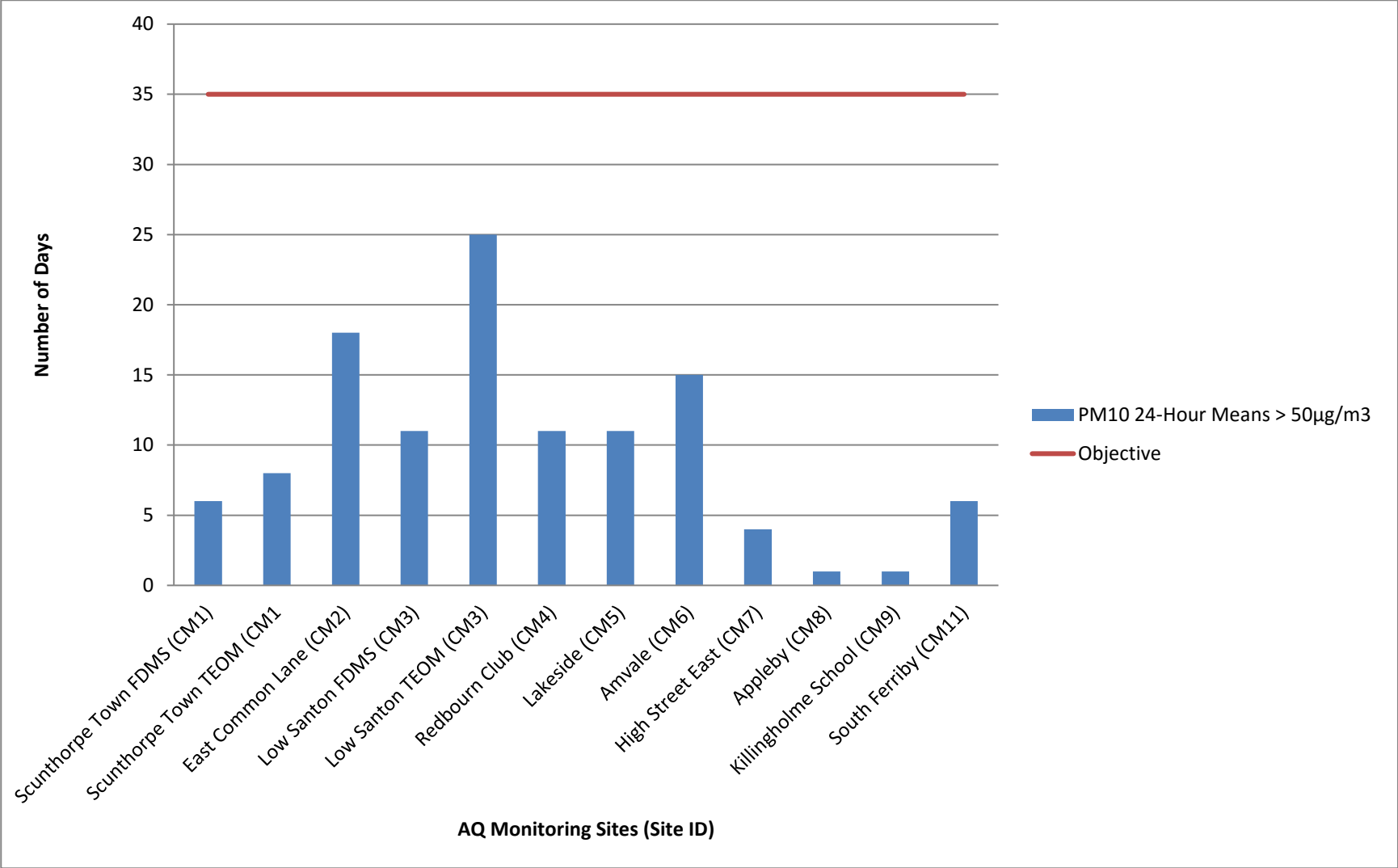


Table A.7 – PM<sub>2.5</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	PM <sub>2.5</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2012	2013	2014	2015	2016
CM2	Urban Background	70.1	28.6	N/A	N/A	N/A	N/A	7
CM11	Other	N/A	93.1	6.9	9.1	5.8	6.8	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

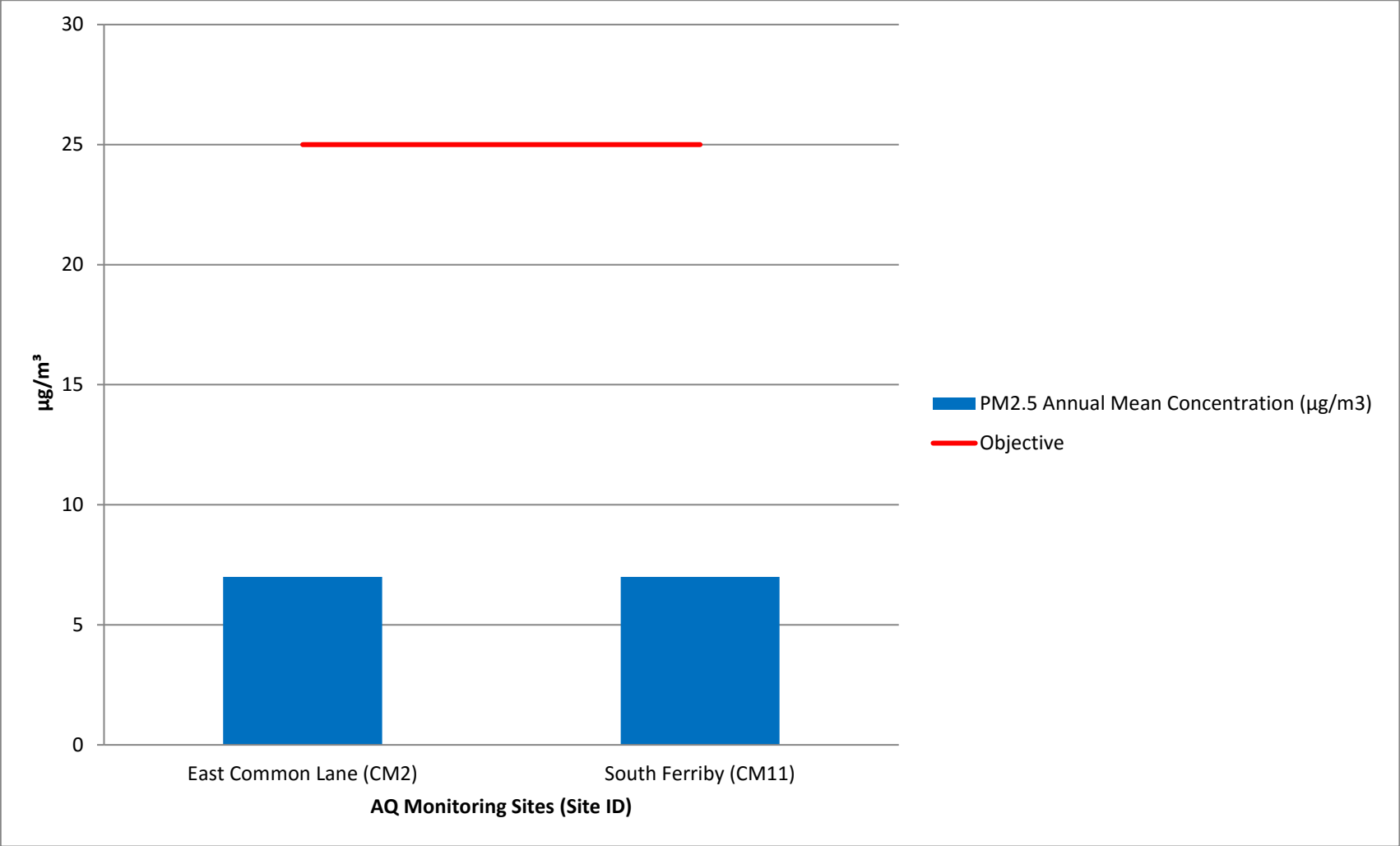


Table A.8 – SO<sub>2</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	Number of Exceedances 2016 (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	Industrial	N/A	93.7	0	0	0
CM3	Industrial	N/A	92.5	0	0	0
CM9	Other	N/A	99.5	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 µg/m3
13/01/2016	27/01/2016	0.94
27/01/2016	10/02/2016	0.46
10/02/2016	24/02/2016	4.24
24/02/2016	09/03/2016	0.76
09/03/2016	23/03/2016	0.72
23/03/2016	06/04/2016	0.64
06/04/2016	20/04/2016	0.9
20/04/2016	04/05/2016	0.51
04/05/2016	18/05/2016	0.85

Start Date	End Date	Scunthorpe Town AURN (CM1) Concentration $\mu\text{g}/\text{m}^3$
18/05/2016	01/06/2016	0.39
01/06/2016	15/06/2016	1.04
15/06/2016	29/06/2016	Data Not Available
29/06/2016	13/07/2016	0.25
13/07/2016	27/07/2016	Data Not Available
27/07/2016	10/08/2016	0.2
10/08/2016	24/08/2016	1.64
24/08/2016	07/09/2016	0.77
07/09/2016	21/09/2016	0.56

Start Date	End Date	Scunthorpe Town AURN (CM1) Concentration µg/m <sup>3</sup>
21/09/2016	05/10/2016	1.56
05/10/2016	19/10/2016	2.57
19/10/2016	02/11/2016	0.59
02/11/2016	16/11/2016	0.77
16/11/2016	30/11/2016	0.74
30/11/2016	14/12/2016	1.92
14/12/2016	28/12/2016	0.84
28/12/2016	11/01/2017	0.73

Note: The Benzene annual mean objective is 5µg/m<sup>3</sup>

Table A.10 PAH 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)	0.72	1.17	0.34	0.69	0.48	0.96	0.03	1.4	0.66	3.9	0.79	1.5	<b>1.05</b>
Low Santon (CM3)	2.52	2.59	0.57	0.40	0.23	0.22	0.45	1.9	1.6	0.56	0.71	2.1	<b>1.14</b>

Notes: Exceedances of the UK PAH annual mean objective of 0.25 ng/m<sup>3</sup> are shown in bold

Figure A.5 – Trends in Annual Mean PAH Concentrations

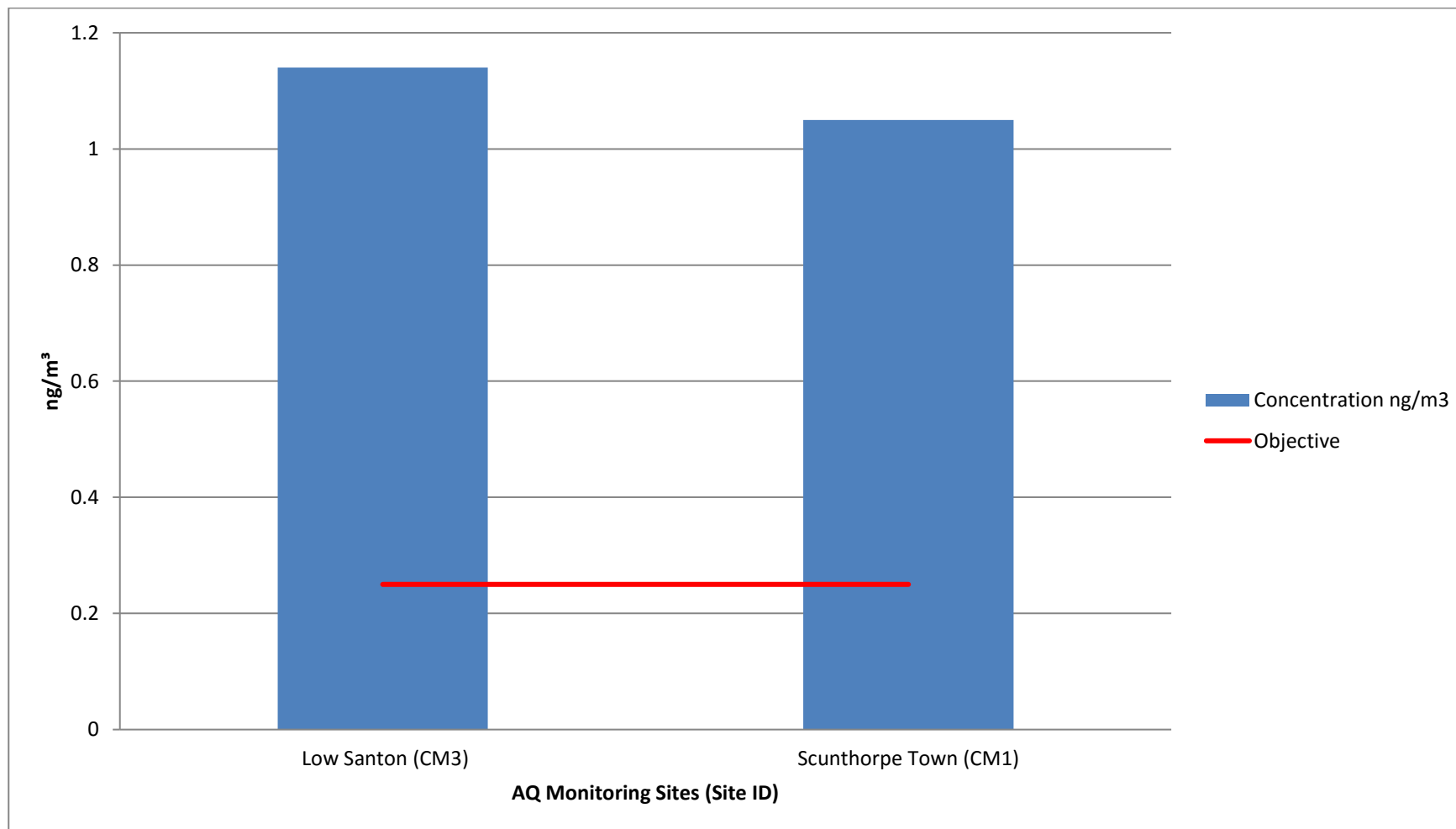


Table A.11 Heavy Metals Monitoring Results

Heavy Metal	Scunthorpe Town AURN (CM1) Annual Mean Concentration ng/m <sup>3</sup>	Low Santon (CM3) Annual Mean Concentration ng/m <sup>3</sup>	Target Value ng/m <sup>3</sup>
Arsenic (As)	0.71	0.70	6
Cadmium (Cd)	0.17	0.30	5
Chromium (Cr)	1.57	2.78	
Copper (Cu)	4.91	4.32	
Iron (Fe)	491.12	1679.56	
Manganese (Mn)	18.23	93.27	
Nickel (Ni)	0.94	1.27	20
Lead (Pb)	11.21	16.60	500
Vanadium (V)	1.30	9.23	

Heavy Metal	Scunthorpe Town AURN (CM1) Annual Mean Concentration ng/m3	Low Santon (CM3) Annual Mean Concentration ng/m3	Target Value ng/m3
Zinc (Zn)	22.53	24.73	
Cobalt	0.11	0.19	
Selenium	0.94	1.12	

Notes: Exceedances of any Target Values are shown in bold

## Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2016

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (factor) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
DT1	45.1	38.7	36.4	34.4	31.2	25.0	29.3	27.7	20.9	30.4	41.0	44.8	33.7	25	23
DT2	43.6	43.9	29.1	43.3	38.8	32.1	30.0	30.3	36.5	34.9	45.1	53.8	38.5	28	24.0
DT3	N/A	N/A	29.7	24.1	23.4	18.4	22.6	22.1	27.5	23.0	36.6	44.5	27.2	20	20.0
DT4	40.0	35.8	30.7	30.4	28.6	22.7	22.9	26.9	31.4	29.1	42.4	53.2	32.8	24	21.0
DT5	43.0	41.5	38.2	33.5	14.9	30.5	27.7	27.3	33.2	34.6	45.5	48.8	34.9	25	23.0
DT6	43.7	37.9	39.3	38.9	36.0	33.5	23.3	27.3	33.2	36.6	44.7	48.6	36.9	27	25.0
DT7	46.3	42.7	38.5	33.3	36.6	30.3	28.8	24.3	35.3	33.7	44.0	45.5	36.6	27	21.0
DT8	46.3	43.3	41.2	37.5	38.1	34.8	28.9	31.9	35.6	36.1	53.3	53.0	40.0	29	22.0
DT9	32.4	30.5	25.4	30.4	28.5	28.8	19.2	20.2	24.0	26.3	38.6	37.7	28.5	21	<b>N/A</b>
DT10	62.3	56.5	44.4	57.3	48.6	N/A	49.9	47.7	51.3	24.3	61.4	72.7	52.4	38	31.0
DT11	36.2	27.9	30.6	29.4	24.3	26.4	26.0	7.9	29.9	15.6	37.1	43.8	27.9	20	19.0
DT12	43.0	42.5	30.8	39.5	31.6	28.8	32.0	28.6	33.1	16.1	42.4	53.6	35.2	26	20.0
DT13	41.7	40.1	42.4	42.8	37.1	32.6	30.2	N/A	N/A	N/A	N/A	N/A	38.1	31	23.0
DT14	51.4	42.0	43.5	50.0	45.2	40.5	39.5	42.4	42.8	21.1	41.6	47.8	42.3	31	23.0
DT15	35.6	36.3	26.7	35.4	35.7	29.5	19.8	20.2	25.1	16.5	41.1	30.6	29.4	21	21.0



DT16	38.6	30.7	43.5	44.2	40.9	34.8	32.4	28.3	31.3	18.4	43.7	N/A	35.2	26	23.0
DT17	33.8	31.0	37.1	35.7	31.7	33.0	25.5	28.3	32.9	19.4	37.5	34.3	31.7	23	20.0
DT18	32.5	24.2	17.5	24.9	18.8	15.1	14.5	20.0	18.2	N/A	31.9	38.5	23.3	17	17.0
DT19	30.6	22.2	20.2	18.1	20.9	14.9	11.5	15.0	21.6	N/A	34.4	40.0	22.7	17	17.0
DT20	31.5	27.5	22.4	21.6	19.3	15.7	12.6	17.1	20.0	N/	29.6	35.9	23.0	17	17.0
DT21	43.1	29.9	32.1	29.3	29.9	27.7	22.2	24.4	30.9	20.5	42.9	47.7	31.7	23	19.0

Local bias adjustment factor used

National bias adjustment factor used

Annualisation has been conducted where data capture is <75%

**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

### C.1 New Local Developments

North Lincolnshire Council has considered all new local developments for the 2016 calendar year and confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area. North Lincolnshire Council confirms that all the following have been considered:

- Developments leading to a significant change in road traffic flows or other transport sources
- Industrial Installations
- Biomass boilers
- Combined Heat and Power (CHP) plant
- Landfill sites and quarries

### C.2 Planning Applications

Two planning applications were made in 2015 to commence the Lincolnshire Lakes development. The Lincolnshire Lakes development is the creation of a series of village settlements providing around 6,000 new homes, a business park, leisure facilities and office accommodation on land West of Scunthorpe. A new football stadium, for Scunthorpe United FC, is proposed for this area and an application has been submitted for de-trunking of the M181 to facilitate access to this area. The implementation date of the Lincolnshire Lakes Development has been delayed. The extent of the Lincolnshire Lakes development area is shown in Figure C.1.



Figure C.1 - The Lincolnshire Lakes development area

The Council routinely review air quality assessments for planning applications and new local developments. For the 2015 calendar year there were no proposed local developments which may have an impact on air quality within the Local Authority area. Appendix F contains details of the New Local Developments and Planning Applications considered.

## Annualising Data

### NO<sub>2</sub> Annual Mean site DT13

Due to improvements to the A160 road, diffusion tube monitoring location DT13 was removed during 2016 and data is only available for 7 months, resulting in 58.3% data capture for 2016. 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
07/01/2016	29/01/2016	20.9	41.7	20.9
29/01/2016	26/02/2016	19.7	40.1	19.7
26/02/2016	31/03/2016	17.8	42.4	17.8
31/03/2016	27/04/2016	14.2	42.8	14.2
27/04/2016	25/05/2016	13.6	37.1	13.6
25/05/2016	30/06/2016	11.9	32.6	11.9
30/06/2016	27/07/2016	9.3	30.2	9.3
27/07/2016	31/08/2016	10.6		
31/08/2016	28/09/2016	13.2		
28/09/2016	26/10/2016	15.5		
26/10/2016	29/11/2016	24		
29/11/2016	28/12/2016	30.1		
<b>Average</b>		<b>16.7</b>	<b>38.1</b>	<b>15.3</b>

B1 = NO<sub>2</sub> data for CM1, Scunthorpe Town AURN

D1 = NO<sub>2</sub> data for DT13

B1 Annual Mean ( $A_M$ ) = 16.7

B1 Period Mean ( $P_M$ ) = 15.3

Ratio of B1 Annual Mean to Period Mean ( $A_M/P_M$ ) = 1.1

Start Date	End Date	B2	D1	B2 when D1 is available
07/01/2016	29/01/2016	21.8	41.7	21.8
29/01/2016	26/02/2016	24.1	40.1	24.1
26/02/2016	31/03/2016	20.3	42.4	20.3
31/03/2016	27/04/2016	18.5	42.8	18.5
27/04/2016	25/05/2016	18.1	37.1	18.1
25/05/2016	30/06/2016	14.7	32.6	14.7
30/06/2016	27/07/2016	14.9	30.2	14.9
27/07/2016	31/08/2016	14.9		
31/08/2016	28/09/2016	17.1		
28/09/2016	26/10/2016	16.3		

## North Lincolnshire Council

26/10/2016	29/11/2016	24.4		
29/11/2016	28/12/2016	28.6		
<b>Average</b>		<b>19.5</b>	<b>38.1</b>	<b>18.9</b>

B2 = NO<sub>2</sub> data for CM3, Low Santon

D1 = NO<sub>2</sub> data for DT13

B2 Annual Mean (A<sub>M</sub>) = 19.5

B2 Period Mean (P<sub>M</sub>) = 18.9

Ratio of B2 Annual Mean to Period Mean (A<sub>M</sub>/P<sub>M</sub>) = 1.0

Start Date	End Date	B3	D1	B3 when D1 is available
07/01/2016	29/01/2016	19.1	41.7	19.1
29/01/2016	26/02/2016	18.1	40.1	18.1
26/02/2016	31/03/2016	17.0	42.4	17.0
31/03/2016	27/04/2016	15.1	42.8	15.1
27/04/2016	25/05/2016	16.6	37.1	16.6
25/05/2016	30/06/2016	13.0	32.6	13.0
30/06/2016	27/07/2016	11.9	30.2	11.9
27/07/2016	31/08/2016	12.2		
31/08/2016	28/09/2016	14.5		
28/09/2016	26/10/2016	16.5		
26/10/2016	29/11/2016	25.3		
29/11/2016	28/12/2016	28.4		
<b>Average</b>		<b>17.1</b>	<b>38.1</b>	<b>15.8</b>

B3 = NO<sub>2</sub> data for CM9, Killingholme School

D1 = NO<sub>2</sub> data for DT13

B3 Annual Mean (A<sub>M</sub>) = 17.1

B3 Period Mean (P<sub>M</sub>) = 15.8

Ratio of B3 Annual Mean to Period Mean (A<sub>M</sub>/P<sub>M</sub>) = 1.1

Annualisation Factor = average of B1, B2 and B3 A<sub>M</sub>/P<sub>M</sub> ratios

$$(1.1 \times 1.1 \times 1.0)/3 = 1.1$$

Estimated Annual Mean = period mean x annualisation factor

$$38.1 \times 1.1 = 41.9$$

Estimated Annual Mean x Bias Adjustment Factor

$$41.9 \times 0.73 = 30.6$$

**PM<sub>2.5</sub> Annual Mean site CM2**

An Osiris monitor was installed at the East Common Lane site (Site ID: CM2) on 4 August 2016, resulting in an annual data capture rate of 28.6%. This is below the 75% data capture threshold and therefore the data has been annualised. The method to undertake this procedure is presented in Air Quality Technical Guidance TG16.

Formula: **M x Ra**

The measured mean concentration **M** for this period was 7.1 µg/m<sup>3</sup>.

Background Site	Annual mean 2016 (A <sub>M</sub> )	Period Mean 2015 (P <sub>M</sub> )	Ratio (A <sub>M</sub> /P <sub>M</sub> )
Hull Freetown (Urban Background)	11.2	11.8	0.95
Leeds Centre (Urban Background)	9.6	9.8	0.98
<b>Average (Ra)</b>		<b>0.97</b>	

**7.1 x 0.97 = 6.88 µg/m<sup>3</sup>**. This is the figure used in Table A.7 – PM<sub>2.5</sub> Monitoring Results

**QA:QC Data**

**Diffusion Tube Bias Adjustment Factors**

North Lincolnshire Council currently uses ESG for both supply and analysis of its Nitrogen Dioxide Diffusion Tubes. The Bias Adjustment factor for ESG in 2016 was 0.73.

**Factor from Local Co-location Studies**

North Lincolnshire Council had only 1 co location study site in 2016, at CM1: Scunthorpe Town an industrial site:

Site	Analyser Annual Mean	Tube Annual Means	Bias Adjustment Factor
<b>CM1: Scunthorpe Town AURN</b>	<b>17</b>	<b>24</b>	<b>0.73</b>

**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 $\mu\text{g m}^{-3}$	Tube 2 $\mu\text{g m}^{-3}$	Tube 3 $\mu\text{g m}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	07/01/2016	29/01/2016	32.5	30.6	31.5	32	1.0	3	2.4	20.9	93	Good	Good
2	29/01/2016	26/02/2016	24.2	22.2	27.5	25	2.7	11	6.6	19.7	99.4	Good	Good
3	26/02/2016	31/03/2016	17.5	20.2	22.4	20	2.5	12	6.1	17.8	99.5	Good	Good
4	31/03/2016	27/04/2016	24.9	18.1	21.6	22	3.4	16	8.4	14.2	99.2	Good	Good
5	27/04/2016	25/05/2016	18.8	20.9	19.3	20	1.1	6	2.7	14	99.4	Good	Good
6	25/05/2016	30/06/2016	15.1	14.9	15.7	15	0.4	3	1.0	12	99.4	Good	Good
7	30/06/2016	27/07/2016	14.5	11.5	12.6	13	1.5	12	3.8	9	98	Good	Good
8	27/07/2016	31/08/2016	20.0	15.0	17.1	17	2.5	14	6.2	11	99.8	Good	Good
9	31/08/2016	28/09/2016	18.2	21.6	20.0	20	1.7	9	4.2	13	99	Good	Good
10	28/09/2016	26/10/2016								16	80.8		Good
11	26/10/2016	29/11/2016	31.9	34.4	29.6	32	2.4	8	6.0	24	97.8	Good	Good
12	29/11/2016	28/12/2016	38.5	40.0	35.9	38	2.1	5	5.2	30.1	99.3	Good	Good
13													

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

Site Name/ID:

<b>Accuracy</b> (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 11 periods of data
Bias factor A 0.73 (0.68 - 0.79)
Bias B 36% (26% - 47%)
Diffusion Tubes Mean: 23 $\mu\text{g m}^{-3}$
Mean CV (Precision): 9
Automatic Mean: 17 $\mu\text{g m}^{-3}$
Data Capture for periods used: 99%
Adjusted Tubes Mean: 17 (16 - 18) $\mu\text{g m}^{-3}$

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

<b>Accuracy</b> (with 95% confidence interval) WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.73 (0.68 - 0.79)
Bias B 36% (26% - 47%)
Diffusion Tubes Mean: 23 $\mu\text{g m}^{-3}$
Mean CV (Precision): 9
Automatic Mean: 17 $\mu\text{g m}^{-3}$
Data Capture for periods used: 99%
Adjusted Tubes Mean: 17 (16 - 18) $\mu\text{g m}^{-3}$

Overall survey --> **Good precision** **Good Overall**  
(Check average CV & DC from Accuracy calculations)

Jaume Targa, for AEA  
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: [LAQMHelpdesk@uk.bureauveritas.com](mailto:LAQMHelpdesk@uk.bureauveritas.com)

### 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.

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<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 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 PM2.5 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

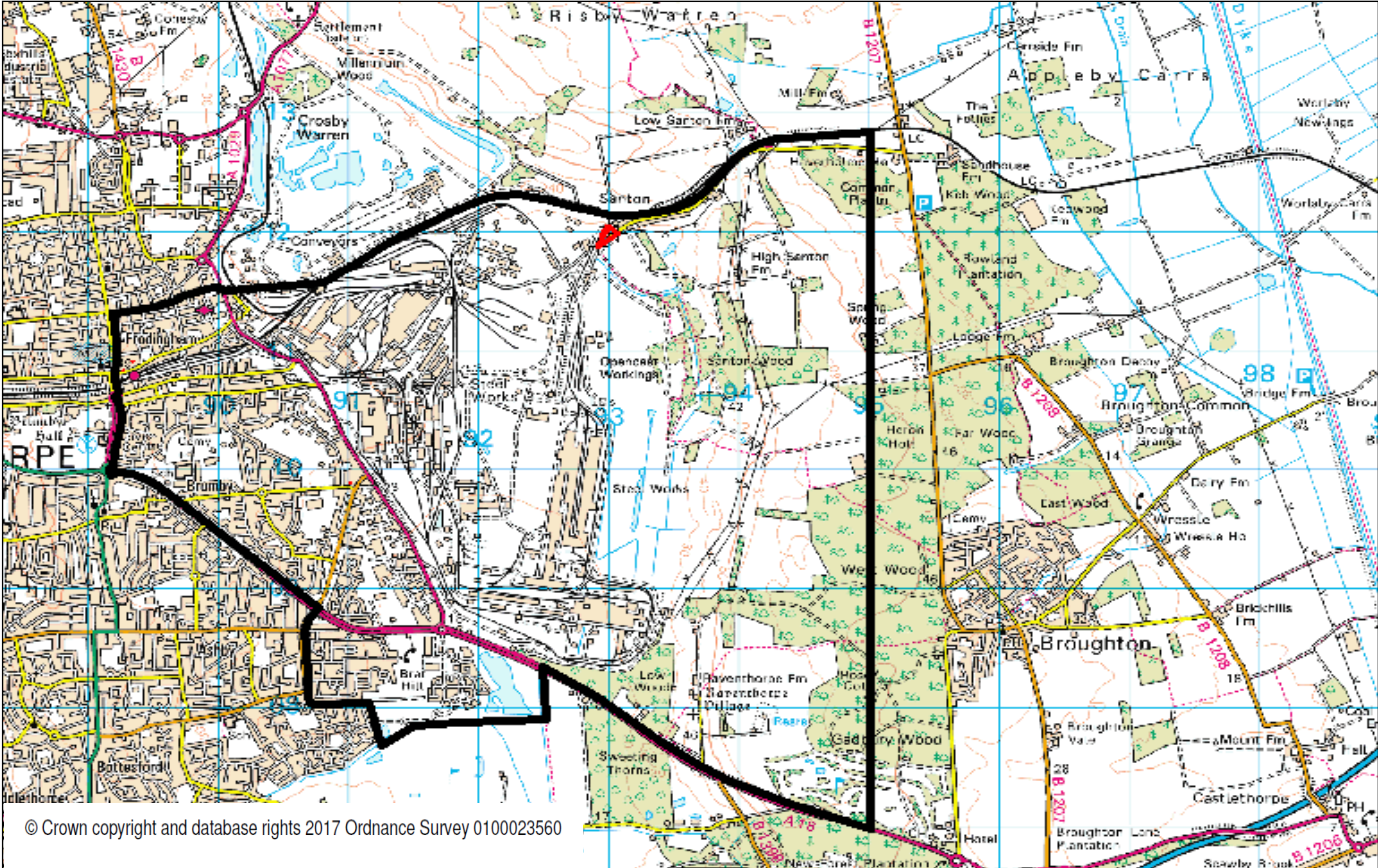


Figure D.1 - The Scunthorpe Town AQMA Boundary

The boundary is shown in black. The small red area within the boundary is the 2008 Low Santon AQMA boundary for the PM<sub>10</sub> annual mean objective.

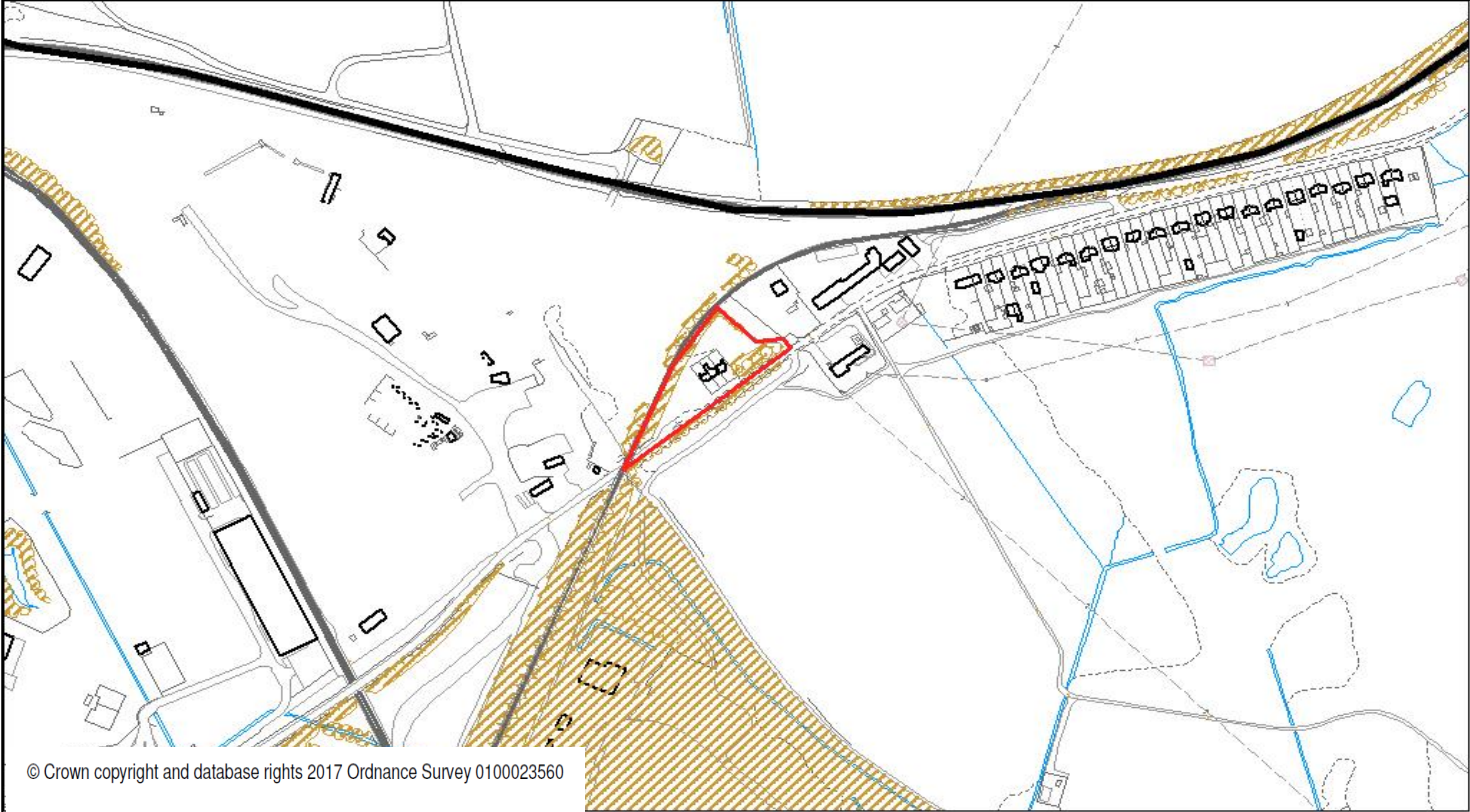


Figure D.2 – The Low Santon AQMA Boundary

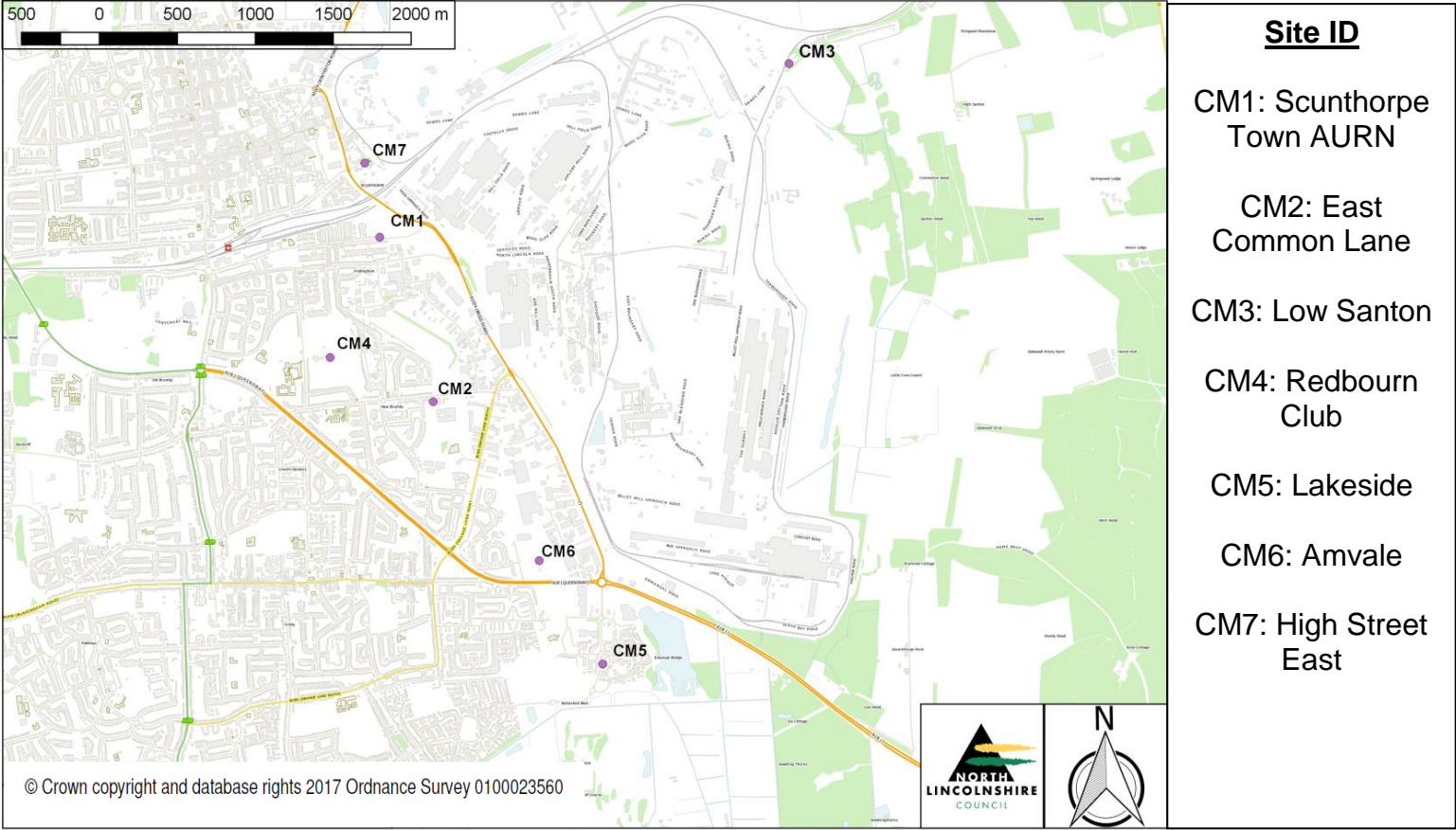


Figure D.3 - Location of continuous monitoring sites in Scunthorpe and Santon



Figure D.4 - Location of the Appleby monitoring site, Site ID: CM8

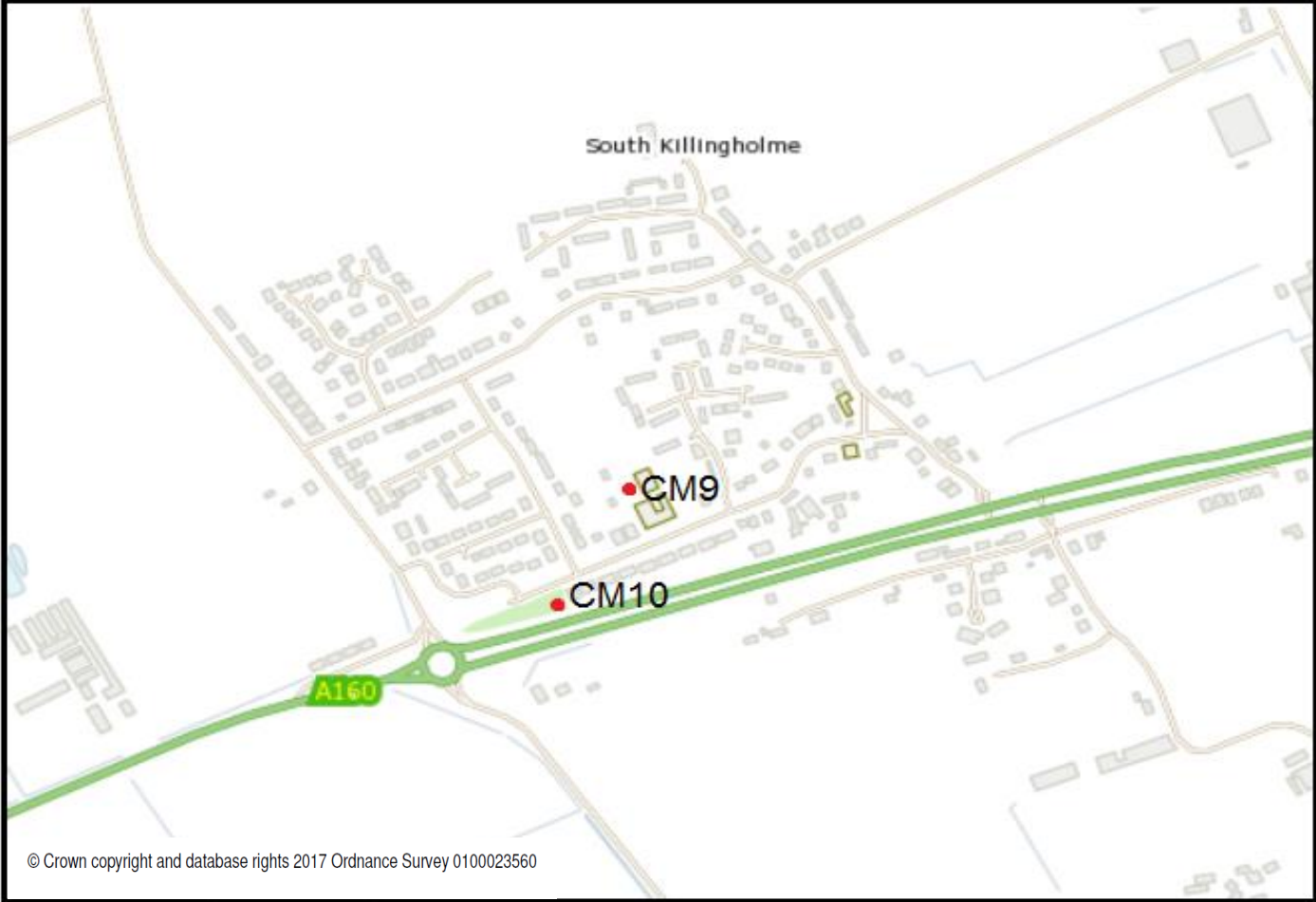


Figure D.5 - Location of the Killingholme School monitoring site (Site ID: CM9) and the Killingholme Roadside monitoring site (Site ID: CM10)

Non-Automatic Monitoring Sites



Figure D.6 – Location of diffusion tube monitoring locations

The Scunthorpe Town AQMA boundary is shown in blue

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

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective <sup>4</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

<sup>4</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).



## Appendix F: New Local Developments and Planning Applications

Reference	Description of Development	Location
PA/2016/565	Planning permission to erect a gas fired energy reserve facility and associated ancillary equipment and components	Access Road to Power Station, Scawby Brook
PA/2016/719	Planning permission for a proposed use of a workshop as a biomass boiler plant house and the erection of associated external flues	Jack Tighe Ltd, Sterling Business Park, Scunthorpe
MIN/2016/719	Application for the Determination of Conditions to Which a Mining Site is to be Subject. First Periodic Review of Mineral Planning Permission at Manton Quarry	Manton Quarry, Manton
PA/2016/1383	Certificate of Lawfulness for the installation of a maximum of 10 generators together with ancillary equipment	Kettleby Lane, Brigg
PA/2016/1240	Planning permission for construction of a compound with 14 (number) gas reciprocating engine generators, step up transformers, security fencing, other ancillary structures and associated works	Killingholme Power Station, North Killingholme
PA/2016/1415	Planning permission to develop a small scale standby electricity generation plant in a new portal framed building and installation of ancillary equipment	Larkfield Farm, Goxhill, Barrow upon Humber
PA/2016/1402	Planning permission for construction and operation of a 20MWe peaking power generation plant and ancillary equipment	Kendale Road, Scunthorpe
PA/2015/0396	Outline planning permission for the development of up to 2500 new homes including a village centre (use classes A1, A2, A3, A4, A5, B1, D1), a health care facility (Class D1), community facilities (Use D1), a 3 form of entry primary school (Use D1), new roads & footpaths, informal areas of open space, play spaces, new wildlife habitat, water bodies & wetland with all matters reserved for subsequent approval.	Lincolnshire Lakes, Scunthorpe
PA/2015/0628	Application for full new road and footpaths, informal areas of open space,	Lincolnshire Lakes, Scunthorpe

Reference	Description of Development	Location
	parklands, play areas and new wildlife habitats, attenuation ponds, recreational lakes and wetlands community. AND Outline application with all matters reserved for non-residential institutions (D1, D2) leisure facilities (A1, A3) and storage (B8)	
MIN/2016/1823	Planning permission for an extension to existing silica sand extraction operations, together with the construction of a new access to Brigg Road, associated works and planting and progressive restoration to a landscaped lake and land suitable for nature conservation and agriculture	Sibelco Quarry, Messingham
PA/2016/1555	Planning permission to erect bio-mass boiler, drier and store	Winterton Road, Scunthorpe
National Infrastructure Project	River Humber Gas Pipeline Replacement Project	Goxhill - Paull
National Infrastructure Project	Variation of Consent to Construct Keadby II Combined Cycle Gas Turbine Generating Station	Keadby, Scunthorpe
Environmental Permit	A2 permit Application for the Manufacturing of Timber and Wood Based Products. Air quality assessment for PM10 and VOC as styrene	Wren, Barton upon Humber

## 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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PCT	Primary Care Trust
PHE	Public Health England
PHOF	Public Health Outcomes Framework
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 PM <sub>10</sub> monitoring data

## References

DEFRA Local Air Quality Management Technical Guidance (TG16)

DEFRA Local Air Quality Management Policy Guidance (PG16)

NPL Annual Report for 2015 on the UK Heavy Metals Monitoring Network

Detailed Assessment of the Scunthorpe PM10 Air Quality Management Area 2016

<https://uk-air.defra.gov.uk/>