2015 Updating and Screening Assessment for North Lincolnshire Council

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

January 2016

Local Authority Officer	Dr Matthew Barnes
	North Lincolnshire Council
Department	Environmental Health (Commercial) Team
Address	PO Box 42 Church Square House Scunthorpe North Lincolnshire DN15 6XQ
Telephone	01724 297617
e-mail	matthew.barnes@northlincs.gov.uk
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Executive Summary

This report considers all potential sources of air pollution within North Lincolnshire which are made up primarily of industrial and traffic sources. The main purpose of the report is to identify those aspects that have changed since completion of the 2012 Updating & Screening Assessment and the Progress Reports of 2013 and 2014.

Continuing problems have been highlighted within the local area relating to PM_{10} which has previously resulted in the declaration of two Air Quality Management Areas (AQMA):

- 2005 Scunthorpe AQMA for breaches of PM_{10} Daily Mean Objective.
- 2008 Low Santon AQMA for breaches of the PM_{10} Annual Mean Objective.

The Low Santon Annual Mean Objective AQMA has shown significant improvements since the Updating and Screening Assessment of 2012. In 2016 the data will be reviewed to determine if it is appropriate to retain this AQMA.

PM_{10} data for 2014 has shown an overall decrease in the number of exceedance days across the network. This may be due to the more usual metrological conditions throughout the year, although the number of exceedance days is still too high to consider removing the AQMA for the PM_{10} Daily Mean Objective.

A potential new exceedance of the air quality objective for NO_2 was identified at South Killingholme in the 2011 Progress Report. A Detailed Assessment of this location is currently being prepared and will be sent to DEFRA when finalised.

All other sources assessed have not met the criteria required to proceed to a Detailed Assessment. These will be assessed again in the 2016 Progress Report to ensure that they do not have a detrimental effect on air quality within North Lincolnshire.

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1 Introduction

1.1 Description of Local Authority Area

North Lincolnshire is an area of around 85,000 hectares located on the southern side of the Humber estuary and occupying tracts of land on either side of the River Trent. Parliamentary Order created the administrative area of North Lincolnshire in March 1995 and on 1st April 1996 the new Unitary Authority area of North Lincolnshire came into being. North Lincolnshire covers a large, mainly agricultural area. The pattern of settlements in the area reflects this with market towns surrounded by many small villages. An important exception to this is the substantial urban area of Scunthorpe and the adjoining town of Bottesford. Almost half of North Lincolnshire's population, approximately 73,250 people, live in Scunthorpe and the adjacent town of Bottesford. Overall, 71 percent of the population live in this main urban area and other towns. The local economy of North Lincolnshire was built on traditional industries such as steel manufacturing and related industries and agriculture. More recently there has been the establishment of two oil refineries and the introduction of several gas fired power stations. The M180 motorway and several primary and strategic routes, including the A18 and A15, are located within North Lincolnshire. By rail there are regular freight movements to and from Scunthorpe Steelworks and Humber port related industries. With several wharf facilities along the banks of the Humber and the Trent; North Lincolnshire is well positioned to take advantage of water transport.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedances are considered likely, the local authority must then 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.

The objective of this Updating and Screening Assessment (USA) is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The Updating and Screening Assessment (USA) report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre $\mu g/m^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

Table 1.1: Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004

Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Previous rounds of review and assessment have led to a number of focused assessments of different pollutants and sources. Summaries of the assessment findings are as follows:

Updating & Screening Assessment 2003

Results of monitoring and the screening exercises in this Review & Assessment, proposed that a detailed assessment of PM_{10} would be conducted in relation to the following: -

- Industrial emissions of PM_{10} in Scunthorpe.
- Emissions of PM_{10} from quarries and landfills in Barnetby.
- Emissions of PM_{10} and SO_2 from domestic solid fuel burning in Keadby.
- Industrial emissions of SO_2 in Killingholme
- Industrial emissions of Benzene in Killingholme and Scunthorpe

Detailed Assessment 2004

Continuing on from the 2003 USA, recommendations for each pollutant were as follows:

Benzene

To gather further data in both Scunthorpe and Killingholme and review and report findings in the next annual Progress Report.

Sulphur Dioxide

To gather further data at Keadby and review and report findings in the next annual Progress Report. No further action was required in respect of sulphur dioxide at Killingholme. No further action was required in connection with stationary railway locomotives at Scunthorpe Station.

PM_{10}

An Air Quality Management Area or Areas shall be defined and then designated for the Scunthorpe area where there is likely exceedance of the Air Quality Objectives. Gather additional PM_{10} data at Keadby and subsequently review and report conclusions in the next annual Progress Report. No further action is required in respect of PM_{10} in Croxton/Barnetby.

Benzene Detailed Assessment 2005

The annual mean of benzene concentrations at relevant locations did not exceed the 2010 objective, although at one location at Santon, Scunthorpe some monthly concentrations did exceed 5µg/m^3 and consequently further investigations were required. The monthly concentrations at certain boundary locations were greater than 5µg/m^3 at installations in Scunthorpe and Killingholme, however where there were no relevant receptors and exposure is unlikely to affect human health, no further investigation was required in relation to air quality assessment.

Progress Report 2005

From the results of the monitoring data in this Progress Report, it was proposed that the following actions be implemented; a benzene diffusion tube survey would continue for a further 12-month period commencing March 2005 at two sites in Scunthorpe identified as having the potential to breach the 2010 annual mean objective of 5µg/m^3.

The two locations identified in Scunthorpe as likely to breach the annual mean air quality objective for nitrogen dioxide of 40µg/m^3, a chemiluminescence NO_x analyser was installed.

The council will declare an Air Quality Management Area for PM_{10} in Scunthorpe, in relation to the 24 hour mean objective of 50µg/m^3 not to be exceeded more than 35

times a year, and continue with the further assessment work to determine the relative contributions of different sources of PM_{10}.

Updating & Screening Assessment 2006

From the results of the monitoring and the screening exercises in this Review & Assessment, it was proposed that detailed assessments would be conducted in relation to the following: -

- Industrial emissions of 1,3-Butadiene in the vicinity of the Conoco Phillips Ltd and Total UK Ltd Oil Ltd Refineries, North Killingholme.
- Industrial emissions of Lead in the vicinity of the Corus (UK) Ltd Integrated Steelworks, Scunthorpe.
- Emissions of Nitrogen Dioxide in the vicinity of Doncaster Rd / Hilton Avenue, Scunthorpe, Junction of Brigg Road and A18, Mortal Ash, Scunthorpe

Detailed Assessment PM_{10} in Scunthorpe 2008

The results presented indicate that the annual PM_{10} objective has been breached in the vicinity of the Low Santon TEOM monitoring station in 2006 and 2007. The mean concentration recorded between October and December 2005 was also greater than 40 $\mu g/m^3$.

Further Assessment of PM_{10} in Scunthorpe 2008

Further assessment of past monitoring data recorded at continuous sites within the AQMA Scunthorpe shows levels remain non-compliant with the short-term objective. The Council has no current plans to move the monitors within the AQMA.

Progress Report 2008

The progress report concluded that NO_2 concentrations within Killingholme had decreased and there had been no significant changes to road traffic flows or other transportation.

Updating & Screening Assessment 2009

The Updating & Screening Assessment 2009 highlighted no new areas of non-compliance. Existing problems such as the ongoing issues with the Integrated Steel Works were again noted and are due to be addressed within forthcoming Further Assessments and Action Plans.

Progress Report 2010

The 2010 Progress Report did not highlight any new exceedances of the air quality objectives. The report reconsidered all potential sources of pollution (primarily industry and traffic related sources) with respect to PM_{10} (particulate matter), nitrogen dioxide, sulphur dioxide & benzene.

Continuing problems have been highlighted within the local area relating to PM_{10} and at present have resulted in the declaration of two Air Quality Management Areas; (AQMA)

- 2005 Scunthorpe AQMA for breaches of PM_{10} daily mean objective.
- 2008 Low Santon AQMA for breaches of the PM_{10} annual mean objective.

Problems persisted at both of these locations although improvements are beginning to show. Daily objective breaches are becoming less frequent throughout the AQMA although East Common Lane and Santon, which surround the Integrated Steelworks site, still exceed the objective. The annual mean objective at Santon has also seen a decrease since 2006 and the application of the Volatile Correction Model in 2008 has resulted in the site being compliant. These results should be treated with caution due to the downturn in the manufacturing industry and the relevance of the VCM FDMS correction which up until 2010 was taken from over 100km away.

Further Assessment of PM_{10} at Low Santon

This Further Assessment was undertaken because of continued exceedances of the Annual Mean Objective of 40µg/m^3 at Low Santon, Scunthorpe. Because of this an Air Quality Management Area was declared on the 10th December 2008.

The study looked at a number of factors likely to influence the elevated concentrations being recorded at Low Santon including:

- Location of the monitoring stations
- Method of measurement
- Historical MET data
- Particle size fractions
- Relationships with other pollutants

- Triangulation with other monitoring stations
- Directional analysis

The study also reviewed ongoing work designed to inform interested parties of exceedance risk and ongoing area contributions including:

- North Lincolnshire Council Tea Break Report
- North Lincolnshire Council Daily Review Analysis
- North Lincolnshire Council PM_{10} Alert System
- North Lincolnshire Council Low Santon PM_{10} Risk Assessment
- AEA Low Santon Modelling Report
- Environment Agency PM_{10} Action Plan

Progress Report 2011

The 2011 Progress Report highlighted a new exceedance of the air quality objectives. The report reconsidered all potential sources of pollution (primarily industry and traffic related sources) with respect to PM_{10} (particulate matter), nitrogen dioxide, sulphur dioxide & benzene. Additional NO_2 tubes identified a potential exceedance along the A160 Road in South Killingholme. This is currently being investigated. Problems persisted within the two declared AQMA's:

- 2005 Scunthorpe AQMA for breaches of PM_{10} daily mean objective.
- 2008 Low Santon AQMA for breaches of the PM_{10} annual mean objective.

Low Santon demonstrated an improvement on previous years but was still well in excess of the Daily Mean Objective. Sites within Scunthorpe recorded compliant results for both Objectives.

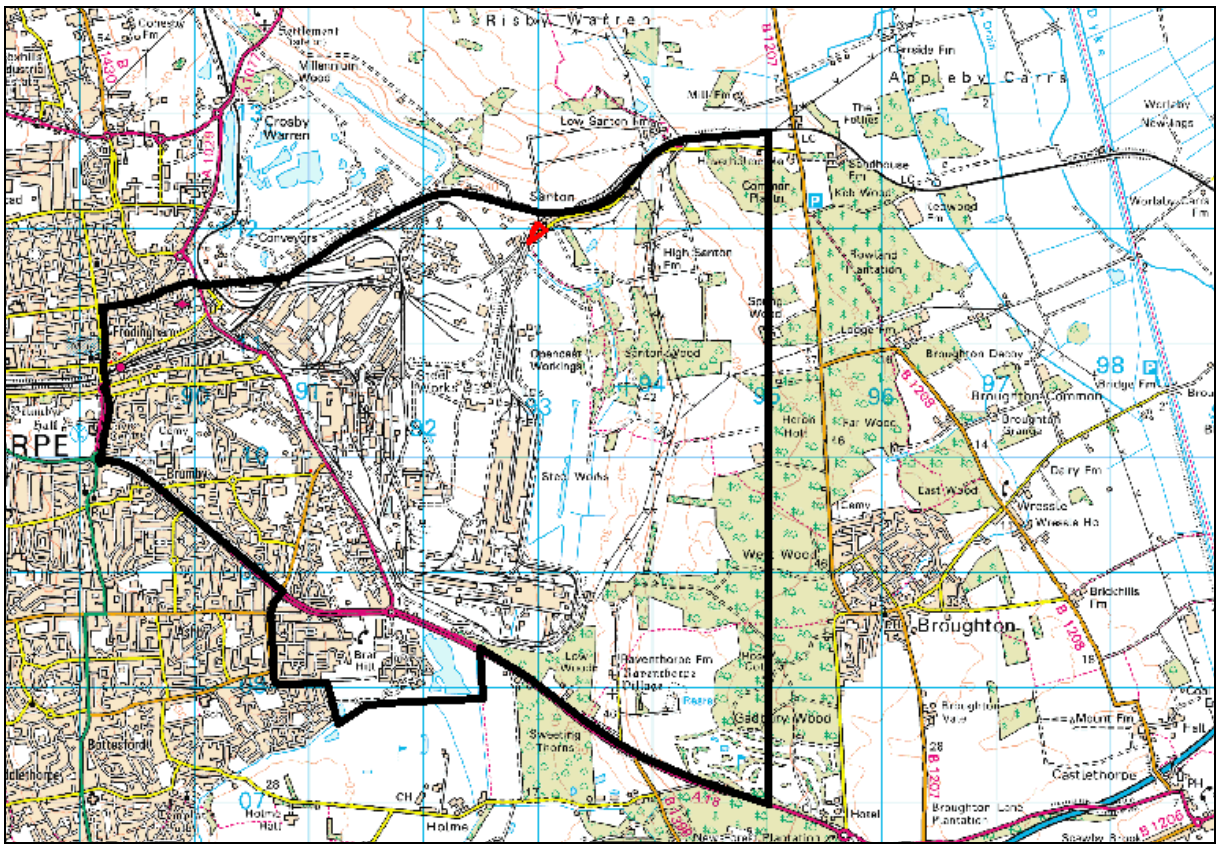


Figure 1.1: **2005 Scunthorpe Town AQMA Boundary in black. The small red area within the boundary is the 2008 Low Santon AQMA boundary for PM_{10} annual mean objective.**

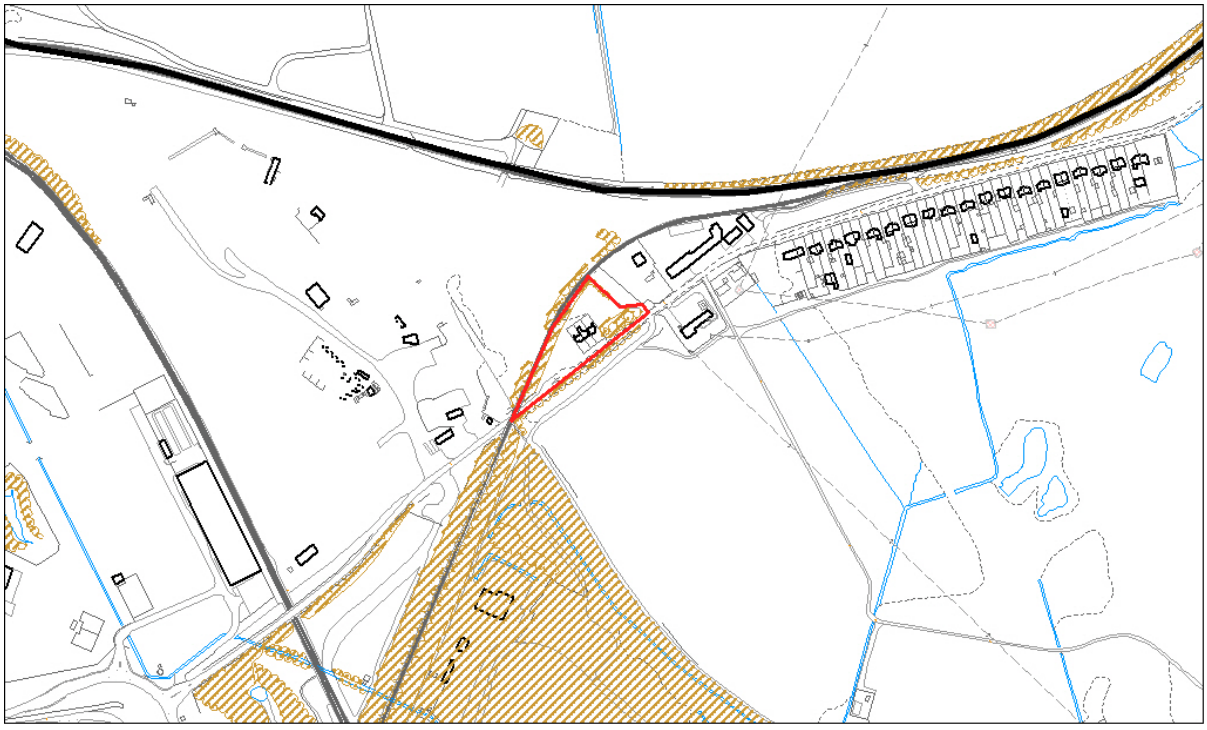


Figure 1.2: 2008 Low Santon AQMA Boundary in red, which sits inside the boundary of the 2005 Scunthorpe Town AQMA Boundary.

Updating & Screening Assessment 2012

Continuing problems were highlighted within the local area relating to PM_{10} which previously resulted in the declaration of two Air Quality Management Areas; (AQMA)

- 2005 Scunthorpe AQMA for breaches of PM_{10} Daily Mean Objective.
- 2008 Low Santon AQMA for breaches of the PM_{10} Annual Mean Objective.

PM_{10} data for 2011 showed an overall increase in the number of exceedance days across the network. This may have been due to a higher than average regional event count and unusual meteorological conditions throughout the year. It should be noted that 2010 saw a reduced number of exceedance days due to unusual ground and meteorological conditions which were not replicated in 2011.

A potential new exceedance of the air quality objective for NO_2 was identified at South Killingholme in the 2011 Progress Report. A Detailed Assessment of this location is currently being prepared and will be sent to DEFRA when finalised.

Progress Report 2013

Continuing problems have been highlighted within the local area relating to PM_{10} daily mean exceedances which previously resulted in the declaration of two Air Quality Management Areas (AQMA).

Data from 2012 saw an overall improvement at the relevant monitoring sites but the report suggests that any improvement should be met with caution because of changing meteorological conditions and reductions in steel production.

Progress Report 2014

Continuing problems have been highlighted within the local area relating to PM_{10} exceedances which previously resulted in the declaration of two Air Quality Management Areas (AQMA) .

Data from 2013 demonstrates that although there are a number of exceedances of the PM_{10} daily mean objective in the Santon area, the number is reducing as is the annual mean. The same cannot be said for monitoring locations on the eastern side of Scunthorpe within the 2005 AQMA. Accordingly, this area will be prioritised for improvement schemes as Santon has been previously.

Elevated NO_2 concentrations at South Killingholme, due to traffic related emissions at the A160 road to Immingham, are now being monitored by an automatic NO_2 analyser to enable a Detailed Assessment to be undertaken to determine if there is a breach of the relevant air quality objectives. All other sources assessed have not met the criteria required to proceed to a Detailed Assessment. These will be assessed again in the 2015 Updating and Screening Assessment Report to ensure that they do not have a detrimental effect on the air quality of North Lincolnshire.

Detailed Assessment of NO_2 at Killingholme 2015

North Lincolnshire Council's progress report 2011 identified a possible exceedance of nitrogen dioxide alongside the A160 in South Killingholme. For this reason, in October 2013 North Lincolnshire Council installed an air quality monitoring site to more accurately measure nitrogen dioxide, nitric oxide and nitrogen oxides at this location.

The main source of NO_2 is from road traffic, specifically from the A160 dual-carriage way in South Killingholme. To provide better access to the Port of Immingham and surrounding area, the Highways Agency are upgrading both the A160 and A180. It is anticipated that construction will take approximately 16 months and should be completed by autumn 2016.

The results of the real-time monitoring presented here indicate that air quality objectives for NO_2 have not been breached. The objectives are an annual mean not to exceed 40 µg m^{-3}, and an hourly mean of 200 µg m^{-3} not to be exceeded more than 18 times a year. The annual mean from the South Killingholme roadside monitor for 2014 was 28.5 µg m^{-3} with no hourly exceedances and a data capture rate over 99%. It is recommended that the monitor remain in situ for a period of at least 12 months to monitor the effects of the A160 upgrade and any potential increase in traffic, particularly HGVs.

2 New Monitoring Data

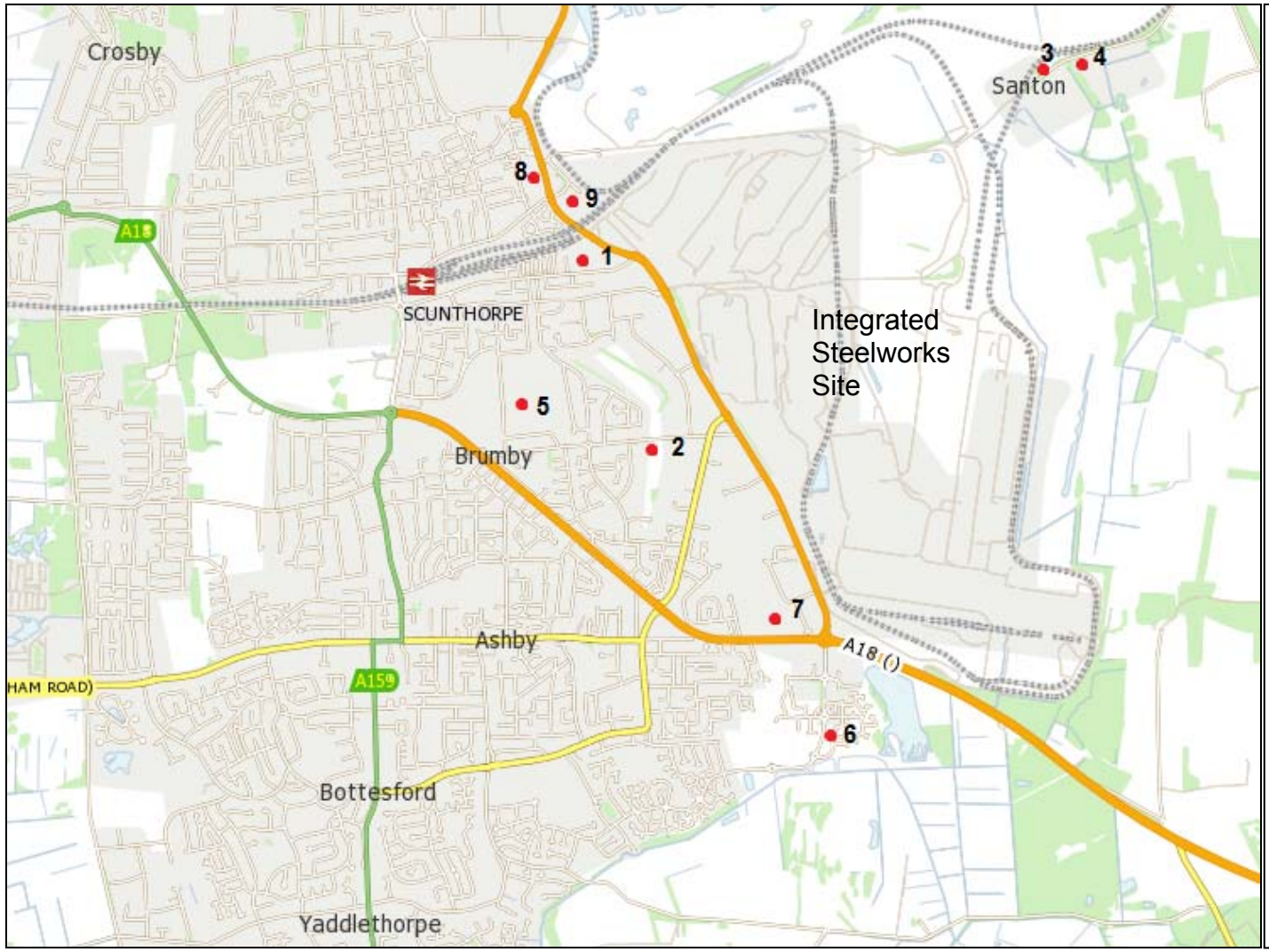
2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

1. Scunthorpe Town AURN (Rowland Road)

This monitoring station is housed within an enclosed air-conditioned unit in the East of Scunthorpe approximately 10 metres to the north of Rowland Road (Figure 2.1). The nearest busy road is Brigg Road (A1029), at its closest point it is 124 metres to the North East of the monitoring site. The monitoring equipment at the station consists of an Enviro-Technology Services model 100A Fluorescent sulphur dioxide (SO_2) analyser, a Casella Evolution ML2041 oxides of nitrogen chemi-luminescence analyser and a Rupprecht & Patterschnick TEOM 1400a PM_{10} monitor. The logging system used is an Odessa DSM3260. In addition wind direction and wind speed are measured at this site. The PM_{10}, NOx and SO_2 analysers are affiliate members of the AURN (Automatic and Urban Rural Network). The site also comprises of an equivalent Partisol Particulate Monitor (Now Suspended 31/03/2010), a National Physical Laboratory funded Heavy Metals sampler and a Digitel DHA-80 High volume PAH sampler. An FDMS C was installed in the monitoring station in January 2010 designed to increase confidence in the Volatile Correction Model currently used to correct the TEOM network.

Planning permission for a new enclosure has been granted, and in early 2015 all of the existing equipment will be re-located into one container, instead of using one smaller container and three additional cages. Old equipment, including the data loggers, will be disposed of and a new SO_2 gas analyser has been purchased.



1. Scunthorpe Town AURN
2. East Common Lane
3. Low Santon
4. High Santon
5. Redbourn Club
6. Lakeside
7. Amvale
8. Church Square
9. High Street East

Figure 2.1: Location of Monitoring Sites in Scunthorpe and Santon

2. East Common Lane

PM_{10} is monitored at this site using a TEOM 1400a. This site is located behind a small block of flats, 34m South of East Common Lane. To the West of the site is a residential area; whilst to the North East and South East are several industrial estates. The site is approximately 500 m west of the integrated steelworks site boundary.

3. Low Santon

This monitoring station is housed within an enclosed air-conditioned unit to the North East of Scunthorpe on the Eastern boundary of the integrated steelworks site. Dawes Lane is 5m to the South of the station, running from a rural location in the East through the steelworks site and into Scunthorpe. A raised embankment 5m north of the site carries freight traffic along one of the major rail lines into the steelworks site. The surrounding area consists of arable fields with a number of trees and to the East, a small residential area consisting of three properties. The monitoring equipment at this station consists of a Signal Ambitech Ambirak analyser, monitoring sulphur dioxide and oxides of nitrogen, and a Rupprecht & Patterschnick TEOM 1400a monitoring PM_{10}. In addition, a Digitel DHA-80 High volume PAH sampler began operation at the site in September 2007. A Partisol 2000 was installed in April 2008 to measure concentrations of heavy metals. Further to this an additional Rupprecht & Patterschnick TEOM 1400a was installed in June 2008 to monitor $PM_{2.5}$. An FDMS C was installed in the monitoring station in March 2010 designed to increase confidence in the Volatile Correction Model currently used to correct the TEOM network and to aid the Further Assessment at Low Santon.

This monitoring station will be upgraded in 2015, with the Ambirak system being removed and new gas analysers being installed.

4. High Santon

This monitoring station was located in a domestic garden 400m from the Low Santon monitoring station. The site comprised of a Partisol 2000 equivalent particulate monitor. It was installed in January 2008 and continued to operate up to the end of 2014, when it was removed at the request of the property owner.

5. Redbourn Club

PM_{10} is monitored at this site using a TEOM 1400a. Redbourn Club is a sports and social club situated 1km from the boundary of the integrated steelworks site. The

monitoring station is sited away from buildings and trees close to the boundary of the clubs cricket pitch.

6. Lakeside

The Lakeside monitoring station sits within a newly built housing development 600m to the South of the integrated steelworks site. Its placement was due to the introduction of receptors close to the boundary of the steel making facility. It is sited within a grassed communal area within 5m of a road.

7. Amvale

This site is located on a brown field site towards the South of the daily mean AQMA. Originally an Osiris monitor was used for screening and was in place from June 2010. This was upgraded to a TEOM 1400a in April 2013. It is planned that an Osiris monitor will be collocated at this site in 2015 to measure $PM_{2.5}$.

8. Church Square

The site was located West of the integrated steelworks site, close to the 20-21 Visual Arts Centre at Church Square on council owned land. The nearest road is Brigg Road and the distance from the site is approximately 78m. The site operated from July 2013 monitoring PM_{10} using a Rupprecht & Patterschnick TEOM 1400a monitor. This monitor was removed in July 2014 as the site is currently being redeveloped.

9. High Street East

The Church Square TEOM was moved to High Street East in August 2014 due to demolition and construction occurring at the original site. The High Street East site is approximately 300 m from Church Square and is 60 m closer to the steelworks site.

10. Appleby Village

This site is located on a playing field in the village of Appleby (Figure 2.2). The village is surrounded by arable fields and open fields and is 6 km North East of Scunthorpe. PM_{10} is monitored at this site using a TEOM 1400a.

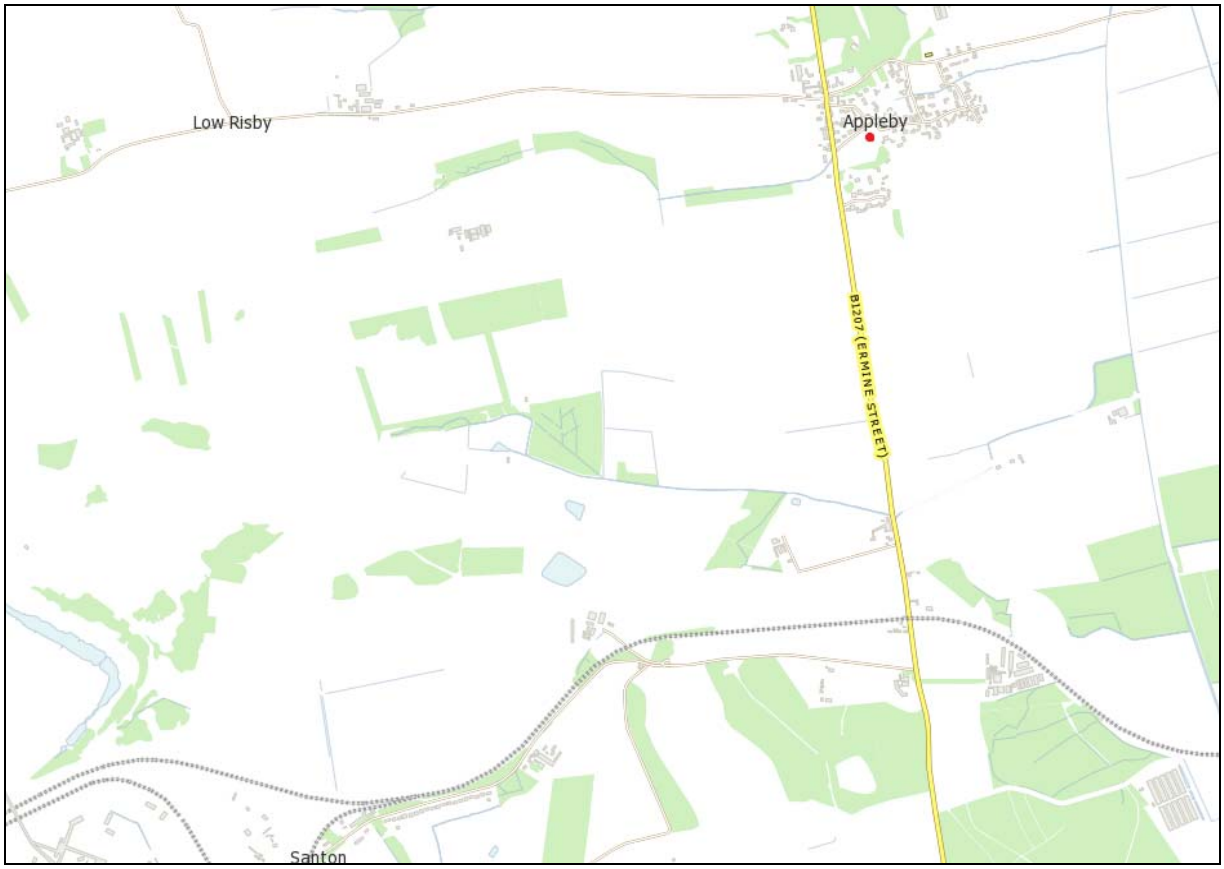


Figure 2.2: Location of Appleby Village Site

11. Killingholme School

The site is located within the grounds of Killingholme Primary School and is approximately 200 m North of the dual-carriage A160 (Figure 2.3). Two refineries are located to the North East and East of the site. The site is approximately 4 km West of the River Humber and the Port of Immingham. The site is approximately 20 km East of the daily mean AQMA in Scunthorpe. Sulphur dioxide, oxides of nitrogen and PM_{10} are the three pollutants measured at this site. In addition wind direction, wind speed and temperature are also measured. A pumped Benzene Tube was installed in September 2008 as part of the National Hydrocarbon Network. This was subsequently removed in March 2010.

12. Killingholme Roadside

The site is located approximately 10 m North of the A160 dual-carriageway. It was installed in October 2013 and contains a Monitor Labs gas analyser to measure oxides of nitrogen.

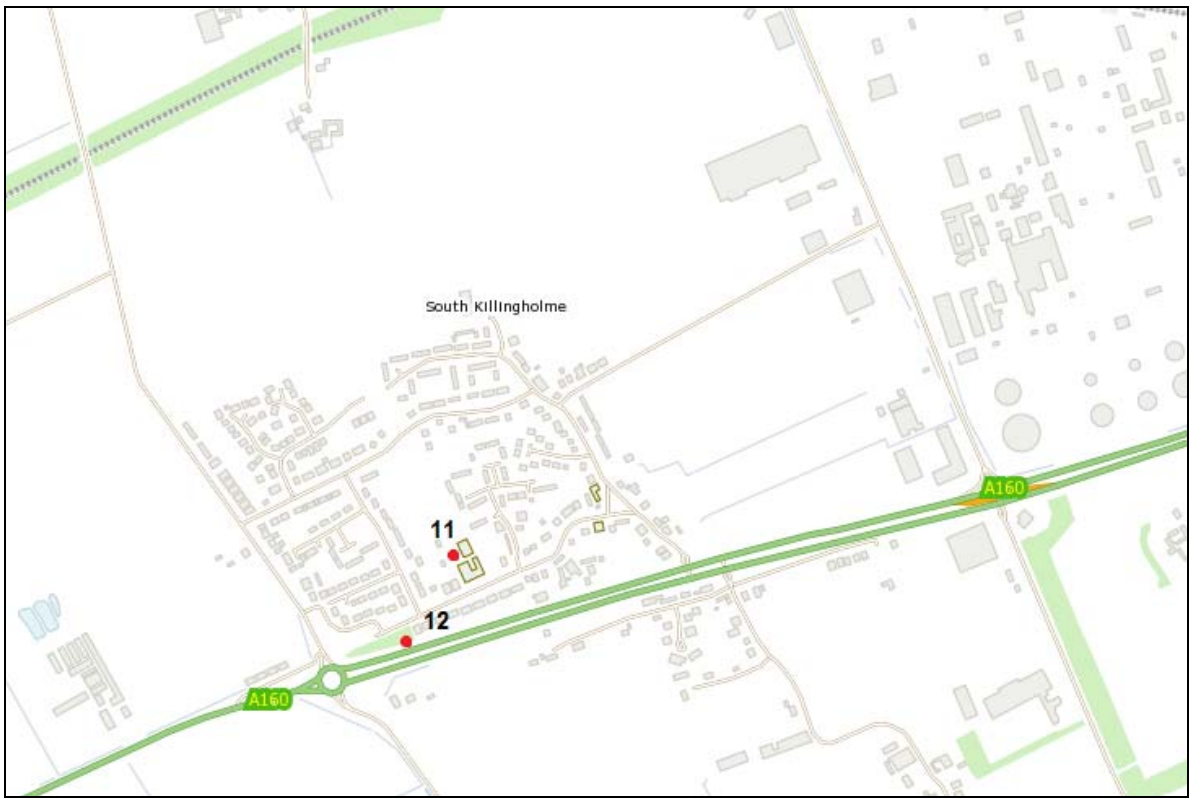


Figure 2.3: Location of the two Killingholme Monitoring Sites

13. Dawes Lane

An Osiris screening monitor was installed on Dawes Lane within the boundary of the integrated steelworks, near to the Dawes Lane coke ovens. It measures both PM_{10} and $PM_{2.5}$ and has been in operation since November 2008.

14. Tarmac

An Osiris screening monitor was installed near to Lafarge Tarmac, a slag handling industrial site. It measures both PM_{10} and $PM_{2.5}$ and has been in operation since January 2012.

15. South Ferriby

An Osiris screening monitor installed on Sluice Road, in the back garden of a residential property in South Ferriby. It is situated approximately half way between the Cemex cement plant and the Cemex quarry. It measures both PM_{10} and $PM_{2.5}$ and has been in operation since November 2008. In December 2013 South Ferriby suffered from severe flooding, resulting in the monitor being out of commission for some of 2014.

Table 2.1: Details of Automatic Monitoring Sites

Site Name	Site Type	X OS GridRef	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
1. Scunthorpe Town (AURN)	Urban Industrial	490320	410831	PM10, SO2, NO2	Yes	FDMS, TEOM, Gas	Y (21m)	7m	N
2. East Common Lane	Urban Industrial	490663	409789	PM10	Yes	TEOM	Y (3m)	28m	N
3. Low Santon	Industrial	492945	411931	PM10, SO2, NO2	Yes	FDMS, TEOM, Gas	Y (41m)	5m	N
4. High Santon	Industrial	492945	411931	PM10	Yes	Partisol	Y (8m)	5m	N
5. Redbourn Club	Urban	490002	410069	PM10	Yes	TEOM	Y (15m)	N/A	N
6. Lakeside	Urban Industrial	491750	408127	PM10	Yes	TEOM	Y (4m)	8m	N
7. Amvale	Urban Industrial	491343	408782	PM10	Yes	TEOM	N	100m	N
8. Church Square	Urban Industrial	489989	411430	PM0	Yes	TEOM	N (17m)	10m	N
9. High Street East	Industrial	490224	411301	PM10	Yes	TEOM	N	10m	N
10. Appleby	Rural	495075	414767	PM10	No	TEOM	Y (17m)	N/A	N
11. Killingholme School	Urban Industrial	514880	416133	PM10, SO2, NO2	No	TEOM, Gas	Y (9m)	N/A	N

Site Name	Site Type	X OS GridRef	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
12. Killingholme Roadside	Roadside	514810	415980	NO2	No	Gas	Y (20m)	10m	N
13. Dawes Lane	Industrial	492481	411887	PM10 and PM2.5	Yes	Osiris	N	N/A	Y
14. Tarmac	Industrial	492736	411585	PM10 and PM2.5	Yes	Osiris	N	N/A	Y
15. South Ferriby	Urban Industrial	497931	420993	PM10 and PM2.5	No	Osiris	Y (10m)	45m	N

2.1.2 Non-Automatic Monitoring Sites

North Lincolnshire Council currently operates a nitrogen dioxide diffusion tube network consisting of 28 sites. Tube locations are regularly reviewed and removed if they have demonstrated compliance over a number of years, new tubes are added as part of the annual progress reports. The diffusion tubes are supplied and analysed by Environmental Scientifics Group (ESG), the tubes were prepared by spiking acetone:triethanolamine (50:50) onto the grids prior to the tubes being assembled. The tubes were desorbed with distilled water and the extract analysed using a segmented flow autoanalyser with ultraviolet detection. North Lincolnshire Council has followed the guidance in relation to applying a bias adjustment calculation. Only one collocation study was conducted within North Lincolnshire in 2014.

The 2014 bias adjustment was calculated using data from Scunthorpe Town NO_2 triplicate study and the collocated AURN chemiluminescence NO_x analyser. Data capture for the AURN site over the period was good for both the automatic and non-automatic methods allowing for the local bias to be applied.

A summary of precision results for nitrogen dioxide diffusion tube collocation studies indicates that Environmental Scientific Group operates to a high level of precision in accordance with the Laboratory Workplace Analysis Scheme for Proficiency, (WASP) scheme.

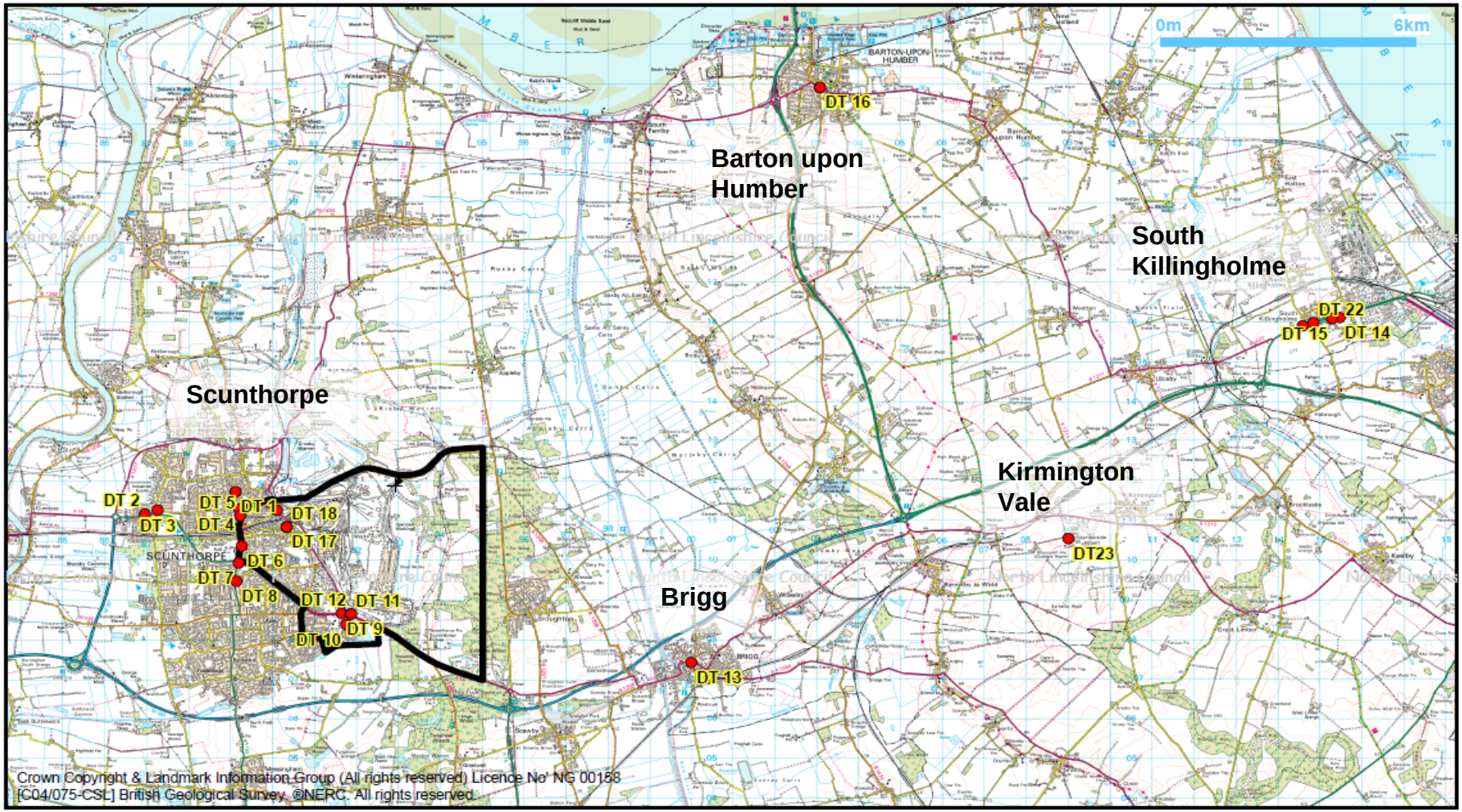


Figure 2.4: Map of Non-Automatic Monitoring Sites

Table 2.2: Details of Non-Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?[a]	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Tube 1	Urban Kerbside	489099	7411723	NO_2	N	N	Y (3m)	1m	Y
Tube 2	Suburban Roadside	486928	411156	NO_2	N	N	Y (12m)	3m	N
Tube 3	Suburban Kerbside	487239	411259	NO_2	N	N	Y (9m)	2m	N
Tube 4	Urban Roadside	489190	411285	NO_2	Y	N	Y (4m)	2m	N
Tube 5	Urban Kerbside	489209	411118	NO_2	Y	N	Y (4m)	3m	N
Tube 6	Urban Kerbside	489247	410355	NO_2	Y	N	Y (20m)	3m	N
Tube 7	Urban Kerbside	489172	409926	NO_2	N	N	Y (20m)	2m	N
Tube 8	Urban Kerbside	489112	409463	NO_2	N	N	Y (15m)	1m	Y
Tube 9	Urban Roadside	491628	408658	NO_2	Y	N	N	2m	N
Tube 10	Suburban Roadside	491737	408378	NO_2	Y	N	N	2m	N
Tube 11	Industrial Roadside	491838	408641	NO_2	Y	N	N	9m	N
Tube 12	Industrial Roadside	491859	408645	NO_2	Y	N	N	9m	N

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?[a]	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Tube 13	Urban Kerbside	499975	407421	NO_2	N	N	Y (60m)	3m	N
Tube 14	Industrial Roadside	515452	416107	NO_2	N	N	N	5m	N
Tube 15	Industrial Kerbside	515279	416107	NO_2	N	N	N	2m	N
Tube 16	Suburban Kerbside	503048	421907	NO_2	N	N	N	1m	Y
Tube 17	Industrial Roadside	490316	410837	NO_2	Y	Y	N	6m	N
Tube 18	Industrial Roadside	490316	410837	NO_2	Y	Y	N	6m	N
Tube 19	Industrial Roadside	490316	410837	NO_2	Y	Y	N	6m	N
Tube 20	Industrial Roadside	490080	411258	NO_2	Y	N	N	1m	Y
Tube 21	Urban Roadside	514573	415901	NO_2	N	N	Y (15m)	1m	Y
Tube 22	Urban Roadside	514827	415982	NO_2	N	N	Y (15m)	1m	Y
Tube 23	Rural	508974	410543	NO_2	N	N	Y (10m)	N/A	N
Tube 24	Urban Roadside	514782	415971	NO_2	N	N	Y (15m)	1m	Y
Tube 25	Urban Roadside	514782	415971	NO_2	N	N	Y (15m)	1m	Y
Tube 26	Urban	514782	415971	NO_2	N	N	Y (15m)	1m	Y

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?[a]	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
	Roadside								
Tube 27	Urban Roadside	489832	411226	NO_2	Y	N	Y (12m)	1m	Y
Tube 28	Urban Roadside	489832	411226	NO_2	Y	N	Y (12m)	1m	Y

[a] Inside the AQMA for daily mean PM_{10}.

2.2 Comparison of Monitoring Results with Air Quality Objectives

The North Lincolnshire Council monitoring network remained virtually unchanged in 2014 with only the Church Square Monitoring Station for PM_{10} being moved to a new location at High Street East, Scunthorpe. This section will outline the ratified monitoring results from 2014. North Lincolnshire Council continue to facilitate a number of external networks within its boundary such as the PAH network and Heavy Metals network. The most recent results available will also be presented within this section.

FDMS data will be submitted in preference to TEOM data where both analysers are in operation at one location. North Lincolnshire Council successfully operated two FDMS sites achieving a higher than average data capture for these instruments.

A number of Osiris particulate monitors are still in operation within North Lincolnshire and are being used as a screening tool in order to assess the relative concentrations at critical locations. The use of Osiris monitors allows a higher spatial resolution with the collection of monitoring data at sites with no previous data. Although these sites are not permanent they are a valuable tool in assessing the scale of exceedances and the identification of pollution sources. Data from these sites will also be presented within this section of the report.

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

There have been no exceedances of the Annual Mean Objective at the North Lincolnshire Council Automatic NO_2 sites since monitoring began. All sites are well within the relevant Objective. A new automatic NO_2 site was added to the network in October 2013. The analyser measures NO_2 concentrations at properties adjacent to the A160 in South Killingholme as indications from NO_2 diffusion tubes suggested there may be elevated concentrations in this area.

Table 2.3: Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?[d]	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2014 % [b]	Annual Mean Concentration μg/m^3				
					2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014 [c]
1. Scunthorpe Town	Urban Industrial	Y	N/A	96.3	19.8	19.7	19.9	26.9	25.2
2. Low Santon	Industrial	Y	N/A	31.9	18.9	19.1	18.6	16.4	16.3
3. Killingholme School	Urban Industrial	N	N/A	74.1	21	21.4	21.1	22.4	22.1
4. Killingholme Roadside	Urban Roadside	N	N/A	99.8				27.1	28.5

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.
[d] The AQMA for PM10 daily mean exceedances.
*Annual mean concentrations for previous years are optional.

There has been a gradual but significant decrease in the NO_2 annual mean at the Low Santon monitor, whilst at Killingholme School the annual mean is almost exactly the same in 2014 as it was in 2007. The Scunthorpe Town monitor has shown a small rise over the past two years, although it is still well below air quality objectives. Traffic count data from the Department for Transport website has shown there to be a small increase in the total traffic on the A1029, the nearest A road to the monitor, over the past two years (www.dft.gov.uk). The mean for 2015 at the end of April was 11.8 µg/m^3.

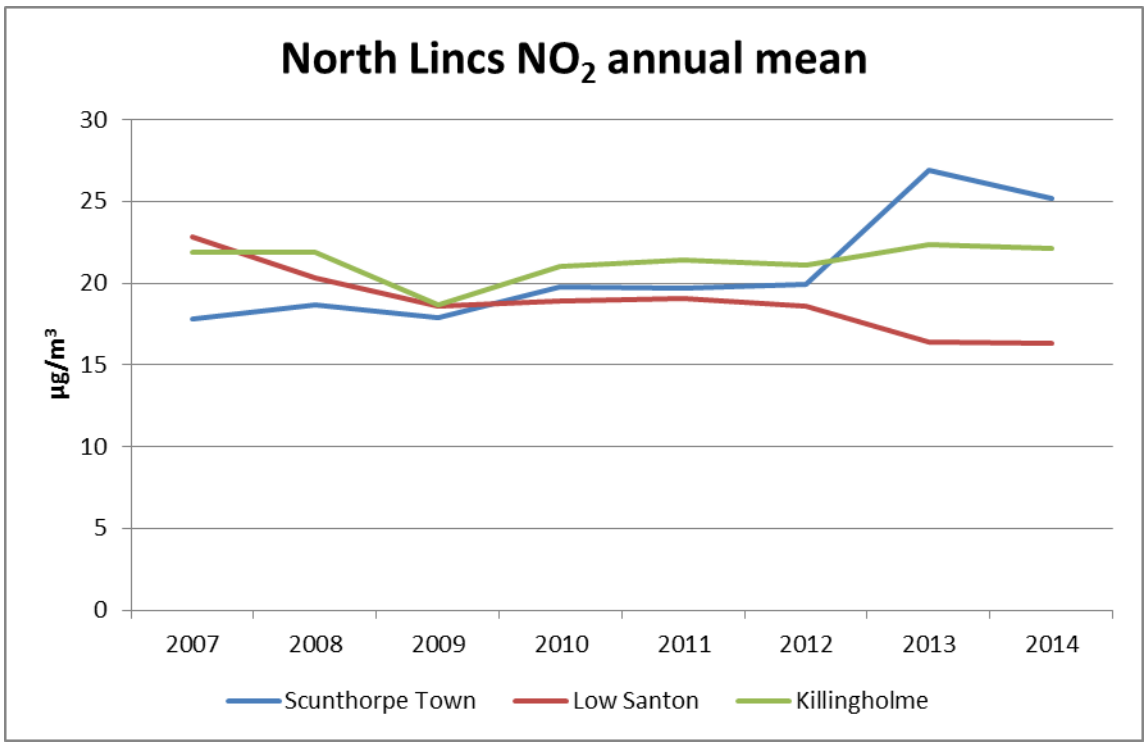


Figure 2.5: Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Automatic Monitoring Sites.

Table 2.4: Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective

Site ID	Site Type	Within AQMA?[d]	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2014 % [b]	Number of Exceedances of Hourly Mean (200 μg/m^3)				
					2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014 [c]
1. Scunthorpe Town	Urban Industrial	Y	N/A	96.3	0	0	0	2	9
2. Low Santon	Industrial	Y	N/A	31.9	0	0	0	0	0
3. Killingholme School	Urban Industrial	N	N/A	74.1	0	0	0	0	0
4. Killingholme Roadside	Urban Roadside	N	N/A	99.8	N/A	N/A	N/A	N/A	0

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] If the period of valid data is less than 90%, include the 99.8th percentile of hourly means in brackets
[d] The AQMA for PM10 daily mean exceedances.
*Number of exceedances for previous years are optional

There have been no exceedances of the Hourly Mean Objective at the North Lincolnshire Council Automatic NO_2 sites since monitoring began with the exception of 9 hours at Scunthorpe Town in 2014. All sites are therefore well within the relevant objective. North Lincolnshire Council does not anticipate any change in these results in the near future. A further automatic NO_2 site was added to the network in 2013. This measures NO_2 concentrations at properties adjacent to the A160 in South Killingholme. Indications from NO_2 diffusion tubes suggested that there may be elevated concentrations in this area, but results from the monitor has shown that the site is well within current air quality objectives.

Diffusion Tube Monitoring Data

Table 2.5: Results of Nitrogen Dioxide Diffusion Tubes in 2014

Site ID	Location	Site Type	Within AQMA?[a]	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88) 2014 (μg/m^3)
Tube 1	Frodingham Road	Urban Kerbside	N	Single	10 months		N	31.1
Tube 2	Doncaster Road	Suburban Roadside	N	Single	12 months		N	29.5
Tube 3	Scotter Road	Suburban Kerbside	N	Single	12 months		N	33.2
Tube 4	Britannia Corner	Urban Roadside	Y	Single	12 months		N	32.2
Tube 5	Oswald Road	Urban Kerbside	Y	Single	12 months		N	31.4
Tube 6	Ashby Road	Urban Kerbside	Y	Single	12 months		N	27.3
Tube 7	Jct A18/Ashby Road	Urban Kerbside	N	Single	12 months		N	32.1
Tube 8	Ashby Road (Brumby Street)	Urban Kerbside	N	Single	12 months		N	32.2
Tube 9	Dudley Road/Queensway	Urban Roadside	Y	Single	12 months		N	24.4
Tube 10	Lakeside Parkway	Suburban Roadside	Y	Single	12 months		N	26.5
Tube 11	Junction Brigg Road/A18	Industrial Roadside	Y	Single	12 months		N	**45.4**
Tube 12	Front of Ashby Lodge Pub	Industrial Roadside	Y	Single	12 months		N	27.3

Site ID	Location	Site Type	Within AQMA?[a]	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88) 2014 (μg/m^3)
Tube 13	Barnard Avenue Brigg	Urban Kerbside	N	Single	12 months		N	30.8
Tube 14	Humber Road, Chip shop	Industrial Roadside	N	Single	12 months		N	27.3
Tube 15	Humber Road, LP 695	Industrial Kerbside	N	Single	12 months		N	35.1
Tube 16	Holydyke Barton	Suburban Kerbside	N	Single	11 months		N	25.6
Tube 17	Rowland Road AQ station	Industrial Roadside	Y	Collocated	12 months		N	21.5
Tube 18	Rowland Road AQ station	Industrial Roadside	Y	Collocated	12 months		N	20.3
Tube 19	Rowland Road AQ station	Industrial Roadside	Y	Collocated	12 months		N	21.5
Tube 20	Station Road (Brigg Road)	Industrial Roadside	Y	Single	10 months		N	27.9
Tube 21	Killingholme 4	Urban Roadside	N	Single	12 months		N	**42.9**
Tube 22	Killingholme 5	Urban Roadside	N	Single	11 months		N	**51.8**
Tube 23	Kirmington Vale	Rural	N	Single	12 months		N	11.7
Tube 24	Killingholme Roadside NOx Analyser	Urban Roadside	N	Triplicate	12 months		N	**46.7**
Tube 25	Killingholme Roadside NOx Analyser	Urban Roadside	N	Triplicate	12 months		N	**41.0**

Site ID	Location	Site Type	Within AQMA?[a]	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88) 2014 (μg/m^3)
Tube 26	Killingholme Roadside NOx Analyser	Urban Roadside	N	Triplicate	12 months		N	**52.2**
Tube 27	Lindum Street 1	Urban Roadside	Y	Single	5 months	Y	N	24.6
Tube 28	Lindum Street 2	Urban Roadside	Y	Single	5 months	Y	N	26.4

[a] The AQMA for PM10 daily mean exceedances.

Table 2.6: Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?[a]	Annual mean concentration (adjusted for bias) μg/m^3				
			2010* (Bias Adjustment Factor = 0.71)	2011* (Bias Adjustment Factor = 0.68)	2012* (Bias Adjustment Factor = 0.67)	2013* (Bias Adjustment Factor = 0.99)	2014 (Bias Adjustment Factor = 0.88)
Tube 1	Urban Kerbside	N	23.7	25.0	26.7	34.6	31.1
Tube 2	Suburban Roadside	N	22.3	25.6	22.8	34.1	29.5
Tube 3	Suburban Kerbside	N	34.4	30.0	26.2	**41.0**	33.2
Tube 4	Urban Roadside	Y	29.5	29.5	30.3	**41.4**	32.2
Tube 5	Urban Kerbside	Y	26.7	27.0	26.6	37.5	31.4
Tube 6	Urban Kerbside	Y	24.2	23.6	25.2	36.2	27.3
Tube 7	Urban Kerbside	N	26.1	26.2	26.9	37.4	32.1
Tube 8	Urban Kerbside	N	28.8	28.1	27.9	39.4	32.2
Tube 9	Urban Roadside	Y	22.8	21.4	21.7	29.8	24.4
Tube 10	Suburban Roadside	Y	22.5	20.1	21.9	32.2	26.5
Tube 11	Industrial Roadside	Y	**41.9**	**43.5**	**43.4**	**60.1**	**45.4**
Tube 12	Industrial Roadside	Y	22.2	26.1	24.8	32.7	27.3
Tube 13	Urban Kerbside	N	25.6	22.0	27.1	39.7	30.8

Site ID	Site Type	Within AQMA?[a]	Annual mean concentration (adjusted for bias) μg/m^3				
			2010* (Bias Adjustment Factor = 0.71)	2011* (Bias Adjustment Factor = 0.68)	2012* (Bias Adjustment Factor = 0.67)	2013* (Bias Adjustment Factor = 0.99)	2014 (Bias Adjustment Factor = 0.88)
Tube 14	Industrial Roadside	N	22.9	19.4	20.7	30.0	27.3
Tube 15	Industrial Kerbside	N	29.5	29.7	30.3	**45.3**	35.1
Tube 16	Suburban Kerbside	N	24.8	22.4	25.2	33.7	25.6
Tube 17	Industrial Roadside	Y	19.8	18.8	21.0	26.1	21.5
Tube 18	Industrial Roadside	Y	20.0	20.1	19.9	26.4	20.3
Tube 19	Industrial Roadside	Y	19.7	20.2	19.0	28.4	21.5
Tube 20	Industrial Roadside	Y	24.1	22.1	20.9	33.2	27.9
Tube 21	Urban Roadside	N	N/A	**44.3**	37.6	**51.3**	**42.9**
Tube 22	Urban Roadside	N	N/A	**40.1**	**42.5**	**64.3**	**51.8**
Tube 23	Rural	N	N/A	9.6	12.3	16.1	11.7
Tube 24	Urban Roadside	N	N/A	N/A	N/A	**48.0**	**46.7**
Tube 25	Urban Roadside	N	N/A	N/A	N/A	**51.3**	**41.0**
Tube 26	Urban Roadside	N	N/A	N/A	N/A	**53.2**	**52.2**
Tube 27	Urban Roadside	Y	N/A	N/A	N/A	N/A	24.6

Site ID	Site Type	Within AQMA?[a]	Annual mean concentration (adjusted for bias) μg/m^3				
			2010* (Bias Adjustment Factor = 0.71)	2011* (Bias Adjustment Factor = 0.68)	2012* (Bias Adjustment Factor = 0.67)	2013* (Bias Adjustment Factor = 0.99)	2014 (Bias Adjustment Factor = 0.88)
Tube 28	Urban Roadside	Y	N/A	N/A	N/A	N/A	26.4

*Optional

[a] The AQMA for PM10 daily mean exceedances.

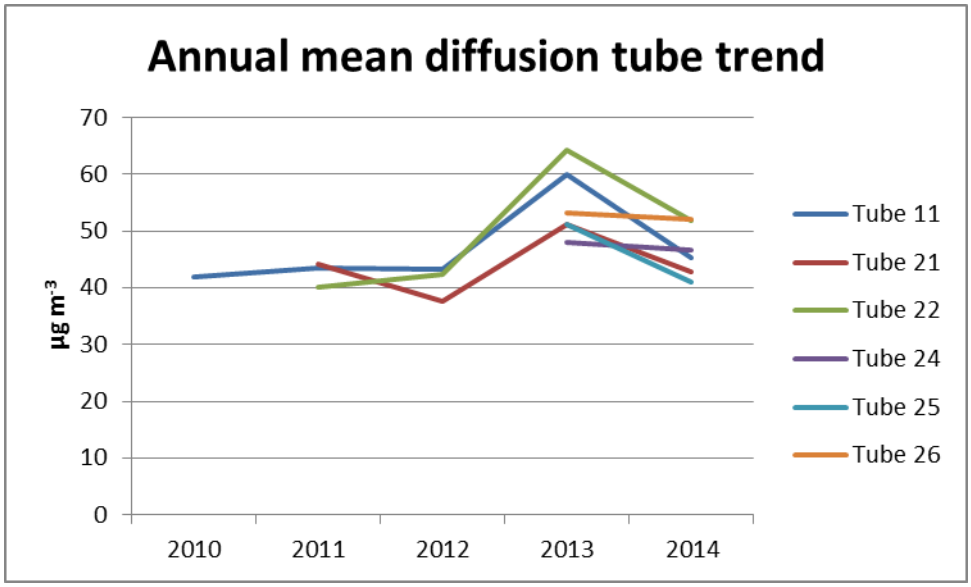


Figure 2.6: Trends in Annual Mean Nitrogen Dioxide Concentrations measured at the Diffusion Tube Monitoring Sites where there has been an exceedance in 2014.

Six sites recorded NO_2 levels above the Annual Mean Objective within the North Lincolnshire Council diffusion tube network. These sites included the consistently non-compliant junction of Brigg Road/A18 (Tube 11) and the five diffusion tubes at Killingholme (Tubes 21, 22, 24, 25 and 26). The site at Killingholme has been the subject of a Detailed Assessment. No further assessment will be required at Brigg Road/A18 as tube 12, located at the nearest sensitive receptor confirms compliance. It is suspected that the spike seen in Figure 2.6 for 2013 is partly due to the higher than normal bias adjustment factor.

2.2.2 PM_{10}

There are no annual means that exceed the 40ug/m^3 objective within the North Lincolnshire Council network. Low Santon was subject to an annual mean exceedance in 2007 and was the trigger for the 2008 Low Santon AQMA. Subsequent years have measured compliant concentrations due in part to changes in correction to VCM, changes in measurement with the FDMS and the focused efforts of operators on the integrated steelworks site in reducing PM_{10} concentrations within the area.

Low Santon has been the subject of a daily mean exceedance for PM_{10} recording 55 daily exceedances at its worst in 2011. The area has been the focus of Detailed and Further Assessment reports. An Action Plan is now in place designed to engage all interested parties in reducing the number of daily exceedances within the area. The Low Santon site still operates a TEOM as well as an FDMS. The Low Santon TEOM will remain in place for data continuity and as a useful tool in source identification, although there have been some communication issues with this monitor towards the end of 2014. An upgrade of the site is due to take effect in April 2015.

The VCM has been used to correct all of the ratified TEOM data. For the sites in Scunthorpe and Appleby the FDMS data used was from Leeds, Scunthorpe Town and an average of remaining sites within range. For the Killingholme TEOM the FDMS data was from York, Scunthorpe Town and again an average of remaining sites within range.

Table 2.7: Results of Automatic Monitoring of PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
						2010*[c]	2011*[c]	2012*[c]	2013*[c]	2014*[c]
1. Scunthorpe Town (FDMS)	Urban Industrial	Yes		91.9	N/A	N/A	22.1	20.8	22.6	21.2 Provisional
1. Scunthorpe Town (TEOM)	Urban Industrial	Yes		90.1	Y	22.3	22.3	20.9	23.4	21.5
2. East Common Lane	Urban Industrial	Yes		99.1	Y	23.1	25.6	22.3	25.2	22.9
3. Low Santon (FDMS)	Industrial	Yes		92.8	N/A	N/A	34.9	26.4	27.5	25.1
3. Low Santon (TEOM)	Industrial	Yes		84.6	Y	32.6	38.7	28.5	33.3	29.6
4. High Santon	Industrial	Yes		93	N/A	22.9	30.1	33	25.3	25.97
5. Redbourn Club	Urban	Yes		95.2	Y	20.4	22.1	19.7	21.8	21.3
6. Lakeside	Urban Industrial	Yes		94.8	Y	N/A	23.3	21.7	23.1	21.6
7. Amvale	Urban Industrial	Yes		83.3	Y	N/A	N/A	22	22.5	20.6
8. Church Square		Yes	62		Y	N/A	N/A	N/A	19.6	26.3
9. High Street East	Industrial	Yes	36	28.4	Y	N/A	N/A	N/A	N/A	21.7
10. Appleby	Rural	No		96.9	Y	18.7	21.1	18	17.5	16.0
11. Killingholme School	Urban Industrial	No		97.6	Y	21.1	21.1	20	19.3	19.1
13. Dawes Lane	Industrial	Yes		64.8	Y	N/A	N/A	N/A	42	27.3
14. Tarmac	Industrial	Yes		89.6	Y	N/A	N/A	N/A	35	27.1

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
						2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014*[c]
15. South Ferriby	Urban Industrial	No		57.2	Y	N/A	N/A	N/A	28	15.8

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.
* Optional

Table 2.8: Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent	Number of Exceedances of 24-Hour Mean (50 μg/m^3)				
						2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014 [c]
1. Scunthorpe Town (FDMS)	Urban Industrial	Yes		91.9	N/A	13	20	10	20	17
1. Scunthorpe Town (TEOM)	Urban Industrial	Yes		90.1	Y	6	24	16	24	18
2. East Common Lane	Urban Industrial	Yes		99.1	Y	11	29	19	35	27
3. Low Santon (FDMS)	Industrial	Yes		92.8	N/A	33	55	16	20	18
3. Low Santon (TEOM)	Industrial	Yes		84.6	Y	58	73	21	43	32
4. High Santon	Industrial	Yes		93		13	34	10	12	18
5. Redbourn Club	Urban	Yes		95.2	Y	5	22	10	17	18
6. Lakeside	Urban	Yes		94.8	Y	N/A	15	12	12	10

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent	Number of Exceedances of 24-Hour Mean (50 μg/m^3)				
						2010*[c]	2011*[c]	2012*[c]	2013*[c]	2014[c]
	Industrial									
7. Amvale	Urban Industrial	Yes		83.3	Y	N/A	N/A	N/A	9	13
8. Church Square		Yes	62		Y	N/A	N/A	N/A	2	11
9. High Street East	Industrial	Yes	36	28.4	Y	N/A	N/A	N/A	N/A	5
10. Appleby	Rural	No		96.9	Y	2	7	1	6	4
11. Killingholme School	Urban Industrial	No		97.6	Y	3	9	4	5	6
13. Dawes Lane	Industrial	Yes		64.8	Y	56	73	88	85	13
14. Tarmac	Industrial	Yes		89.6	Y	N/A	5	15	58	20
15. South Ferriby	Urban Industrial	No		57.2	Y	8	11	10	20	4

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] if data capture is less than 90%, include the 90th percentile of 24-hour means in brackets
* Optional

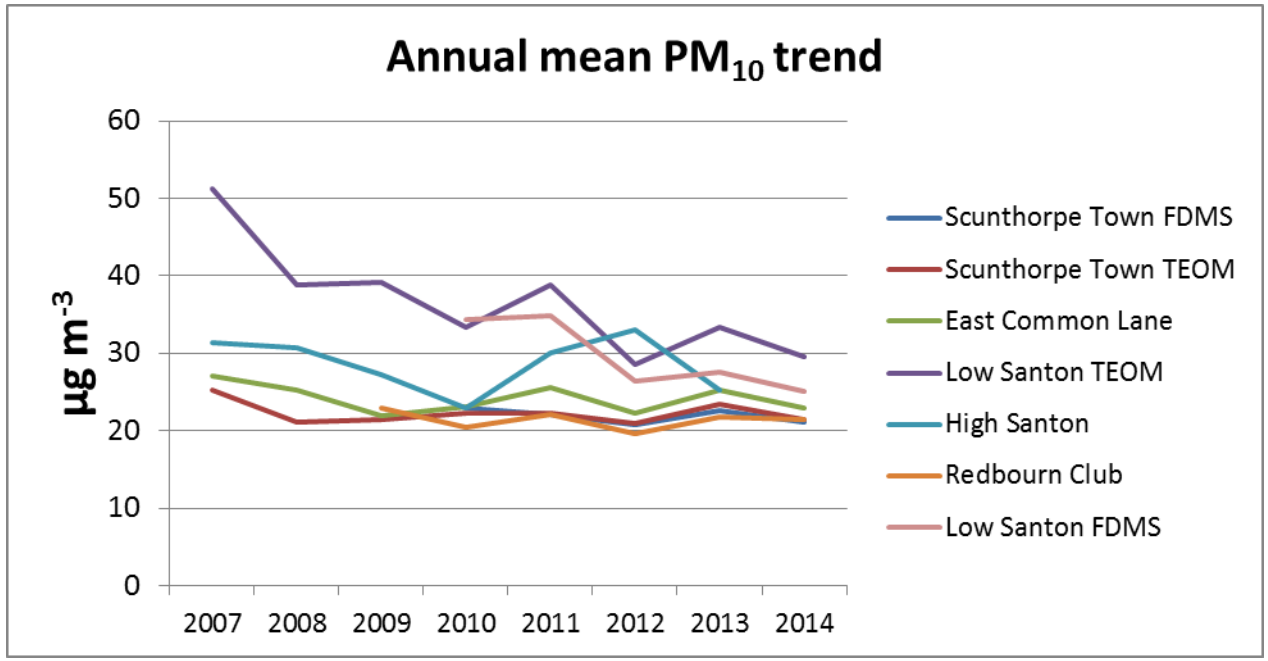


Figure 2.7: Trends in Annual Mean PM_{10} Concentrations from the TEOM monitors.

The annual mean PM_{10} trend appears to have stabilised over the past five years, with most of the TEOMs recording a value less than 25 µg/m^3. Low Santon is measured using a regular TEOM, but from 2010 an FDMS was used as well. Close scrutiny will continue at the Low Santon site, but the Council may look to remove the annual mean PM_{10} AQMA (Figure 1.2) if results continue to show improvements.

2.2.3 Sulphur Dioxide

Automatic Monitoring Data

Reference to Table 2.9 shows that North Lincolnshire Council has not recorded any exceedances of an SO_2 objective in 2014. This mirrors previous years in which no exceedances were recorded. Although SO_2 levels in North Lincolnshire are very low the monitors will remain in place for 2015/16.

Table 2.9: Results of Automatic Monitoring of SO_2: Comparison with Annual Mean Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Number of Exceedances (percentile in bracket μg/m³)[c]		
					15-minute Objective (266 μg/m³)	1-hour Objective (350 μg/m³)	24-hour Objective (125 μg/m³)
1. Scunthorpe Town	Urban Industrial	N	98	75.5	0	0	0
2. Low Santon	Industrial	N		82.7	0	0	0
11. Killingholme School	Urban Industrial	N		96.7	0	0	0

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] if data capture is less than 90%, include the relevant percentile in brackets

2.2.4 Benzene

Benzene has been monitored at the Scunthorpe Town site from 06/11/2012. More information on how Benzene is measured can be found on the non-automatic hydrocarbon network page of the UK air website (www.uk-air.defra.gov.uk). This site is representative of relevant public exposure as it is situated close to residential houses on land close to the integrated steelworks site. The annual running mean recorded from 05/11/2013 up to 05/11/2014 was 1.85 µg/m^3, below the objective level of 5.00 µg/m^3. The running mean for 2014 was 2.43 µg/m^3, although for the last three months of the year the data has not been fully verified by the National Physical Laboratory.

Table 2.10: Annual running mean for Benzene

Pollutant	Scunthorpe Town running mean
Benzene	1.85 µg/m^3

2.2.5 Other pollutants monitored

In addition to the pollutants presented above North Lincolnshire Council also operate two heavy metals monitors and two PAH monitors, with one of each at the Scunthorpe Town and Low Santon sites. These are operated for NPL on behalf of DEFRA. The latest results are as follows:

Table 2.11: Heavy Metals

Results for heavy metals and PAHs are not yet ratified.

Heavy Metal	Scunthorpe Town 2014 ng/m3	Low Santon 2014 ng/m3
Arsenic (As)	0.82	0.85
Cadmium (Cd)	0.33	0.51
Cobalt (Co)	0.14	0.22
Chromium (Cr)	1.61	2.46
Copper (Cu)	5.53	5.31
Iron (Fe)	557.76	1655.71
Manganese (Mn)	22.45	76.99
Nickel (Ni)	1.36	1.68
Lead (Pb)	11.74	16.45
Platinum (Pt)	-	
Selenium (Se)	1.02	1.33
Vanadium (V)	1.78	7.10
Zinc (Zn)	23.87	30.84
Mercury (Hg)	-	-

Table 2.12: PAH Results

PAH Compound	Scunthorpe Town 2014 ng/m^3	Low Santon 2014 ng/m^3
Benzo(a)pyrene	3.59	3.72

North Lincolnshire records some of the highest specific heavy metal compounds and PAHs in the UK. The EU has set an annual mean target of 1 ng/m^3 for PAHs to be achieved by 2012, whilst the UK has set a more stringent target of 0.25 ng/m^3, but

with no date for when this is to be met. PAH measurements have been highlighted in previous review and assessment reports. PAH concentrations are influenced by coke processing on the integrated steelworks site, and Tata Steel is working with the Environment Agency to reduce PAHs in the Scunthorpe area. Low Santon records the highest concentrations of the two monitoring sites and has not achieved compliance in any of the years in which the monitoring has taken place.

2.2.6 Summary of Compliance with all AQS Objectives

No new areas of concern have been highlighted by new monitoring data within North Lincolnshire. Previously highlighted issues remain a concern but are showing signs of improvement. It is hoped that the continuation of the Air Quality Action Plan and the focused efforts of industry, health professionals and the regulators will bring about further reductions of PM_{10} at Low Santon.

Figure 2.8 highlights the improvements that have been made since monitoring began in 2005. The annual mean for PM_{10} for each year from 2005 has been plotted and the thicker red line shows the long term trend. The surrounding pink shaded area shows 1 standard deviation.

This data used in Figure 2.8 is ratified data with the 1.3 correction factor applied, but has not been VCM adjusted.

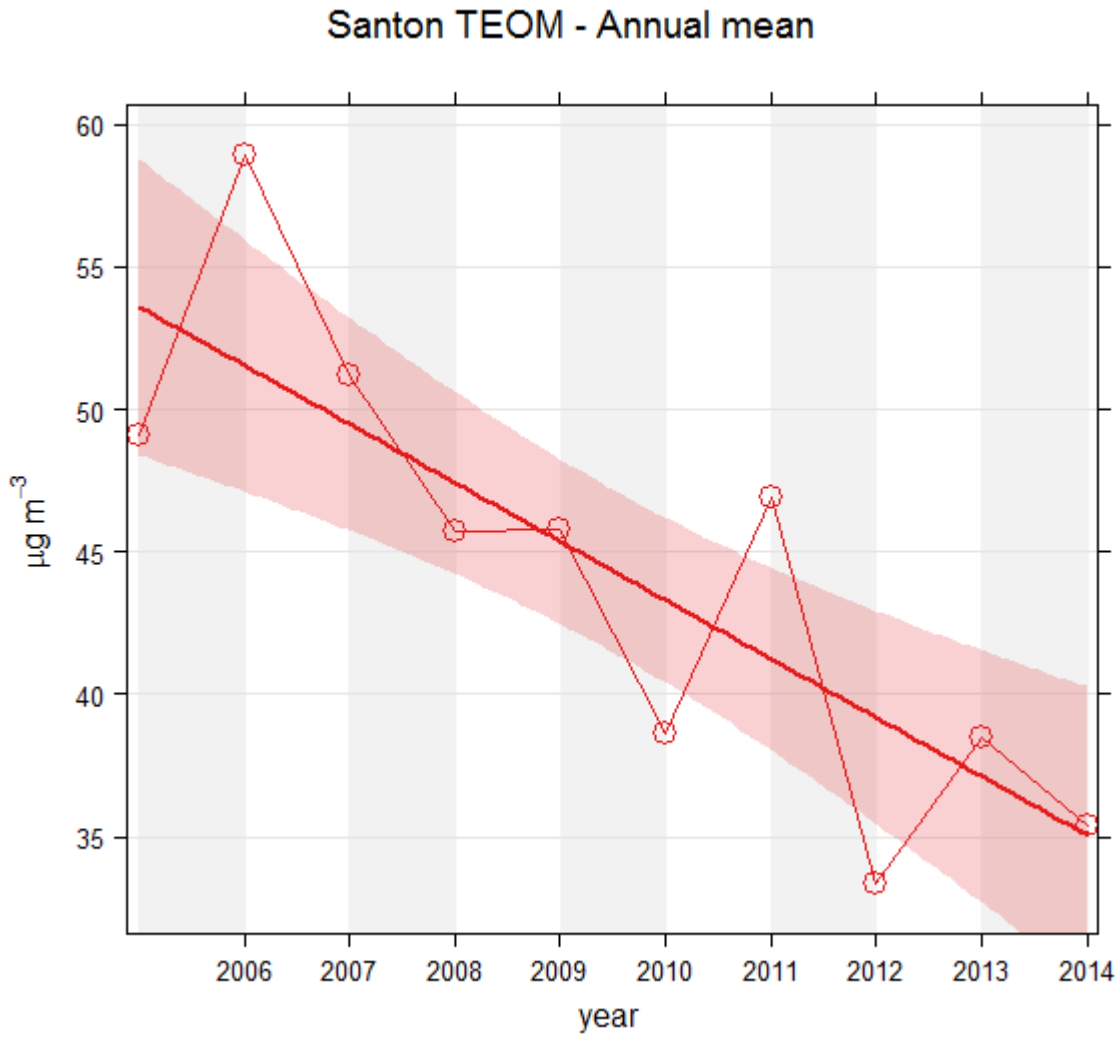


Figure 2.8: The long term trend from the Santon TEOM using ratified data.

The data in Table 2.8 shows that monitoring locations to the West of the integrated steelworks site - Scunthorpe Town, Redbourn Club and particularly East Common Lane - have not shown this level of improvement and schemes that will benefit East Scunthorpe will be prioritised.

Current schemes that have been proposed by Tata Steel Ltd and other operators on the integrated steelworks site are:

- Continued greening of the site to prevent and capture fugitive particulate emissions.
- Enclosing the material reception area at the Ore Blending Plant
- Installation of a chemical dust suppression system on the main Sinter Plant material conveyor.
- Providing further areas of hard standing on the Slag Haul Road.

The Council is participating in discussions with Tata Steel and the Environment Agency to identify solutions to the PAH emissions. Currently Tata Steel are using reverse dispersion modelling and undertaking localised monitoring to identify the areas of the coke ovens with the highest amount of gas leakage. In the short term, minimising emissions from the coke oven doors should reduce emissions, however a noticeable reduction in the level of PAH emissions may only be possible with a full refurbishment or provision of new coke ovens.

North Lincolnshire Council has examined results and concentrations outside of the AQMA, and they are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

North Lincolnshire Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

North Lincolnshire Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

North Lincolnshire Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

North Lincolnshire Council confirms that there are no new/newly identified busy junctions/busy roads.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

North Lincolnshire Council has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment. The criteria set out in Section A.5 of Box 5.3 in TG(09) is for any new road where the traffic flow exceeds 10,000 vehicles per day.

3.6 Roads with Significantly Changed Traffic Flows

Work has begun on an upgrade to the A160, but this will not significantly change the total daily traffic flows.

There is a proposal to de-trunk the M181. The Council is awaiting a full planning application with an air quality impact assessment.

North Lincolnshire Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

North Lincolnshire Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

North Lincolnshire Council confirms that there are no airports in the Local Authority area that meet the criteria as set out in TG (09).

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

North Lincolnshire Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

North Lincolnshire Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

North Lincolnshire Council confirms that there are no ports or shipping that meets the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

North Lincolnshire Council has received a number of planning applications for major developments in which air quality assessments have been carried out. In the 2012 USA projects within the Port of Immingham were discussed. The Able Marine Energy Park wind turbine manufacturing facility is ongoing although the previous air quality impact assessment does not need to be updated.

Another development subject to national infrastructure planning regulations is the Hornsea Offshore wind farm project 2. A thorough air quality impact assessment has been submitted to North Lincolnshire Council and it has been deemed not to adversely affect the air quality in the area.

Three are also three new smaller industrial sources that required air quality impact assessments; Hibaldstow anaerobic digestion plant, Tamar Energy Ltd bio waste plant in Bonby and a combined cycle gas turbine power station in Brigg. It was concluded that none of them will have an adverse effect on the air quality in the areas where they are to be situated.

North Lincolnshire Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

North Lincolnshire Council previously assessed the impact of existing installations using the Environment Agency Pollution Inventory. For this assessment the European Pollutant Release Transfer Register (PRTR) was used. All these sites are Part A1 Processes; no new operational sites have been identified, although some sites have been removed, either because they have closed down or were considered to be too far away from the North Lincolnshire Council boundary. Due to the

timescales of this report, data from the pollution inventory is only available for 2012. When 2013 data is available this will be assessed and considered. No new receptors have moved closer to the boundary of any of these sites.

Table 5.1: Benzene (tonnes per annum)

Installation	2010	2011	2012	% Change
Tata Steel	29	29.1	26	-11
Total Lindsey Oil Refinery	76	62	83	+8

Table 5.2: Carbon Monoxide (tonnes per annum)

Installation	2010	2011	2012	% Change
Tata Steel	85,000	93,000	78,100	-8
Cemex UK Ltd	255	-	528	+48
Total Lindsey Oil Refinery	-	-	629	-

Table 5.3: Lead (tonnes per annum)

Installation	2010	2011	2012	% Change
Tata Steel	9	9.3	7.6	-16

Table 5.4: Nitrogen Dioxide (tonnes per annum)

Installation	2010	2011	2012	% Change
Immingham CHP	1335	1350	1280	-4
Tata Steel	5025	5820	5160	+3
Biffa Waste Services, Roxby	214	209	228	+7
Fibrogen Ltd	231	142	146	-63
Keadby Power Station	765	447	-	
Cemex UK Ltd	570	656	703	+23

Total Lindsey Oil Refinery	1093	955	1220	+11
Centrica KPS Ltd	671	327	480	-29
E. On UK Plc	1400	158	-	

Table 5.5: PM_{10} (tonnes per annum)

Installation	2010	2011	2012	% Change
Tata Steel	2613	2630	2500	-4
Total Lindsey Oil Refinery	81	88	124	+53

North Lincolnshire Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

North Lincolnshire Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There are major fuel (petrol) storage depots within the Local Authority area, but these have been considered in previous reports.

5.3 Petrol Stations

North Lincolnshire Council confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

North Lincolnshire Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

In 2014 an installation permitted under the Environmental Permitting (England and Wales) Regulations 2010, Lebus Upholstery Ltd. installed a biomass boiler manufactured by Talbotts, model MWES, with a 950 kw capacity. The main pollutant emitted from this is PM_{10}. Lebus Upholstery Ltd. is located within Scunthorpe's daily mean AQMA. The site is regulated by the Council under an environmental permit and relevant emission limits are in place.

The Council has no record of any other biomass installations that meet the criteria set out in Section D.1a of chapter 5, TG(09).

North Lincolnshire Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

North Lincolnshire Council confirms that there are no biomass combustion plants in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

North Lincolnshire Council confirms that there are no new areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

North Lincolnshire Council previously assessed a number of fugitive and uncontrolled sources and did not identify any potential exceedances. Many of the sources are still in operation yet continue to be adequately controlled via dust management plans. There are no new fugitive sources since the previous screening assessment.

North Lincolnshire Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

North Lincolnshire Council has continued to operate an extensive air quality monitoring network. The data captured from this network has not identified any new areas of exceedance and has continued to identify known areas of poor air quality. 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 steelworks site, both areas for PM_{10}. The previous Updating & Screening Assessment identified the A160 in Killingholme as a possible exceedance for NO_2. Additional monitoring has been carried out and a detailed assessment completed which concluded that there is not an exceedance of an air quality objective, although monitoring will be continued to assess the impacts of the A160 upgrade and the potential increase in traffic and HGVs from committed development.

8.2 Conclusions from Assessment of Sources

The largest source of air pollution in the Scunthorpe area is the integrated steelworks site, where North Lincolnshire Council is working in conjunction with the Environment Agency to reduce emissions and improve local air quality. The assessments of new or significantly changed sources have not identified any potential exceedances of air quality objectives.

8.3 Proposed Actions

There are no new actions as a result of new monitoring data or the assessment of sources. There are ongoing actions that will need to continue. North Lincolnshire Council has proceeded to a Detailed Assessment for NO_2 in South Killingholme and this report has been completed. North Lincolnshire Council prepared Action Plans for the two AQMA's and will continue to deliver these assessing the improvements within the data. Further actions for the air quality network include the ongoing refining of the

existing AQMA's and the upgrading of air quality monitoring stations as and when required.

Appendices

Appendix A: 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 2014 was 0.88.

Factor from Local Co-location Studies (if available)

North Lincolnshire Council had only 1 ongoing co location study as discussed in the monitoring data section of this report in 2011, Scunthorpe Town an urban industrial site:

Site	Analyser Annual Mean	Tube Annual Means	Bias Adjustment Factor
Scunthorpe Town	20	22	0.88

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 lampposts. 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 carried out by AEA.

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Automatic Method: Period Mean	Automatic Method: Data Capture (% DC)	Data Quality Check: Tubes Precision Check	Data Quality Check: Automatic Monitor Data
1	########	30/01/2014	32.0	26.2	32.3	30	3.4	11	8.5	17.2	88	Good	Good
2	30/01/2014	28/02/2014	27.1	27.6	29.1	28	1.0	4	2.6	14.5	98.7	Good	Good
3	28/02/2014	28/03/2014	38.9	25.3	31.7	32	6.8	21	16.9	32.8	99.7	Poor Precision	Good
4	28/03/2014	########	19.6	22.9	24.7	22	2.6	12	6.4	31.5	99.9	Good	Good
5	########	30/05/2014	22.5	21.8	19.5	21	1.6	7	3.9	19.4	100	Good	Good
6	30/05/2014	########	14.1	15.9	14.4	15	1.0	7	2.4	18.9	99.9	Good	Good
7	########	30/07/2014	15.3	15.8	14.5	15	0.7	4	1.6	20.3	88.6	Good	Good
8	30/07/2014	29/08/2014	18.3	17.9	19.1	18	0.6	3	1.5	16.3	76.6	Good	Good
9	29/08/2014	29/09/2014	15.7	15.3	10.9	14	2.7	19	6.6	30.3	99.7	Good	Good
10	29/09/2014	31/10/2014	25.1	25.6	28.5	26	1.8	7	4.6	15.2	99.2	Good	Good
11	31/10/2014	28/11/2014	36.2	29.8	34.6	34	3.3	10	8.3	24.2	58.6	Good	or Data Capture
12	28/11/2014	31/12/2014	27.8	32.3	34.5	32	3.4	11	8.5	12.7	94.1	Good	Good
13													
										Overall survey -->		Good precision	Good Overall DC

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

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

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

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

Bias calculated using 10 periods of data

Bias factor A: 0.88 (0.62 - 1.51)

Bias B: 13% (-34% - 60%)

Diffusion Tubes Mean: 22 µgm^{-3}

Mean CV (Precision): 9

Automatic Mean: 20 µgm^{-3}

Data Capture for periods used: 94%

Adjusted Tubes Mean: 20 (14 - 34) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 11 periods of data

Bias factor A: 0.9 (0.65 - 1.46)

Bias B: 11% (-31% - 53%)

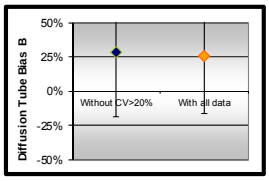
Diffusion Tubes Mean: 23 µgm^{-3}

Mean CV (Precision): 10

Automatic Mean: 21 µgm^{-3}

Data Capture for periods used: 95%

Adjusted Tubes Mean: 21 (15 - 34) µgm^{-3}



Jaume Targa
jaume.targa@aeat.co.uk

Version 03 - November 2006

PM Monitoring Adjustment

Particulate matter within North Lincolnshire is currently measured using TEOM. Numbers reported with results from a TEOM have had a factor of 1.3 applied and then corrected using the Volatile Correction Model as recommended by the Technical Guidance 2009.

QA/QC of automatic monitoring

AEA Technology currently carries out the QA/QC amendments to our data via their Calibration Club service. Each of the gas analysers is calibrated every 2 weeks with the TEOMs calibrated fortnightly and filter changed whenever required.