2019 Air Quality Annual Status Report (ASR)

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

October 2019

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Report Reference number	2019 v1.0
Date	October 2019

Executive Summary: Air Quality in Our Area

Air Quality in Rutland County Council

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

This report considers the work undertaken to protect and where possible improve Rutland's air quality. The monitoring data for 2018 has been evaluated and in combination with the work to protect air quality, they demonstrate that the objectives for air quality aren't exceeded. This ongoing work means there are no Air Quality Management Areas (AQMA) in Rutland and it is currently unlikely that one would have to be declared.

Rutland monitors for nitrogen Dioxide (NO_2) using diffusion tubes at 11 locations in the County. The long terms trends in NO_2 across the county vary but changes in 2018 were small and mostly within the range of results of previous years. NO_2 concentrations generally decreased slightly in Oakham, but rose for the third consecutive year in Uppingham by 1 µg/m^3 to 29.2 µg/m^3 this is still significantly below the annual mean objective of 40 µg/m^3.

No new major sources of emissions have been introduced in 2018, but there is ongoing development in the County. Two limestone quarry extensions have been put forward this year near Clipsham and Stretton. Potential air quality impacts have been identified and are in the process of being addressed through the planning regime.

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

Actions to Improve Air Quality

Public Protection's work to improve air quality during 2018 involved significant input into the Local Plans evaluation of potential designated sites and advising Development Control at pre-application and planning application stages of certain developments.

The Authority has recently installed an electric car charging point at its offices in Oakham for use with a staff pool electric car. Whilst this is a small part in proving air quality it should also help reduce carbon emissions associated with fossil fuel usage.

Conclusions and Priorities

Monitoring shows that air quality in Rutland is generally good, work by the Public Protection Section to maintain and improve air quality has helped ensure there are no AQMAs in Rutland. The priorities are ongoing and can be summarised;

- To continue to screen proposed developments from the earliest stages for potential impacts on air quality and to ensure they are addressed.

- To maintain the NO_2 monitoring program and to evaluate where monitoring locations can be changed to seek out potential locations where traffic could adversely impact air quality.

Local Engagement and How to get Involved

The Travel4Rutland program is a free service for residents and people working in Rutland to identify opportunities for car sharing. This can help save on fuel and parking costs as well as helping reduce emissions from vehicles, thereby helping to improve local air quality.

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1 Local Air Quality Management

This report provides an overview of air quality in Rutland County Council during 2018. 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 Rutland County 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 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.

Rutland County Council currently does not have any AQMAs. For reference, a map of Rutland County Council's monitoring locations is available in Appendix D.

2.2 Progress and Impact of Measures to address Air Quality in Rutland County Council

Defra's appraisal of last year's ASR concluded

1. *Rutland County Council does not have any declared air quality management areas (AQMAs); as such there is no formal requirement to develop an air quality action plan (AQAP). During 2017 the Council undertook air quality monitoring through their network of 11 NO2 diffusion tube sites. In 2017 there were no exceedances of air quality objectives (AQOs), with a maximum annual mean concentration of 27.3µg/m^3. All sites recorded concentrations far below objective limits. Generally NO2 concentrations have steadily decreased across most sites over the last 5 years. Road traffic is the main source of pollution within the County.*
2. *Although the Council does not have a formal AQAP, they do have 5 measures in place to mitigate emissions. These are at various stages of completion, and include: policy guidance, transport planning, public information campaigns, and car/lift share schemes. The report provides good discussion of local developments and planning applications, with all relevant applications required to complete air quality assessments. There is limited discussion of PM2.5 issues, relative to the Public Health Outcomes Framework. QA/QC procedures have been applied for bias adjustment (using a national factor) and distance corrections. No other corrections are required.*
3. *On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants, with the provisos listed in the commentary below. The Council should continue to implement their air quality strategy, and continue monitoring. Following the completion of this report, Rutland County Council should submit an Annual Status Report in 2019.*

Rutland County Council has taken forward a number of direct measures during the current reporting year of 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in the following text and in Table 2.1.

Key completed measures are:

1. **Consultation with Local Plans Review to 2036**

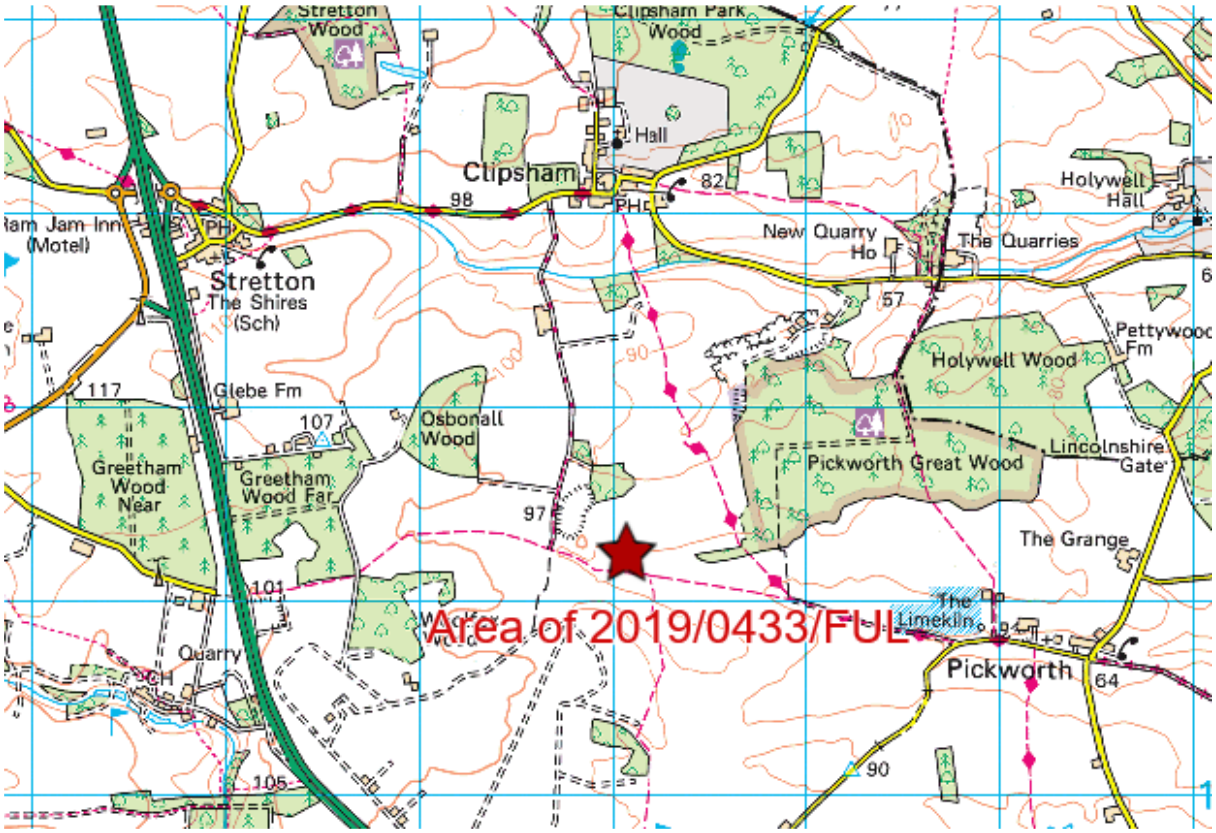
A further 15 potential sites for allocation in the Local Plan came forward in 2019. Environmental Health responded to a request from our Local Plans team to comment on these potential development sites. Issues of potential impacts on air quality were highlighted when proposed residential development was adjacent to roads where traffic flow data indicates that the 'screening criteria for busy roads' would or were close to being exceeded. Sites were also highlighted where the location would mean additional traffic flows on roads where congestion can occur or where extra vehicles would result in traffic flows above or close to those for busy roads in existing / proposed residential areas. The level of detail available regarding the proposed sites, available data for existing traffic flows and limited resources available to consider the potential impacts mean it is only possible to screen and highlight potential concerns for impacts on Air Quality. But this process has helped advise Local Plans where detailed Environmental Assessments are required and for some sites near Stamford, it has also prompted a recommendation for Local Plans to consult with the neighbouring local authority of South Kesteven District Council specifically regarding air quality.

2. **Proactive Development Control**

2019/0433/FUL – Stamford Stone, Clipsham Bidwells Quarry, Bidwells Lane, Clipsham, Rutland, LE15 7WQ – 'southern extension of limestone quarry, stone workshop'

Environmental Health commented on this application and objected in part because the potential impacts on air quality hadn't been assessed within the application. This was despite pre-application advice that requested an assessment and where necessary management and mitigation schemes. The application currently hasn't been determined, the Environmental Impact Assessment of air quality is still pending. The approximate location of the proposal is shown below in figure 2.1.

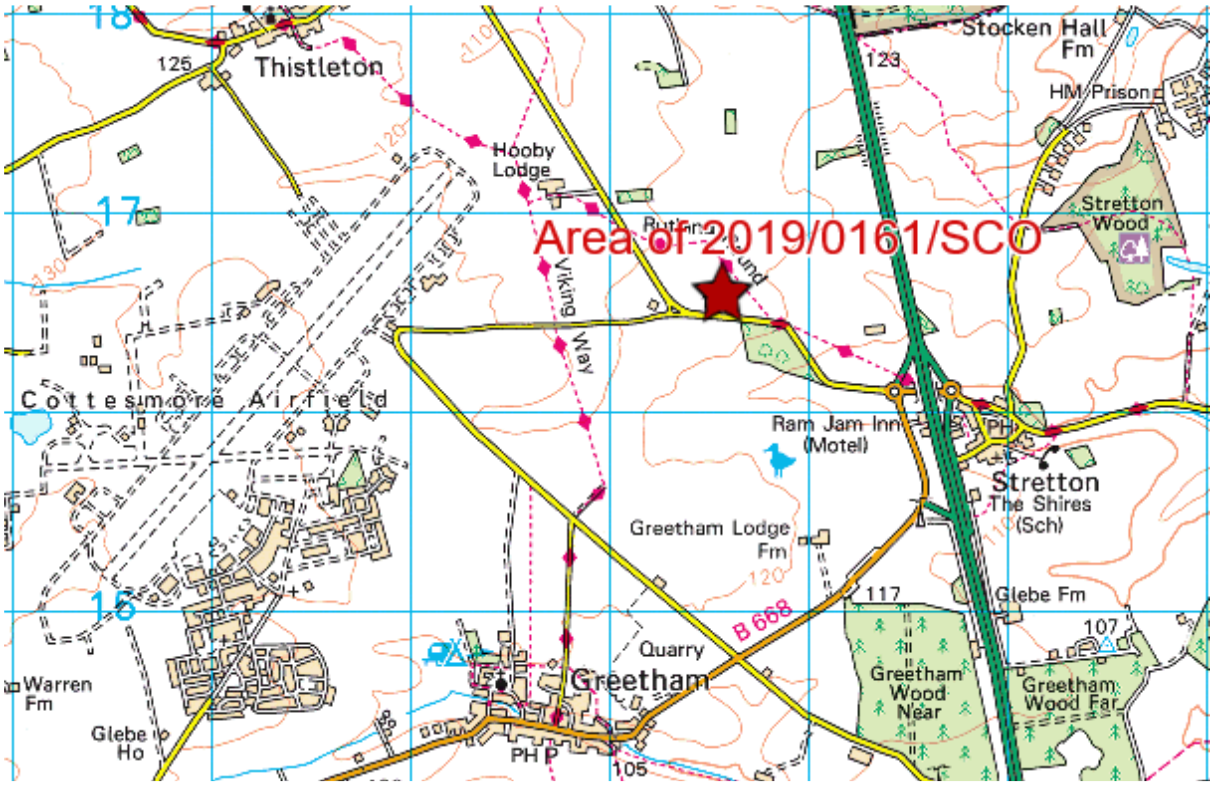
Figure 2.1 Approximate location of proposed limestone quarry extension and stone workshop at Bidwell Lane, Clipsham, Rutland, LE15 7WQ.



2019/0161/SCO – Goldholme Stone Ltd, Hooby Lane Quarry, Stretton, Rutland, LE15 7QY, Scoping Opinion for 'limestone quarry extension and stone workshop'

The applicants were seeking determination on whether an Environmental Impact Assessment would be required as part of a subsequent planning application for a proposed quarry extension and stone workshop located to the west of Stretton. Environmental Health identified that impacts on air quality including particulate matter should be included. If planning permission is subsequently sought it will need to include an assessment of air quality and associated management and control measures. The location of the site is shown approximately in figure 2.2.

Figure 2.2 Location of proposed limestone quarry extension and stone workshop at Hoby Lane, Stretton, Rutland, LE15 7QY



3. Rutland County Council Staff Electric Pool Car and Charging Point

In 2019 Rutland County Council has installed an electric car charging point at its offices in Oakham, as shown in the executive summary. The charging point is used for a staff pool car instead of a conventional petrol /diesel vehicle.

Rutland County Council's priorities for the coming year are

- Continue to review and assess potential impacts on Local Air Quality from proposed sites for the Local Plan and Planning Applications.
- The NO_2 diffusion tube monitoring program will be maintained. As potential changes to the design of Oakham High Street are now unlikely to affect local traffic flows, two NO_2 diffusion tube monitoring locations were relocated in 2019. Sites were selected to evaluate potential impacts of 'slow moving, queuing traffic and idling vehicles' as described in Section 3.1.1. A further review will consider relocating

monitoring sites in 2020 and will include areas that have been recently developed and the surrounding areas.

The principal challenges and barriers to implementation that Rutland County Council anticipates facing are a relatively low level of resource and competing priorities. This means that any work to improve or maintain local air quality is on a limited scale.

Table 2.1 – 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
1	Consultation with Local Plans	Policy Guidance and Development Control	Other policy	LA Environmental Health	N/A	Complete	15 of 15 potential additional development sites screened for AQ issues	N/A	Initial screening, feed-back to Local Plans	Completed Oct 2019	
2	Proactive Planning Consultation	Policy Guidance and Development Control	Other policy	LA Environmental Health	N/A	Ongoing	N/A	N/A	Implemented and ongoing development advice	Ongoing	
3	Electric pool car & charging point installation	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	LA	N/A	2019	N/A		Charging point installed, vehicle ordered	Oct/Nov 2019	
4	Open Fires and Wood Stoves guide added to RCC website	Public Information	Via the Internet	Defra & LA	N/A	Ongoing	N/A	N/A	Implementation on-going	Ongoing	
5	Travel 4 Rutland	Alternatives to private vehicle use	Car & lift sharing schemes	LA	N/A	Ongoing	N/A	Reduced vehicle emissions	Implementation on-going	Ongoing	

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

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

Rutland County Council doesn't monitor for $PM_{2.5}$ or PM_{10}. Previous rounds of the Air Quality Review and Assessment process have indicated that particulates (PM_{10}) aren't a significant problem in the county. Defra[4] have modelled maps of background $PM_{2.5}$ concentrations in 1km x 1km squares. These predictions indicate that in 2018 the highest concentrations are along the A1, with the highest concentration being 11.1 µg/m^3 in the 1km^2 square that includes the junction of the A1 and A606. This is considerably below the UK air quality standard of 25 µg/m^3 to be achieved by 2020.

It should be born in mind that the issue of very fine particulates ($PM_{2.5}$) is being investigated internationally and it is very likely to drive policy changes in the future. It is therefore recognised that where possible work should seek to reduce emissions of particulate emissions. The following measures should help reduce emissions of particulates;

- Review and assess potential impacts on Local Air Quality from proposed Planning Applications.
- Advising Local Plans regarding sites that maybe 'allocated' in the Local Plan, where the development could be affected by poor air quality and where proposed development could affect air quality in the surrounding areas.
- Publishing Defra's guide 'Open fires and wood-burning stoves' on Rutland County Council's website.

[4] Defra background maps, 2017 based are available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017

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

3.1 Summary of Monitoring Undertaken

3.1.1 Non-Automatic Monitoring Sites

Rutland County Council undertook non- automatic (passive) monitoring of NO_2 at 11 sites during 2018. Table A.1 in Appendix A and the maps in Appendix D show the details of the sites.

Diffusion tube monitoring serves a number of purposes. Many sites are close to roads in locations where stopping traffic, congestion and the position of sensitive receptors makes it more likely that an exceedance of an objective would occur, i.e. monitoring takes places at 'worse case' locations within Rutland. Monitoring in 2018 has found that the annual average air quality objective of 40 µg/m^3 for NO_2 hasn't been exceeded and currently there doesn't appear to be any trends that might indicate an exceedance was likely. On the basis of monitoring it isn't considered necessary to declare or start a detailed investigation of a potential Air Quality Management Area.

Diffusion tube monitoring is also used where new developments or changes are proposed, meaning that impacts on air quality may occur. In part this gathers evidence of existing NO_2 concentrations which forms the basis of determining whether proposed developments would have a negative and adverse impact. Monitoring is also a useful tool for the independent evaluation of developments or scheme where they progress, to evaluate the actual impacts on air quality.

Monitoring locations using diffusion tubes were reviewed in 2017 Air Quality report. Two sites in Oakham, Brooke Rd (21.1µg/m^3 in 2016) and High Street (17.5 µg/m^3 in 2016) were considered for redeployment because the annual average NO_2 concentrations were significantly below the objective and hadn't changed significantly over the past 5 years. Proposals that would have changed traffic flows in Oakham, associated with a one way scheme along Oakham High Street [5] meant it was appropriate to maintain these sites into 2018.

[5.] https://www.rutland.gov.uk/my-council/news-archive/2017-archive/consultation-begins-on-improvements-to-oakham-town-centre/

In addition as the proposed scheme was likely to divert some traffic along other town centre roads, it was thought appropriate to start monitoring on Station Road in Oakham, which runs parallel to High Street. There is no traffic count data for Station Rd, however in 2016 a manual count for the High Street established annual average traffic flows were over 7000 vehicles per day. Given a proportion of those vehicles could have been diverted down Station Road in addition to any existing traffic flows it was thought appropriate to start monitoring in that area to gather baseline data and should the scheme have progressed to help predict impacts on NO_2 concentrations. A site was selected as shown in figure 3.1 and on the maps in Appendix D, where receptors (domestic dwellings) are close to the road and parked vehicles can slow or stop passing traffic.

Figure 3.1 Location of NO_2 diffusion tube relocated to Station Rd, Oakham from January 2018

Maps showing the location of the monitoring sites are provided in Appendix D.

During 2018 it became apparent that the proposed one way system was unlikely going to progress, this did open up the opportunity to reconsider some of the monitoring locations in Oakham commencing in January 2019.

Brooke Road, Oakham Site 6

This monitoring location was next to housing on the traffic light controlled junction of Brooke Rd, South Street and Mill Street. It returned results in 2017 of 21.8 µg/m^3 and monthly results in 2018 indicated a similar annual average was anticipated, which was subsequently confirmed as 19.7 µg/m^3. These results and the likely cancelation of the one way system indicated there was potential to relocate the Brooke Road, monitoring site at the start of January 2019. Brook Road does have a railway level crossing and vehicles regularly parked on the road that can cause periods of congestion near to housing. Draft proposals from Local Plans are also considering development sites to the south west of Oakham, this potentially means there would be more traffic using Brooke Road in the near future. It was therefore deemed appropriate to relocate the Brooke Road monitoring site closer to the level crossing and housing that is relatively close to the road, figure 3.2 shows the area in which the monitoring location has been moved to.

Figure 3.2 Location of NO_2 diffusion tube relocated in Brooke Road, Oakham from January 2019

Note: full details of the monitoring location will be provided in the 2019 update.

New Street to John Street (bus station), Oakham Site 10

This monitoring site was located on New Street which is a key access route to Tesco Oakham and is adjacent to housing where vehicles often park, meaning periodically there can be congestion and vehicles waiting. The New Street monitoring location had been established at about the time that planning permission had been granted to effectively double the size of the Tesco store and car park. During 2018, these proposals were replaced by relatively small scale residential developments of South Street, Penn Street in Oakham. Given possible increases in traffic flows were now significantly reduced and as explained above the one way system had been cancelled, there was potential to relocate this monitoring position. The annual average NO_2 concentration in 2017 was 18.0 µg/m^3 at this site and monthly results in

2018 indicated that it was likely there would be no increase, the result for 2018 was subsequently found to be 16.6 µg/m^3. It was therefore decided to relocate this site from January 2019 to John Street, near to housing opposite Oakham bus station. Oakham bus station had been 'screened' out in previous assessments of air quality as timetable data indicated bus vehicle movements were significantly below the 2500 per day threshold identified in technical guidance. However changes in developments and NO_2 concentrations consistently below the Annual Average Objective in New Street, meant the potential impact of buses and other passing vehicles could be monitored. Figure 3.3 below shows the approximate location of the monitoring position.

Figure 3.3 Location of NO_2 diffusion tube relocated in John Street, Oakham from January 2019

Note: full details of the monitoring location will be provided in the 2019 update.

A further review of monitoring locations will take place and be discussed in the 2020 air quality report. Any changes are likely to focus on areas where there is likely to be

development or there has been recent developed such as Barleythorpe, Oakham and Leicester Road in Uppingham.

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

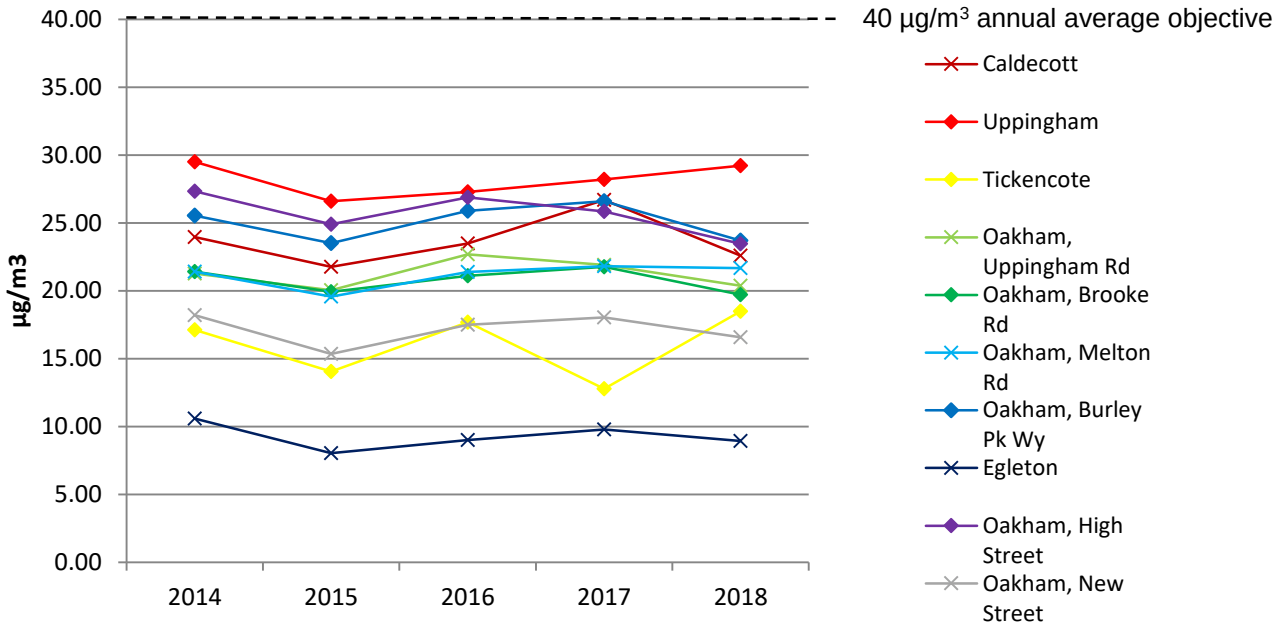
The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

There are no Air Quality Management Areas (AQMA) in Rutland because air quality is generaly good. Whilst all monitoring locations are outside of AQMAs, locations that are classified as kerbside or roadside i.e. sites 1, 2, 5, 6, 7, 10 and 11 are all in positions on that section of road where the highest concentrations of NO_2 would be expected. For example sites 1 (Caldecott), 2 (Uppingham), 5 (Uppingham Rd, Oakham), 6 (Brooke Road, Oakham), 7 (Melton Road Oakham) are all adjacent to features such as traffic lights, railway level crossings and pedestrian crossings that will repeatedly cause traffic to slow, stop and que. Most of these locations are also in built up areas and so are more likely to be suject to ‘canyon effects’ where tall buildings close to a road can hinder the natural dispersion of vehicle exhuast gases, which include NO_2.

Figure 3.4 below shows the trends in NO_2 concentrations from 2013 to 2018 at the monitoring sites. The numerical data and a larger version of figure 3.4 are available in Table A.2 of Appendix A.

Figure 3.4 Annual Average NO_2 concentrations 2014-2018



The diffusion tube monitoring at the eleven sites in Rutland hasn't identied an exceedance of the 40 µg/m^3 objective for annual average concerations of NO_2 in 2018.

The full 2018 dataset of monthly mean values is provided in Appendix B. All monitoring data gathered in 2018 has been ratified and adjusted for laboratory bias as described in Appendix B and C. Where monitoring results are within 10% of the annual air quality objective i.e. at 36 µg/m^{3}or greater and the monitoring location isn't at the same from the kerb as the point of public exposure, then a 'distance correction' should be applied to those results. The distance correction is to take account of the generally decreasing NO_2 concentrations that occur at greater distances from the kerbside of roads. Where the monitoring location is at a different distance from the road compared to the location being assessed then this adjustment is applied. As none of the monitoring sites in Rutland are at or above 36 µg/m^3 NO_2 the figures presented in tables and graphs aren't adjusted for 'distance correction'. The only exception to this is table B2 in Appendix 2 where distance corrections in accordance with 'NO2 Fall off with Distance Calculator (V4.2)' are provided. As all monitoring locations are closer to the kerbside than the point of public exposure, the effect is to slightly reduce estimated NO_2 concentrations.

All sites apart from No3 Station Rd, Oakham have at least 5 years data available and are shown in figure 3.4. Uppingham has shown a slight gradual upward trend in the three years since 2015, and from 2017 to 2018 increased by 1 µg/m^3 to 29.2 µg/m^3 , but it is still significantly below 40 µg/m^3. Although there are some local developments in Uppingham, there is nothing that is likely to see this increase accelerate. But continued monitoring at this location is proposed.

All sites in Oakham showed a decrease in NO_2 concentrations in 2018, although the changes were slight ranging from -.01 to -2.9 µg/m^3. They don't appear to be part of a significant trend and are within the range of results that has been obtained for each site over the past 5 years. Any changes for Oakham shown in figure 3.4 are limited and as explained in section 3.1.1. some sites were relocated at the start of 2019, this situation will be kept under review. There will still be need for monitoring in Oakham as traffic passes through the town centre, in addition the edge of Oakham and Barleythorpe is the location of most of the current and proposed development in the County.

The monitoring location at Tickencote at the edge of the village closest to the A1 showed what initially appears to be a marked increase in 2018 of almost 6 µg/m^3 to 18.5 µg/m^3. The result however is well below the annual objective of 40 µg/m^3 and is close to the range of results already obtained at this site over the past 5 years, which have fluctuated every year, with no apparent trend or underlying cause.

The remaining site, Egleton is used as a rural background monitoring location showed a very slight decline of less than 1 µg/m^3 to 9.0 µg/m^3, again this is within the range of results seen at this site over the past five years and the results obtained appear to be steady and consistent.

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
1	Caldecott	Kerbside	486720	293460	NO2	N	1.0m	1.0m	No	2.2m
2	Uppingham	Roadside	486630	299640	NO2	N	0.3m	1.2m	No	2.2m
3	Oakham, Station Road	Other	485907	309062	NO2	N	0.2m	1.4m	No	2.2m
4	Tickencote	Rural	499060	309650	NO2	N	N/A	N/A	No	2.0m
5	Oakham, Uppingham Rd	Kerbside	486300	308490	NO2	N	4.0m	0.2m	No	2.2m
6	Oakham, Brooke Rd	Kerbside	486130	308570	NO2	N	0.4m	1.0m	No	2.2m
7	Oakham, Melton Rd	Kerbside	485760	308890	NO2	N	1.2m	0.2m	No	2.2m
8	Oakham Burley Pk Wy	Kerbside	486640	309710	NO2	N	6.3m	1.4m	No	2.2m
9	Egleton	Rural	487910	307540	NO2	N	N/A	N/A	No	1.5m
10	Oakham, High St	Kerbside	486206	308740	NO2	N	0.3 m	1.0m	No	2.2m
11	Oakham, New St	Kerbside	485850	308690	NO2	N	0.1m	1.0m	No	2.2m

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.2 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m³) (3)				
					2014	2015	2016	2017	2018
1	Kerbside	Diffusion	100	100	24	21.8	23.5	26.7	22.6
2	Roadside	Diffusion	100	100	29.5	26.6	27.3	28.2	29.2
3	Other	Diffusion	100	100	-	-	-	-	16.6
4	Rural	Diffusion	100	100	17.1	14.1	17.7	12.8	18.5
5	Kerbside	Diffusion	100	100	21.3	20	22.7	21.9	20.4
6	Kerbside	Diffusion	100	100	21.4	19.9	21.1	21.8	19.7
7	Kerbside	Diffusion	100	100	21.4	19.6	21.4	21.8	21.7
8	Kerbside	Diffusion	100	100	25.6	23.5	25.9	26.6	23.7
9	Rural	Diffusion	83	83	10.6	8.1	9	9.8	8.9
10	Kerbside	Diffusion	100	100	27.3	24.9	26.9	25.8	23.5
11	Kerbside	Diffusion	92	92	18.2	15.4	17.5	18.0	16.6

☒ **Diffusion tube data has been bias corrected**

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

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m³ are shown in **bold**.

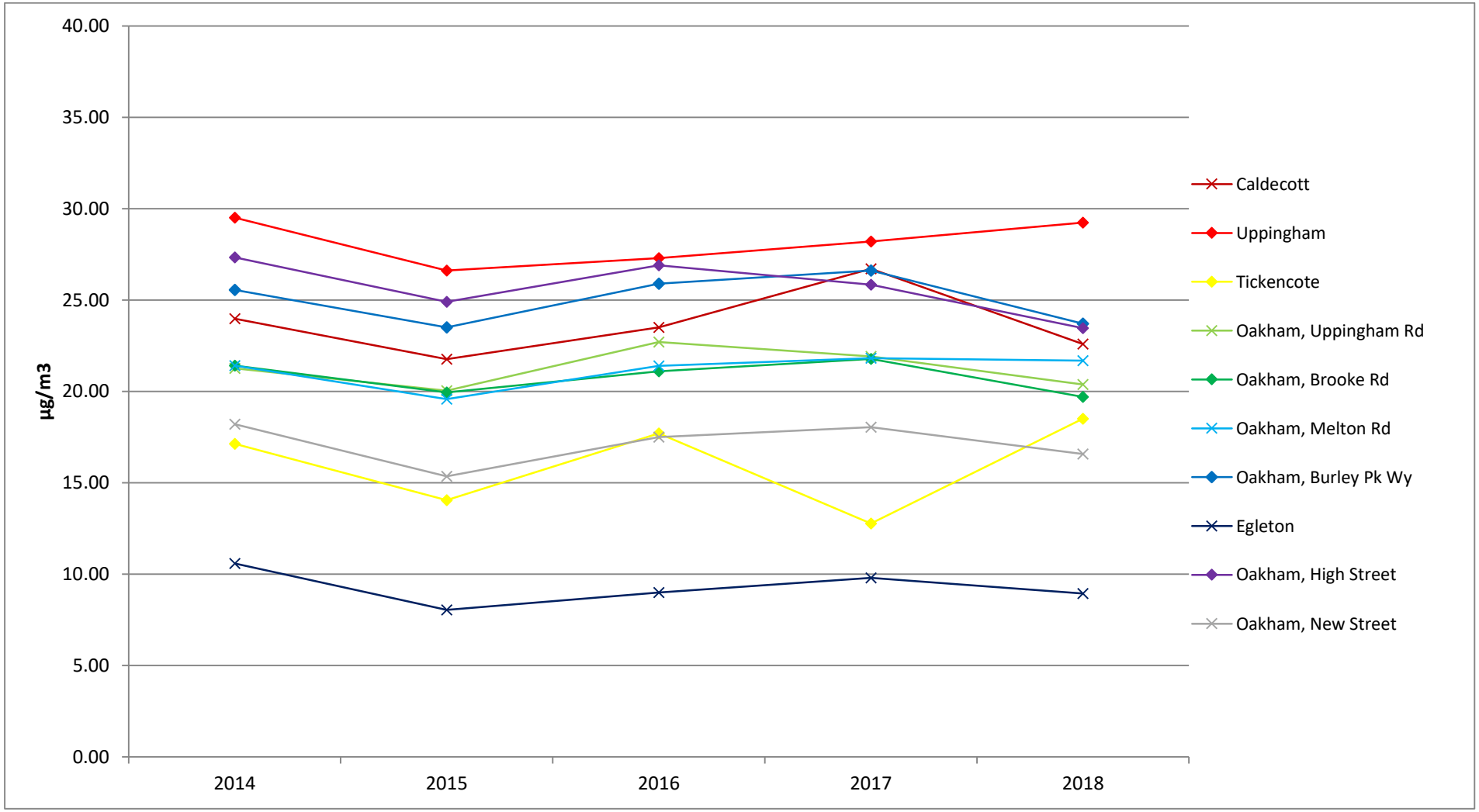
NO_2 annual means exceeding 60µg/m³, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(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_2 Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2018

Site ID	NO_2 Mean Concentrations (µg/m³)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
1	25.96	25.14	30.39	16.43	24.68	17.59	33.59	30.08	12.41	26.53	26.40	25.53	24.6	**22.6**	**20.7**
2	31.03	39.91	37.89	26.05	28.18	21.04	40.02	41.19	18.10	34.49	30.35	33.02	31.8	**29.2**	**28.3**
3	22.49	32.95	22.83	12.59	16.18	11.50	14.86	18.11	8.61	18.12	16.12	21.91	18.0	**16.6**	**16.4**
4	13.31	25.53	22.02	14.75	26.00	15.80	17.95	13.23	40.93	17.98	17.06	16.72	20.1	**18.5**	
5	22.77	26.69	26.01	17.46	21.67	16.13	23.74	26.80	11.66	24.93	22.26	25.74	22.2	**20.4**	**15.1**
6	24.48	30.83	27.91	15.61	21.88	15.71	21.73	23.11	10.95	20.16	19.94	24.74	21.4	**19.7**	**19.0**
7	21.36	30.31	29.56	17.91	29.63	21.80	25.08	24.64	10.96	23.92	22.25	25.48	23.6	**21.7**	**17.9**
8	27.48	32.64	31.96	20.74	33.04	20.12	31.70	8.93	13.10	30.74	30.54	28.33	25.8	**23.7**	**18.3**
9	12.29	15.81	10.82	5.19	5.85	2.52	6.88	-	-	9.98	14.03	13.88	9.7	**8.9**	
10	29.11	35.03	32.35	21.57	27.56	18.70	30.38	18.55	13.26	24.31	24.58	30.62	25.5	**23.5**	**22.7**
11	16.89	25.75	21.28	13.94	20.53	14.26	18.14	-	7.67	20.02	17.88	21.83	18.0	**16.6**	**16.4**

☒ **National bias adjustment factor used**

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

☒ **Where applicable, data has been distance corrected for relevant exposure**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

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

(2) Distance corrected to nearest relevant public exposure.

Table B.2 – NO_2 Fall off with Distance Calculator (V4.2) data and distance corrected results

Site Name/ID	Distance (m)		NO_2 Annual Mean Concentration (µg/m^3)		
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor
1 Caldecott	**1.0**	**2.0**	8.9	22.6	20.7
2 Uppingham	**1.2**	**1.5**	8.9	29.2	28.3
3 Station Rd, Oakham	**1.4**	**1.6**	8.9	16.6	16.4
5 Oakham Upp Rd	**0.2**	**4.2**	8.9	20.4	15.1
6 Oakham Brooke Rd	**1.0**	**1.4**	8.9	19.7	19.0
7 Oakham Melton Rd	**0.2**	**1.4**	8.9	21.7	17.9
8 Oakham Burley Pk Wy	**1.4**	**7.7**	8.9	23.7	18.3
10 Oakham High St	**1.0**	**1.3**	8.9	23.5	22.7
11 Oakham New St	**1.0**	**1.1**	8.9	16.6	16.4

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

Changes to sources of pollution

During 2018 no significant additional sources of pollution were identified in Rutland and as such no screening assessments have been undertaken this year.

Diffusion tubes bias adjustment

Bias adjustment is to take account of the overall tendency for diffusion tubes to either under or over-read NO_2 concentrations when compared to the results of a chemiluminescence analyser. The bias adjustment can be taken from a local study or the National database of studies.

Rutland doesn't have a chemiluminescence analyser to use in a local colocation study. Rutland's NO_2 diffusion tube monitoring program matches the monthly exposure periods of the National diffusion tube calendar. It's therefore appropriate to use the nationally derived bias adjustment factor that includes a large number of studies that will give greater confidence in the bias adjustment figure used.

The diffusion tubes used in 2018 were supplied and analysed by Gradko International. The tube preparation method is 20% (Triethanolamine)TEA / Water.

The bias adjustment factor for 2018 has been taken from Defra's UK national bias adjustment spreadsheet (version 09/19). Fourty studies were used to derive the bias adjustment factor, so there is a good degree of confidence in using the bias adjustment factor. The Bias adjustment factors used in the last five years are shown in table C1.

Table C1 2013 – 2017 Bias Adjustment Factors

Year	National bias adjustment factor
2014	0.91
2015	0.87
2016	0.92
2017	0.87
2018	0.92

QA/QC of diffusion tube monitoring

Gradko International are accredited by the United Kingdom Accreditation Service (UKAS). They comply with ISO17025 'General requirements for the competence of testing and calibration laboratories'.

NO_2 diffusion tubes are stored, exposed and collected by Rutland County Council in accordance with the 'NO_2 Diffusion Tube Calendar' and the relevant guidance in, 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for laboratories and users'.

Diffusion tube Precision

The precision of the diffusion tubes used in 2018 is 'GOOD'. The results of thirty five from a total of thirty eight colocation studies were recorded as 'Good' precision, the other two studies were recorded as 'Satisfactory'. This information was obtained from the National Diffusion Tube Bias Adjustment Spreadsheet v09/19.

Annualisation

There are occasions where diffusion tubes results aren't available for all 12 months of the year, for example during a short term (6 month study) or if the diffusion tube is missing or isn't collected for some reason. Where diffusion tube results are only

available for nine months or less, then these results can't be compared against annual air quality objectives, unless they have been 'annualised', to take account of variations in NO_2 concentrations over a year. As between 83% and 100% of the year's data is available for all of the sites, annualisation hasn't been necessary. However during 2018 two sites were missing one result or more, these were Egleton (2 months missing) and Oakham New Street (1 month missing). The annual average NO_2 concentration was calculated from average over the reduced number of months i.e. the annual result for Egleton was averaged over 10 months.

Distance Correction

It isn't always possible to place diffusion tubes exactly at the same position as the location that the monitoring is trying to represent. The monitoring is trying to represent those locations where public exposure to the pollutants occurs. Typically when annual average NO_2 concentrations are considered the location of concern would be facades of residential properties. Studies including Laxden and Marner (2008), have demonstrated that for road traffic NO_2 concentrations at monitoring points are closely related to the distance from the road kerbside.

For most NO_2 diffusion tubes sites in Rutland the monitoring location is aiming to determine the public's exposure to annual average NO_2 is from a nearby road. In most locations the distance from the road to the monitoring location is slightly different to the point where public exposure to NO_2 would occur. Table B.2 sets out how distance corrected annual average NO_2 concentrations have been calculated using the distance from the road to the monitoring location as well as the distance from the road to the relevant public exposure i.e. the nearest residential façade. The distance corrections have been calculated using the 'NO2 Fall off with Distance Calculator v4.2'. All corrections applied are within the stated limitations of the calculator. Table C.2. below shows where the data input to the 'NO_2 Fall off with distance calculator' was obtained from.

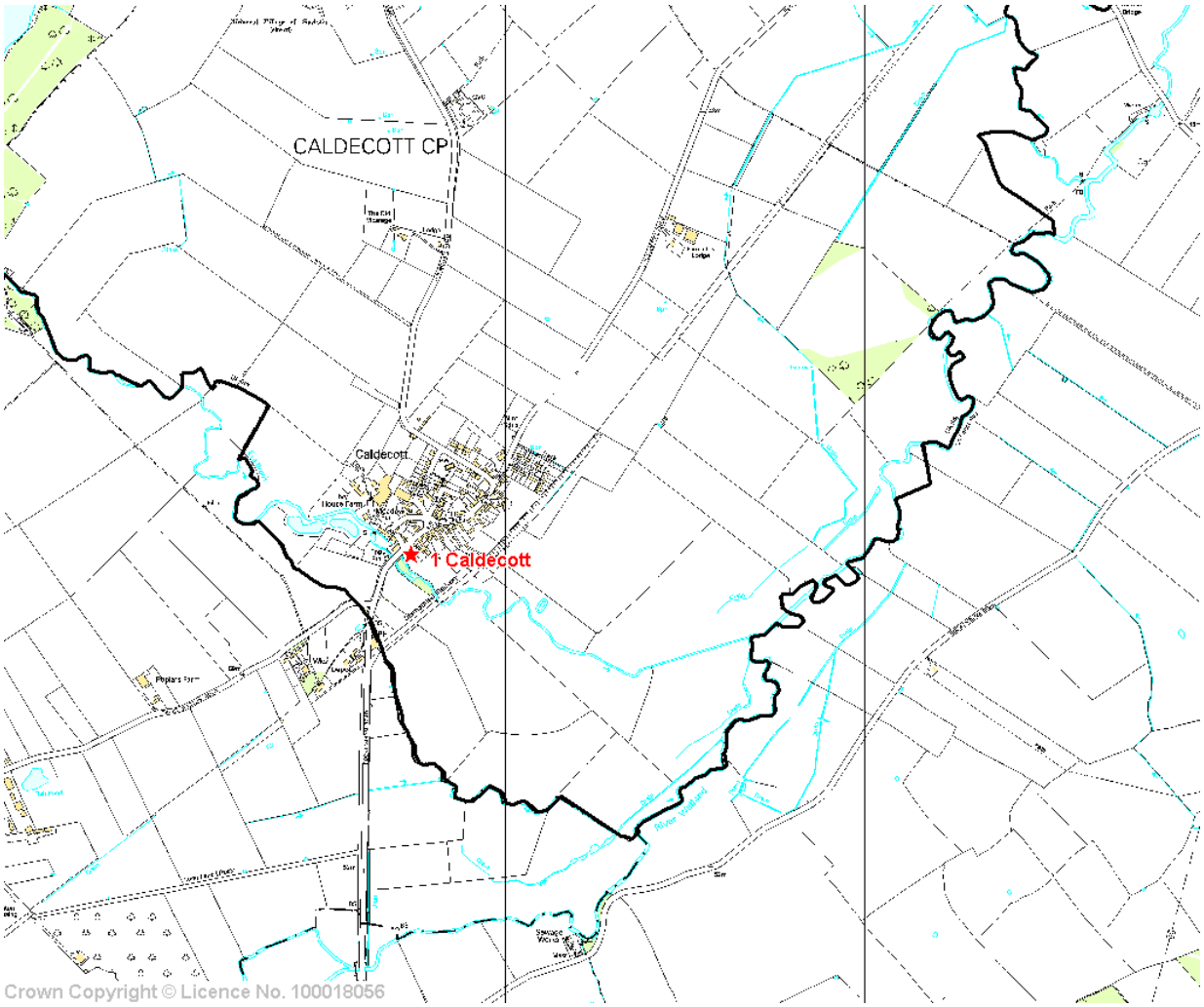
Table C.2 Source of data used in NO_2 fall off with Distance Calculator

Input Data	Information Source
Distance from kerb to measurement position	Table A.1
Distance from kerb to receptor position	Table A.1
Local annual mean background NO_2 concentration	9.8 µg/m^3 (Egleton 2017)
Measured annual mean NO_2 concentration	Table B.1 (bias adjusted results)

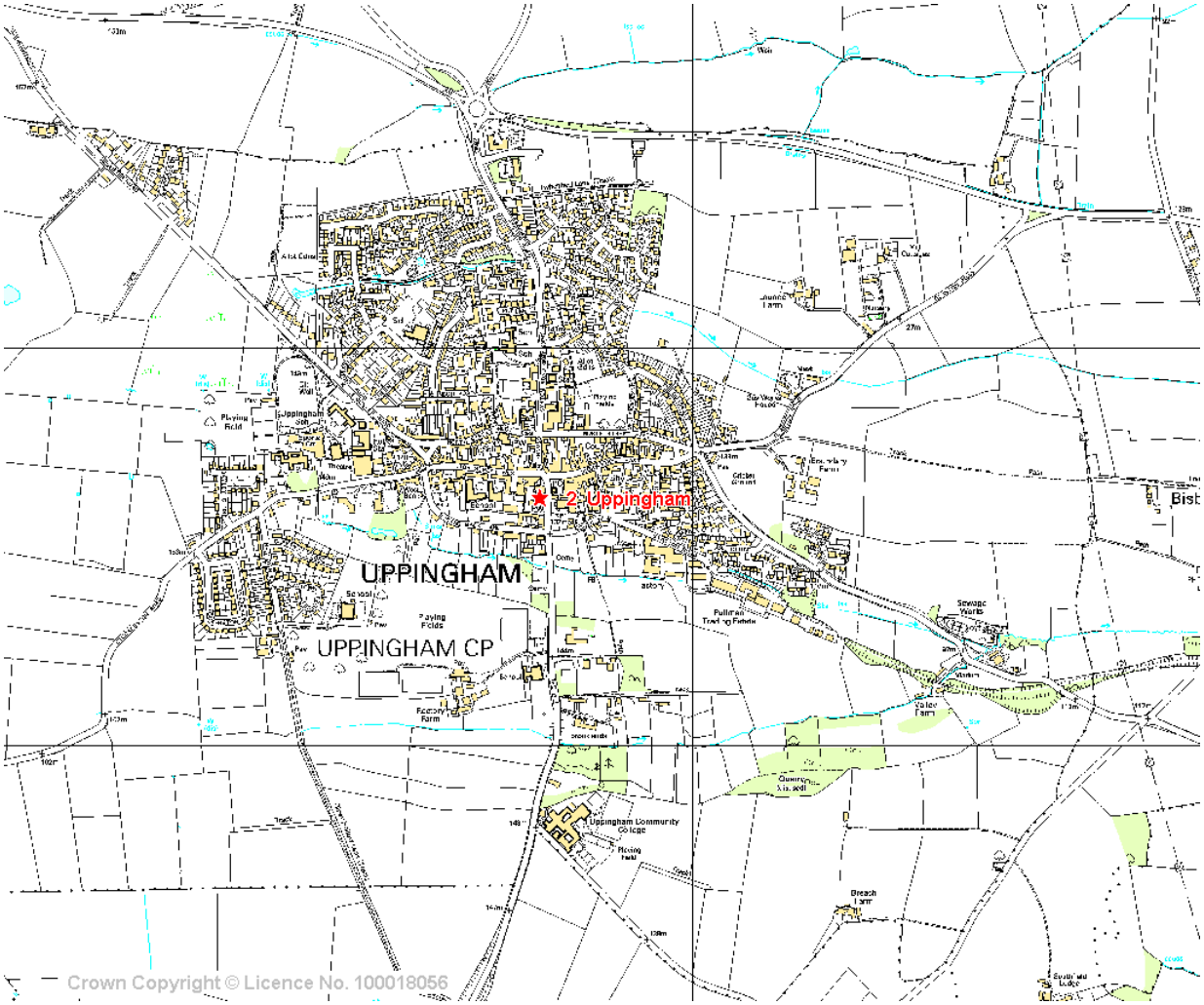
Appendix D: Map(s) of Monitoring Locations and AQMAs

There are no AQMAs in Rutland, therefore the following maps show the diffusion tube monitoring locations for annual average concentrations of NO_2.

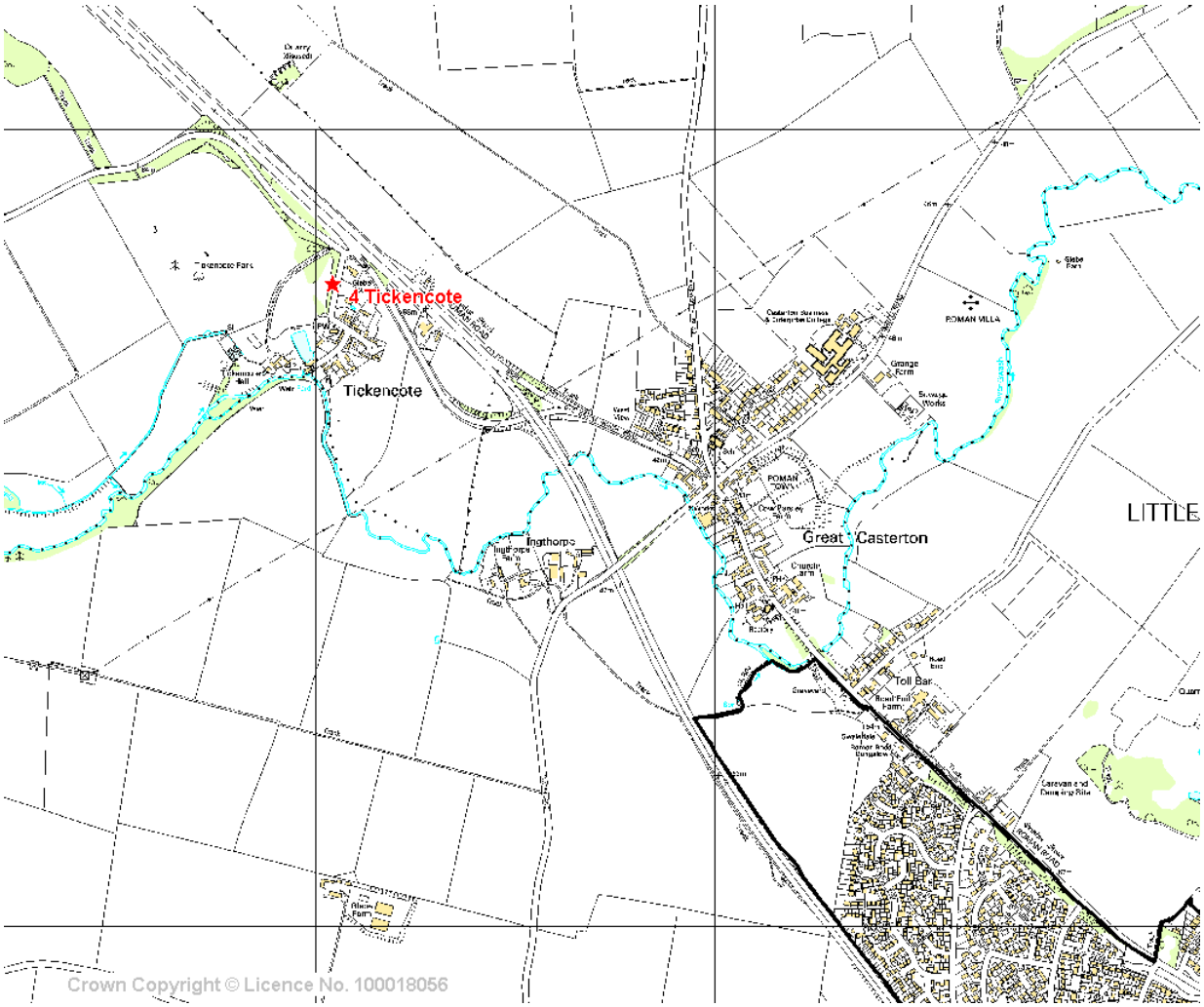
Site 1 Caldecott



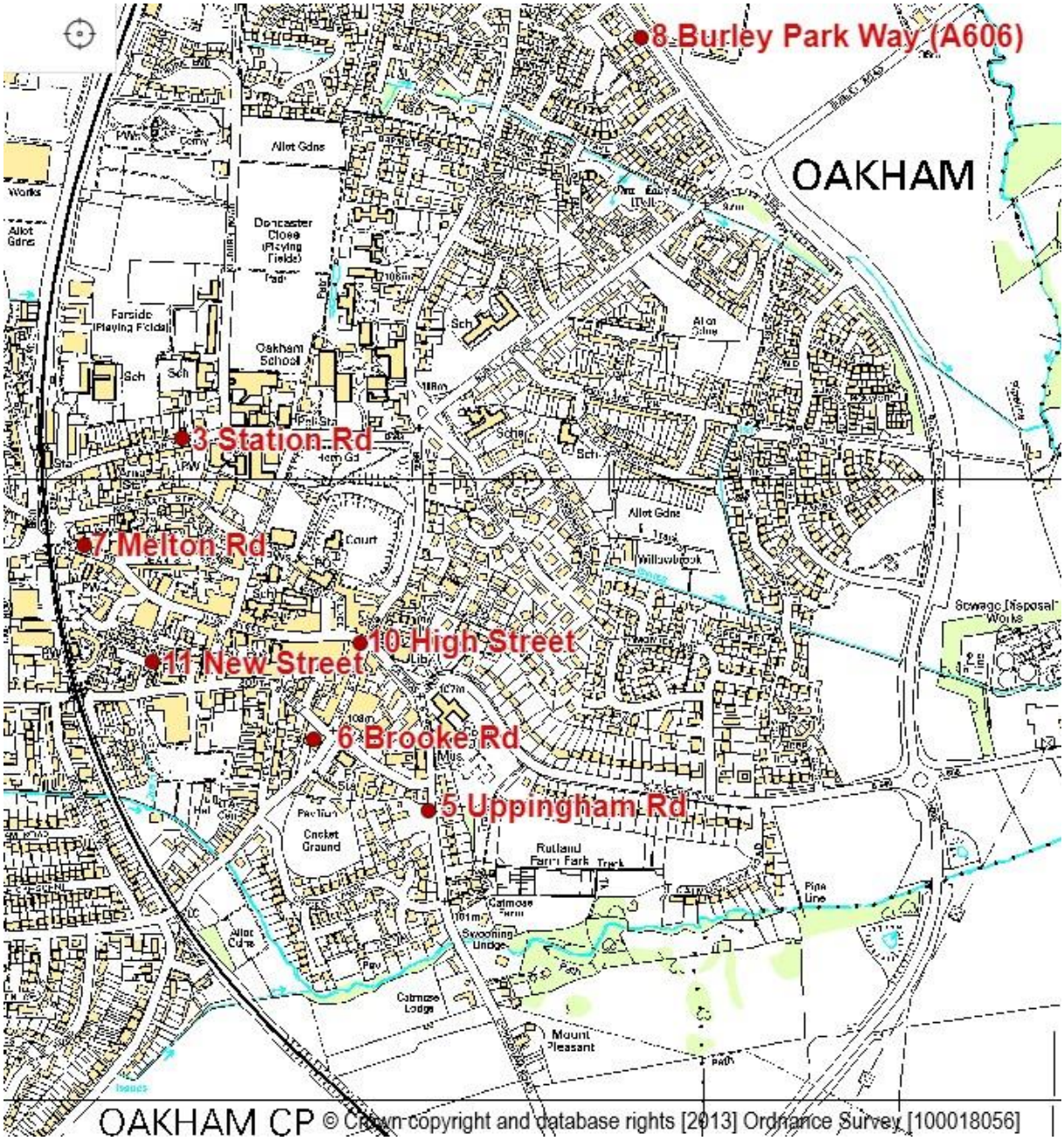
Site 2 Uppingham



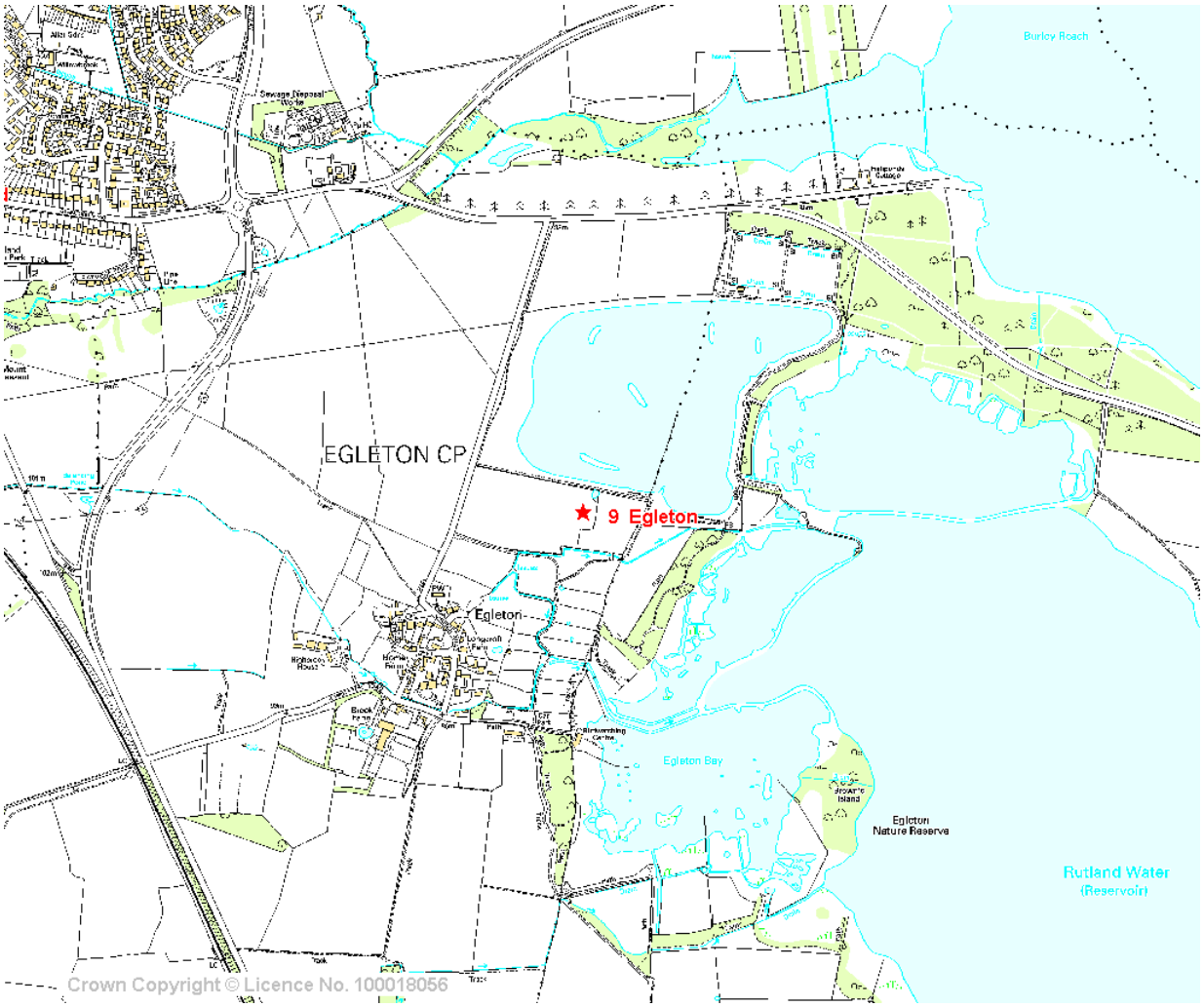
4 Tickencote



Oakham, 3 Station Road, 5 Uppingham Road, 6 Brooke Road, 7 Melton Road, 8 Burley Park Way, 10 High Street and 11 New Street



9 Egleton


Burley Reach
EGLETON CP
9 Egleton
Egleton
Egleton Bay
Egleton
Nature Reserve
Rutland Water
(Reservoir)
Crown Copyright © Licence No. 100018056

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[4] The units are in micrograms of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

Defra UK Air Information Source (Background mapped data for pollutants 2017)
https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017