Mid Devon District Council

Air Quality Progress Report 2005

Local Air Quality Management
Environment Act 1995

Where People Matter

This report has been produced by:

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EXECUTIVE SUMMARY

Mid Devon District Council has undertaken the second round of air quality review and assessment, in which sources of air pollutant emissions are reassessed to identify whether the situation has changed since the first round, and if so, what impact this may have on compliance with Air Quality Strategy objectives.

The second round of review and assessment comprises two steps. The first step is an Updating and Screening Assessment, which updates the Stage 1 and 2 review and assessment previously undertaken for all pollutants identified in the Air Quality Regulations. Where a significant risk of exceedance is identified for a pollutant it will be necessary for the local authority to proceed to a Detailed Assessment, equivalent to the previous Stage 3 assessments. Where a local authority does not need to undertake a Detailed Assessment, a Progress Report is required instead.

Mid Devon District Council completed the first of these two steps, the Updating and Screening Assessment in May 2003[6]. This concluded that the UK Air Quality Strategy objectives were unlikely to be met, by the required dates, for nitrogen dioxide (NO_2) and particles (PM_{10}) at two locations in Crediton. The Updating and Screening Assessment also concluded that a Detailed Assessment was not required for any other pollutants at any other locations, however, NO_2 concentrations were predicted to remain close to the annual mean UK objective in Cullompton.

The Detailed Assessment of NO_2 and PM_{10} in Crediton was completed in April 2004[7] with the recommendation that an Air Quality Management Area (AQMA) was required for both pollutants. Following wide consultation on the AQMA boundary, the formal Crediton AQMA was declared in September 2004 with the AQMA coming into effect on the 8 November 2004.

Following a review of more recent NO_2 data in Cullompton and the introduction of traffic control changes at a key junction, Mid Devon decided a Detailed Assessment was also required for NO_2 in the town. This assessment commenced in August 2004 and the preliminary results are presented in this report.

Like many other Local Authorities, Mid Devon has predicted to exceed the provisional 2010 objective for annual mean PM_{10} at some roadside locations. The future status of this objective remains unclear until a review of the UK Air Quality Strategy is completed by Defra later in 2005.

In addition to the preliminary results from the current assessment in Cullompton, this Progress Report considers new monitoring data for calendar years 2003 and 2004 and the impact of new developments across the Mid Devon area.

Mid Devon undertake ambient air quality monitoring of the following pollutants in their area:

- Nitrogen dioxide (NO_2) - measured by diffusion tubes at 16 permanent sites in Crediton, Cullompton, Tiverton and Willand
- NO_2, Particles (PM_{10}) and Ozone (O_3) - measured by real-time continuous monitors housed within two permanent roadside monitoring stations in Crediton and Cullompton

None of the other pollutants covered by the UK Air Quality Strategy are monitored.

NO_2 diffusion tube measurements for 2003 and 2004 indicate the annual mean UK Air Quality Objective of 40 μg/m^3 in 2005 will be met in Tiverton and Willand.

The UK NO_2 annual mean objective and the PM_{10} 24-hour mean objective (50 μg/m^3 with a maximum of 35 exceedences permitted a year) continue to be exceeded at a number of locations in Crediton and the Air Quality Management Area (AQMA) should remain in place. Mid Devon has commenced its development of an Air Quality Action Plan in Crediton in response to the AQMA declaration.

The preliminary results for the Detailed Assessment of NO_2 in Cullompton indicate that the annual mean objective may not be met at some locations, however, this is an on-going assessment and the full results will not be available until August 2005.

A review of long-term NO_2 diffusion monitoring sites across the Mid Devon area indicates that there is no clear trend in NO_2 concentrations over the period 1999-2004 with some monitoring locations showing no improvement and others showing a slight improvement or deterioration in air quality.

This Progress Report does not identify the requirement for a new Detailed Assessment in Mid Devon for any of the pollutants of local concern within the scope UK Air Quality Strategy and the Air Quality Regulations.

The next reports to be completed will be a Detailed Assessment of NO_2 in Cullompton, after August 2005, and a district-wide Updating and Screening Assessment Report in April 2006.

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1. INTRODUCTION

1.1 Background

The Environment Act 1995 required the UK Government to produce a national air quality strategy containing standards and objectives for improving ambient air quality. The Act also introduced the system of local air quality management (LAQM). As a result, local authorities are required periodically to review and assess the current and future air quality in their areas against those in the Strategy which have been prescribed in regulations.

To ensure continuity in the LAQM process, between the periodic review and assessments, annual Progress Reports are completed which provide an opportunity to reassess and update air quality issues. This ensures that changed circumstances can be identified early and acted upon promptly. The requirement to complete progress reports followed a detailed review of the LAQM process by Defra in 2002[3] with the initial progress reports due in 2004 (for those authorities not completing a Detailed Assessment of air quality at a specific location). More information on the LAQM timetable is given in Section 1.7 of this report.

1.2 Purpose and Scope of the report

The purpose of this document is to complete the Progress Report required for LAQM process within the administrative boundaries of Mid Devon District Council. This is a draft report completed for statutory consultation.

In completing its Progress Report, Mid Devon District Council aims to:

- Communicate the latest information on air quality within Mid Devon to the public and elected members
- Maximise the usefulness and interpretation of air quality monitoring work carried out by this authority
- Provide an update on progress with the Crediton Air Quality Management Area (AQMA) Action Plan
- Assist our responses to requests for up-to-date air quality information
- Provide information that is relevant and useful to other policy areas within local government and other government agencies e.g. land-use and transport planning
- Fulfill our statutory obligations under the Environment Act 1995 and the local air quality management system

The scope and structure of this Progress Report is in accordance with that set out in guidance LAQM.PRG(03)[5] (see section 1.6 of this report) and includes both the minimum requirements and additional information where available. The subsequent sections of this report represent a summary of the relevant new or previously unreported air quality information for 2003 and 2004.

More detailed technical information relating to monitoring data is contained in the relevant Appendix sections at the end of this report.

This report has been completed by Simon Newcombe (BSc(Hons) MIEnvSc), Environmental Protection Officer, Mid Devon District Council.

1.3 National Air Quality Strategy

The most recent National Air Quality Strategy[1] was published in January 2000. The Strategy sets air quality standards and objectives for eight key air pollutants to be achieved between 2003 and 2008. For seven of these pollutants local authorities are charged with the task of working towards the objectives in a cost effective way.

The Strategy objectives for particles (PM_{10}), benzene and carbon monoxide were reviewed in 2000/2001 and as a result tighter air quality objectives for these pollutants were adopted in an Addendum[2] to the Strategy. The Addendum also introduced, for the first time, an objective for polycyclic aromatic hydrocarbons (PAHs), however, for the time being local authorities have no statutory responsibilities for the new PAH objective.

The air quality *standards* set out in the Strategy are based purely on medical evidence of the effects of the particular pollutants on health and represent the minimum or no significant risk levels. They are not based upon costs and benefits assessments or on technical feasibility, but on the advice of the Expert Panel on Air Quality Standards (EPAQS) or upon EU limit values derived from World Health Organisation (WHO) guideline values.

However, the air quality *objectives* in the Strategy do take into account the costs and benefits, and the feasibility of achieving the standards. The objectives therefore provide a framework for determining the extent to which air quality policies should aim to improve air quality and also a measure for each particular pollutant of concern against which future progress can be judged.

The most significant judgement local authorities should make is whether the Air Quality Objectives are likely to be met in their area by the relevant deadline. Where objectives are not likely to be met then the local authority is required to designate an Air Quality Management Area (AQMA) at the relevant locations.

1.4 Regulations and Air Quality Objectives

The existing and, where relevant, newly tightened Air Quality Objectives are set out in the Air Quality Regulations (England) (Wales) 2000 and in the Air Quality (England) (Wales) (Amendment) Regulations 2002. The exception is the newly tightened national particles (PM_{10}) objectives for 2010 which are provisional and are not, for the time being, included in the regulations for the purposes of LAQM. The Government will consider the inclusion of a new particles objective for 2010 in the regulations after completion of the EU's first Air Quality Daughter Objective and a susequent review of the national Air Quality Strategy by Defra later in 2005.

The objectives currently included in the regulations for the purposes of Local Air Quality Management are given in Table 1 below:

Table 1: Objectives included in the regulations for the purposes of Local Air Quality Management

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 µg/m^3	annual mean	31/12/2010
1,3 Butadiene	2.25 µg/m^3	Running annual mean	31/12/2003
Carbon monoxide	10 mg/m^3	maximum daily 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
* measured using the European gravimetric transfer sampler or equivalent			

The provisional objectives for particles (PM_{10}) for 2010 are different for London, Wales and the Rest of England. In Scotland tighter objectives for PM_{10} have already be included in the equivalent Scottish Air Quality Regulations. As is applicable to Mid Devon District Council, the provisional objectives for the Rest of England are given in Table 2 below:

Table 2: Provisional objectives for particles not included in the regulations for the purpose of Local Air Quality Management

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Particles (PM_{10}) (gravimetric)*	50 µg/m^3 not to be exceeded more than 7 times a year	24-hour mean	31/12/2010
	20 µg/m^3	annual mean	31/12/2010
* measured using the European gravimetric transfer sampler or equivalent			

Although local authorities are not yet statutorily required to assess levels of particles for 2010, they are strongly recommended to start this work early. The reasons for doing so are:

- The fact that authorities are likely to need to carry out this work in 2006 (see table 2) and subsequent round of reviews and assessments;
- The fact that local authorities have a key role to play in ensuring that the UK delivers the EU limit values for 2010 (approximately equivalent to the above provisional objectives). Thus, the sooner local authorities can identify any potential local exceedences, the better placed they are to be able to tackle them;
- It can assist local authorities in the consideration of the potential impact of new developments.

Therefore, a provisional assessment of particles (PM_{10}) concentrations at relevant locations in Mid Devon has been included as part of this report.

1.5 Local Air Quality Management (LAQM) in Mid Devon 1998-2004

Part IV of the Environment Act 1995 requires local authorities 'from time to time' to review and assess the current, and likely future, air quality in their areas against those objectives in the Strategy. As discussed above, where objectives are not likely to be met then the local authority is required to designate an Air Quality Management Area (AQMA) at the relevant locations. The local authority must then draw up an action plan setting out the measures it intends to take in pursuit of the air quality objectives within the area covered by the AQMA.

A review and assessment is the initial step in the LAQM process, the structure of the reviews and assessment are set out in the guidance made under the Act and deadlines for each round of review and assessment is set out in the regulations.

Mid Devon District Council completed the **first round of review and assessment** between 1998 and 2000. The outcome of the first round in Mid Devon was published in the following reports:

- Stage 1 Review and Assessment of Air Quality in Mid Devon, Mid Devon District Council (1998)
- Stage 2 Review and Assessment of Air Quality, Consultants in Environmental Sciences Ltd (CES) for Mid Devon District Council (July 1999)
- Dispersion Modelling of Vehicle Emissions of NO_2 and PM_{10} from Four Locations in Mid Devon, Cambridge Environmental Research Consultants Ltd (CERC) on behalf of Mid Devon District Council (May 2000)
- Stage 3 Review and Assessment of Air Quality in Mid Devon, Mid Devon District Council (December 2000)

The first round was completed with the Stage 3 report which concluded that there was no requirement to declare an AQMA in the Mid Devon area. The subsequent statutory review, completed by University of the West of England on behalf of Defra, accepted the

findings of the first round of review and assessment and concurred with the Stage 3 report conclusions.

Mid Devon District Council completed it's the first step of the **second round of review of assessment** in 2004 with the outcomes published in the following report:

- Updating and Screening Assessment (USA) report, Mid Devon District Council (May 2003)

The USA report concluded that it was necessary to proceed with a detailed assessment (step two of the second round of review and assessment) as follows:

- For nitrogen dioxide at Exeter Road, Crediton
- For nitrogen dioxide at High Street, Crediton

Both of the above locations identified as having predicted nitrogen dioxide concentrations greater than the statutory air quality objective in 2005 (annual mean concentration of 40 $\mu g/m^3$ to be achieved by the 31 December 2005). The most important source of nitrogen dioxide at these locations is likely to be road traffic emissions and concentrations are likely to be adversely affected by the street canyon nature of the roads. The USA report also concluded that there was a risk of exceeding current and provisional objectives for particulate matter (PM_{10}) although lack of real-time monitoring data for this pollutant meant that accurate comparison with air quality objectives was not possible at that time.

None of the other pollutants reported in the USA report and within the scope of Local Air Quality Management were predicted to exceed the UK Air Quality Objectives at any locations in Mid Devon although monitored and modelled results for nitrogen dioxide were close the relevant annual mean objective at Station Road, Cullompton.

A Detailed Assessment was commenced in April 2003 for nitrogen dioxide and PM_{10} at Exeter Road and for nitrogen dioxide at the High Street, Crediton. This assessment was completed in April 2004[7] and concluded the following:

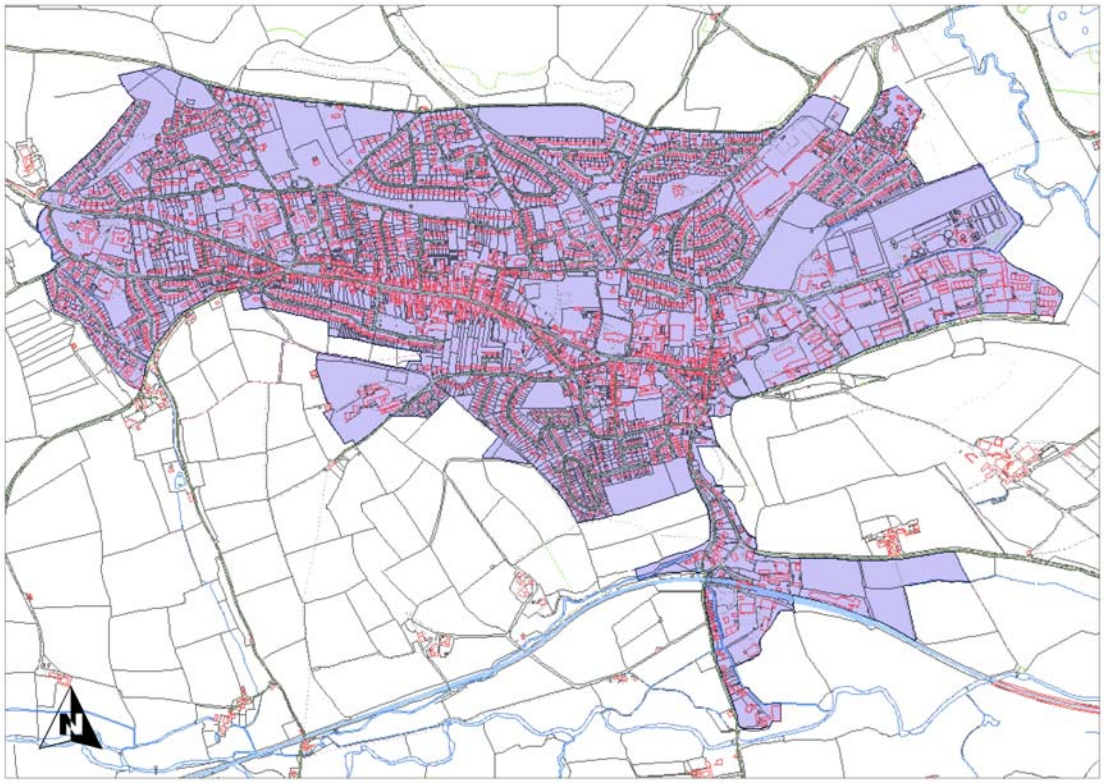
- Current and forward-predicted exceedences of the relevant air quality objectives for nitrogen dioxide and particles (PM_{10}) have been identified at Exeter Road and the High Street, Crediton.
- Relevant air quality objectives are as set out in the Air Quality Regulations (England) (Wales) 2000 and in the Air Quality (England) (Wales) (Amendment) Regulations 2002 which are made under the Environment Act 1995, as well as provisional objectives not currently set in the Regulations.
- The spatial extent of air quality objectives can be defined with reasonable certainty and includes areas of relevant public exposure i.e. shopping areas (High Street) and residential properties (Exeter Road and High Street).

As a result of the Detailed Assessment recommended that an Air Quality Management Area (AQMA) is required for nitrogen dioxide and particles in Exeter Road and nitrogen dioxide in the High Street in Crediton. This recommendation was made in accordance with section 83(1) of the Environment Act 1995.

The subsequent statutory review, completed by Air Quality Consultants on behalf of Defra, accepted the findings of the second round of review and assessment and concurred with the USA and Detailed Assessment conclusions.

Following wide consultation on options for the AQMA boundary during the summer of 2004, the formal **'Crediton Air Quality Management Area Order 2004'** was adopted by Mid Devon District Council on the 20 September 2004 and came into operation on the 8 November 2004. The AQMA boundary is shown below.

Crediton Air Quality Management Area (AQMA)



1.6 LAQM Guidance

The following guidance for Round 2 of Review and Assessment has been issued by Defra under section 88(1) of the Environment Act 1995:

- Policy Guidance LAQM.PG(03) (February 2003)[3]
- Technical Guidance LAQM.TG(03) (February 2003)[4]

The above guidance replaces the previous guidance published in 2000 as LAQM.G1, G2, G3 and G4(00) and LAQM.TG4(00). The new guidance sets out the latest statutory, policy and technical framework for the system of LAQM and the completion of both the USA and any required Detailed Assessment that make up Round 2 of Review and Assessment.

In order to provide further guidance on the completion of Progress Reports, Defra subsequently released the following supplementary guidance:

- Progress Report Guidance LAQM.PRG(03) (December 2003)[5]

The above guidance sets out the specific minimum and potential additional requirements for a progress report and is intended to be used in conjunction with LAQM.PG(03) and LAQM.TG(03) where these are applicable.

The timescale for the local air quality management reporting process is set out in the Regulations and is detailed below.

1.7 Timetables for Submission of Local Air Quality Management reports

In accordance with the latest regulations and guidance, local authorities should carry out their LAQM duties to the recommended timescales given in Table 3 below:

Table 3: Recommended timescales for submissions of reviews and assessment and progress reports for local authorities

LAQM Activity	Completion Date	Which authorities?
Updating and Screening Assessment (USA)	End of May 2003	All authorities
Detailed Assessment	End of April 2004	Those authorities which have identified the need for one in their May 2003 USA
Progress Report	End of April 2004	Those authorities which identified that there was no need for a Detailed Assessment in their May 2003 USA
Progress Report	End of April 2005	All authorities
USA	End of April 2006	All authorities
Detailed Assessment	End of April 2007	Those authorities which have identified the need for one in their April 2006 USA
Progress Report	End of April 2007	Those authorities which identified that there was no need for a Detailed Assessment in their April 2006 USA
Progress Report	End of April 2008	All authorities
USA	End of April 2009	All authorities
Detailed Assessment	End of April 2010	Those authorities which have identified the need for one in their April 2009 USA
Progress Report	End of April 2010	Those authorities which identified that there was no need for a Detailed Assessment in their April 2009 USA
Timescale surrounded in **bold** above represents the current reporting stage		

1.8 Useful air quality information and tools used in air quality assessment

National air quality monitoring data, forecasts and additional air quality information can be obtained at the national Government air quality website:

http://www.airquality.co.uk/archive/

National and local emissions estimates, point source information and activity data can be obtained at the National Atmospheric Emissions Inventory (NAEI) website:

http://www.naei.org.uk/data_warehouse.php

National air pollution banding (categorised air pollution levels) information used for public information services by the Government can be seen at:

http://www.airquality.co.uk/archive/standards.php#band

National air quality legislation, the UK Air Quality Strategy and related policy/technical reports can be viewed the Department for Environment, Food and Rural Affairs (Defra) website at:

http://www.defra.gov.uk/environment/airquality/

The Council's air quality information can be viewed at:

http://www.middevon.gov.uk/index.cfm?articleid=367

CEEFAX – see page 417 (forecast)
TELETEXT – see pages 155 (forecast) and 169 (health advice)

1.9 Sources of key air pollutants – Nitrogen dioxide and Particles

Nitrogen dioxide

Nitrogen dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen and collectively referred to as nitrogen oxides (NOx). All combustion processes produce NOx emissions, largely in the form of NO, which is then converted to NO_2, mainly as a result of reaction with ozone in the lower atmosphere. It is NO_2 that is associated with adverse effects upon human health.

The principal source of NOx emissions is road transport, which accounted for 49% of total UK emissions in 2000. Within most urban and non-industrialised areas the contribution of road transport will be much greater than the national picture.

The contribution of road transport to NOx emissions has declined in recent years as a result of various policy measures, and further reductions are expected up until 2010. In practice, nationally it is expected to be demanding to meet the annual mean objective by 2005 and the EU Directive limit value by 2010 with a large number of Air Quality Management Areas (AQMAs) already declared with respect to this pollutant.

Analysis of the National Atmospheric Emissions Inventory indicates that the estimated sources of NOx emissions specifically in the Mid Devon area for 2002 were as follows:

Table 4: Sources of Mid Devon NOx emissions (2002)

Sector	Tonnes	%
Energy Production and Transformation	0.00	0.00
Commercial, Institutional and Residential Combustion	102.30	4.50
Industrial Combustion	105.86	4.66
Industrial Processes	0.00	0.00
Road Transport	1844.21	81.12
Other Transport	219.69	9.66
Waste Treatment and Disposal	0.22	0.01
Agriculture	1.09	0.05
Total all sectors	**2273.30**	**100**

Particles (PM_{10})

There are a wide range of emission sources that contribute to PM_{10} concentrations in the UK. These sources can be broadly divided into 3 main categories. *Primary particle* emissions derived directly from combustion sources including road transport, power generation, industrial processes and quarrying etc. *Secondary particles* which are formed in atmospheric chemical reactions and comprise principally of sulphates and nitrates. *Coarse particles* which derive from a wide range of sources including re-suspended dusts from road traffic, construction works, quarries, wind-blown dusts and soils, sea salt and biological particles.

The expected reduction in particle emissions for each source is different e.g. road traffic and industrial primary particles emissions are governed by existing and new legislation whilst secondary particle emissions will largely be governed by controls on power stations and coarse particles are largely uncontrolled and in general are not expected to decline in future. Additionally, coarse particle emissions are often subject to wide variation due to metrological conditions.

There has been significant progress in recent years in reducing UK emissions of particles from both the transport and industrial sectors. Road transport emissions will be further tightened as a result of the Euro III and Euro IV emission standards. Within the industrial sector, particles are further controlled by the Integrated Pollution Prevention and Control regime and through Local Air Pollution Control. In addition, the EU legislation on the Acidification Strategy should further reduce emissions of those pollutants which lead to the formation of secondary particles.

For the different source categories of PM_{10}, the exact regional or local contribution to annual mean background concentrations is variable and will depend on the precise location, whilst at the same time a significant proportion of annual mean concentrations is derived from regional (including long distance transport from Europe) background sources.

The focus of LAQM and the review and assessment of PM_{10} is towards a local level and an assessment of the contribution of local emission sources.

Analysis of the National Atmospheric Emissions Inventory indicates that the estimated sources of PM_{10} emissions specifically in the Mid Devon area for 2002 were as follows:

Table 5: Sources of Mid Devon PM_{10} emissions (2002)

Sector	Tonnes	%
Energy Production and Transformation	0.00	0.00
Commercial, Institutional and Residential Combustion	67.65	15.56
Industrial Combustion	18.38	4.23
Industrial Processes	72.11	16.59
Road Transport	98.30	22.61
Other Transport	18.65	4.29
Waste Treatment and Disposal	0.41	0.09
Agriculture	147.18	33.86
Point source emissions (all sectors)	12.00	2.76
Total all sectors	**434.65**	**100**

1.10 Health effects – Nitrogen dioxide and Particles

Health effects of nitrogen dioxide

Nitrogen dioxide is associated with adverse respiratory effects and especially with people with existing sensitivities. Therefore, people with asthma are normally more sensitive to the effects of the nitrogen dioxide than healthy people. The balance of evidence from experimental inhalation studies suggests that adverse health effects are unlikely to occur in subjects with asthma below a threshold of about 200 ppb.

At high concentrations nitrogen dioxide can cause inflammation of the airways and lead to an increased risk of respiratory infection, especially in children, leading to reduced lung function.

Health effects of particles (PM_{10})

Airborne particulate matter will vary in size, shape, mass and chemical composition. These variables will effect how long the particulate matter may remain suspended in the air and the potential effect if inhaled. From a purely physical perspective, those particles of less than 10 µg in size are most likely to be inhaled and therefore may cause respiratory effects.

To fully understand the potential for health effect is a complex issue and additional factors such as the individual and combined chemical constituent effects need also to be taken into account. The chemical composition of particles will vary depending of local geology and human activities, distant sources and weather conditions as discussed above. As a result, health effects will vary from location to location and person to person. Nonetheless, the overall assumption is that PM_{10} may affect respiratory and cardiovascular systems due to inflammation of the airways. As with other pollutants, the effects may be more pronounced in sensitive populations such as asthmatics and those suffering from heart disease.

2. AIR QUALITY MONITORING AND AIR QUALITY COMPLAINTS

2.1 Nitrogen dioxide diffusion tube monitoring

Monitoring for nitrogen dioxide using diffusion tubes is completed at 16 roadside locations within the Mid Devon area as detailed below:

Table 6: Nitrogen dioxide diffusion tube monitoring locations

Id	Location	Type	National Grid Ref.	
1	Tiverton (Leat Street)	Roadside	295125	112718
2	Willand (Somerville Close)	Roadside	303290	111059
3	Cullompton (Station Road – Police Station)	Roadside	302188	107548
4	Cullompton (Station Road – No.49)	Roadside	302289	107591
5	Cullompton (Higher Street – No.15)	Roadside	302129	107597
6	Cullompton (Higher Street – No.31)	Roadside	302117	107709
7	Cullompton (High Street)	Roadside	302093	107432
8	Cullompton (Fore Street – Manor Hotel)	Roadside	302054	107320
9	Cullompton (Fore Street – No.45)	Roadside	302073	107188
10	Crediton (Exeter Road – top)	Roadside/Kerbside	283874	99941
11	Crediton (Exeter Road – middle)	Roadside/Kerbside	283945	99732
12	Crediton (Exeter Road – bottom)	Roadside	283980	99668
13-15	Crediton (Exeter Road – monitoring station)	Roadside (triplicate)	283848	99860
17	Crediton (High Street – HSBC)	Roadside	283277	100289
18	Crediton (High Street – middle)	Roadside	283063	100327
19	Crediton (High Street – Duke of York)	Roadside	282778	100376

All of the monitoring locations are in built up areas at roadside locations situated within 3m of the kerbside and within 0-2m of the building facades of residential properties (or are at equivalent locations to nearby residential properties if a suitable monitoring position was not available) and therefore there is relevant public exposure.

These sites represent potential worst-case, 'hot-spot' locations for nitrogen dioxide air pollution in the Mid Devon area where there may be an impact on residents. The tube network was reviewed following completion the USA report due to the requirements to undertake additional monitoring in Crediton for Detailed Assessment purposes and to enhance the monitoring undertaken in Cullompton.

Expansion of the tube network was required in Cullompton in order to better understand the likelihood for, and spatial extent of, potential exceedence areas following changes to the traffic control at a key junction (Station Road/High Street – M5 motorway link road) and to address recommendations for additional monitoring given by Air Quality Consultants (AQC) in their formal appraisal of the Mid Devon USA report on behalf of Defra. Results reported in the USA report in 2003 from the long-term monitoring position at Station Road, Cullompton and DMRB[10] modelling of the above junction indicated that

concentrations were below but significantly close to the UK objective for this pollutant. The expanded network of sites in the town is being used to detailed assessment of nitrogen dioxide, which commenced in August 2004.

Further details of the current network of monitoring sites and changes from the previous network (as reported in the USA report in 2003) are given below.

- Cullompton – number of monitoring locations increased from 1 to 7 from August 2004. The long-term site at the Police Station in Station Road has been retained. The expanded network of sites in the town is providing data to support a detailed assessment at key receptor locations.

- Crediton – number of monitoring locations increased from 2 to 7 from April 2003. Long-term sites at mid-Exeter Road and mid-High Street retained. Triplicate tubes co-located at the continuous monitoring station for bias-adjustment purposes. All sites are within the Crediton Air Quality Management Area (AQMA)

- Silverton – the single monitoring location in Silverton Square is no longer used. This site was for background purposes only and consistently results were significantly below the UK objective for NO_2.

- Tiverton – number of monitoring locations reduced from 6 to 1 from April 2003. All monitoring sites, with the exception of Leat Street, have shown consistent results below the UK objective for NO_2 hence monitoring has been discontinued. The Leat Street monitoring location is still used and as a busy street canyon road link it remains the location in Tiverton where NO_2 concentrations are currently likely to be highest.

- Willand – no change. The long-term monitoring site adjacent to the M5 motorway at Somerville Close has been retained.

Monitoring was completed using passive NO_2 diffusion tubes (all prepared using Gradko 50% TEA in water). The tubes are exposed for one-month periods, providing a monthly average for each month within the period, which is then used to calculate an annual mean.

A summary of the annual mean results for 2003 and 2004 for the long-term Mid Devon sites is given in Table 7 below together with the calculated predicted future annual mean concentration for 2005 and 2010. Monitoring at locations 4-9 (Cullompton new sites – see Table 6 above) commenced in August 2004 and the period mean for all available data up to end-March 2005 is shown separately in the Table… below. Since the period mean for locations 4-9 is for eight-months data only then no calculation of future predicted concentrations has been carried out for results obtained to date at these locations. Such calculations will be completed after 12-months monitoring data has been obtained in July 2005.

All reported results have been adjusted using monthly correction factors to allow for known under-read (bias) of Gradko tubes. These factors have been derived from the triplicate diffusion tubes co-located with a real-time continuous chemiluminescent nitrogen oxides monitor at the Crediton (Exeter Road) monitoring station (see section 2.2 below). The application of these factors results in an adjustment of the potential over-

read of the tubes and is intended to produce annual mean results that are closer to the true concentration.

Full details of the diffusion tube monitoring techniques, including bias-adjustment, data ratification and quality control/assurance procedures are included in Appendix 1 and all monitoring locations are shown in Appendix 2.

Table 7: Long-term Mid Devon nitrogen dioxide diffusion tube monitoring sites results 2003 and 2004.

Id	Location	Bias-adjusted Annual Mean µg/m^3	Predicted Annual Mean 2005* µg/m^3	Predicted Annual Mean 2010* µg/m^3	% change bias adjusted annual mean 2003- 04
1	Tiverton (Leat Street)	42.09 (2003) 33.92 (2004)	39.90 (2003) 33.07 (2004)	32.83 (2003) 27.21 (2004)	-19.4
2	Willand (Somerville Close)	33.39 (2003) 29.08 (2004)	31.65 (2003) 28.35 (2004)	26.04 (2003) 23.33 (2004)	-12.9
3	Cullompton (Station Road – Police Station)	41.56 (2003) 35.37 (2004)	39.40 (2003) 34.48 (2005)	32.42 (2003) 28.37 (2004)	-14.9
10	Crediton (Exeter Road – top)	50.48 (2003) 44.73 (2004)	47.85 (2003) 43.61 (2004)	39.38 (2003) 35.88 (2004)	-11.4
11	Crediton (Exeter Road – middle)	51.67 (2003) 46.86 (2004)	48.98 (2003) 45.68 (2004)	40.30 (2003) 37.59 (2004)	-9.3
12	Crediton (Exeter Road – bottom)	51.86 (2003) 48.14 (2004)	49.16 (2003) 46.93 (2004)	40.45 (2003) 38.62 (2004)	-7.2
13-15	Crediton (Exeter Road – monitoring station)	58.88 (2003) 52.69 (2004)	55.81 (2003) 51.37 (2004)	45.93 (2003) 42.27 (2004)	-10.5
16	Crediton (High Street – HSBC)	53.98 (2003) 45.00 (2004)	51.17 (2003) 43.87 (2004)	42.11 (2003) 36.10 (2004)	-16.6
17	Crediton (High Street – middle)	45.58 (2003) 37.56 (2004)	43.21 (2003) 36.62 (2004)	35.55 (2003) 30.13 (2004)	-17.6
18	Crediton (High Street – Duke of York)	52.26 (2003) 49.36 (2004)	49.54 (2003) 48.12 (2004)	40.76 (2003) 39.60 (2004)	-5.5

Results in red exceed the 2005 and/or 2010 (provisional) annual mean UK air quality objective of 40 µg/m^3

* These are forward estimates based upon monitoring data obtained in 2003 and 2004 (year used shown in brackets) and have been calculated using correction factors published in Box 6.6 of Defra Technical Guidance LAQM.TG(03)[4]. These are national generic factors based upon estimated improvements to emissions from the national vehicle fleet due to introduction of the Euro 3/III and Euro 4/IV emission standards which are statutory for all new four-wheel road vehicles from 2000 and 2005 respectively.

Table 8: Detailed assessment short-term (preliminary) Cullompton nitrogen dioxide diffusion tube monitoring results August 2004 – March 2005.

Id	Location	Bias-adjusted Period Mean August 2004 - March 2005 (µg/m^3)
3	Cullompton (Station Road – Police Station)*	39.80
4	Cullompton (Station Road – No.49)	36.56
5	Cullompton (Higher Street – No.15)	44.07
6	Cullompton (Higher Street – No.31)	32.94
7	Cullompton (High Street)	36.74
8	Cullompton (Fore Street – Manor Hotel)	56.88
9	Cullompton (Fore Street – No.45)	50.13

* This is a long-term site and the annual mean results for 2003 and 2004 are reported in Table 7 above. The result shown here is for the same monitoring period (August 2004-March 2005) as sites 4-9 and is included for comparison purposes.

Conclusions from nitrogen dioxide diffusion tube monitoring

Monitoring at Tiverton (Leat Street) and Willand (Somerville Close) indicates that current annual mean concentrations of nitrogen dioxide are below the UK Objective of 40 µg/m^3 and are predicted to remain so in 2005 and 2010.

Monitoring at Cullompton (Police Station, Station Road) indicates that current and predicted concentrations are also below the UK Objective but remain significantly close.

Monitoring at locations in Crediton indicates that current and predicted nitrogen dioxide concentrations remain above the UK objective along Exeter Road and the High Street and therefore AQMA should remain in place.

Analysis indicates that nitrogen dioxide concentrations fell at all monitoring locations by on average 12.5% (range 5.5-19.4%). This reduction has been mirrored nationally and is likely to be attributable to less settled weather conditions during the summer of 2004 compared to the extended calm conditions experienced during the summer of 2003. The average reduction (2003-04) within the Crediton AQMA was 11.2%, however this was lower for those sites along Exeter Road where the average reduction was 9.6%. By contrast, the reduction for two sites along the High Street (HSBC and mid-High Street) was greater than the district average at 16.6% and 17.6% respectively. The lowest reduction in the district (5.5%) was reported at western-end of the High Street, Crediton (Duke of York PH) and the greatest reduction in the district reported at Leat Street, Tiverton (19.4%).

The long-term trend is shown in Section A1.2 (Appendix 1) of this report. This indicates that there is no clear trend across the long-term Mid Devon monitoring locations, with some sites showing no change whilst others increase or decrease across the monitoring period (1999-2004). Long-term year-to-year variations, due in probability to fluctuating weather patterns, are shown clearly. This demonstrates the difficulty in applying the national (generic) correction factors (see Box 6.6 of Defra Technical Guidance LAQM.TG(03)[4]) when predicting both local short-term and long-term future trends.

Overall, there is no need for Mid District Council to conduct any new detailed assessments of nitrogen dioxide at the diffusion tube monitored locations in Tiverton or Willand. The detailed assessment in Cullompton is on going and due for completion after end-July 2005. Preliminary results as reported above indicate that it is unlikely that the 2005 annual mean UK objective for nitrogen dioxide will be met at some locations, notably No.15 Higher Street, Manor Hotel Fore Street and No.45 Fore Street.

2.2 Nitrogen dioxide, Particles and Ozone continuous (real-time) monitoring

Mid Devon operates two permanent continuous monitoring stations at the following roadside locations in the district:

Table 9: Continuous monitoring station locations

Id	Location	Type	National Grid Ref.	
MS1	Cullompton (Station Road – PC)	Roadside	295125	112718
MS2	Crediton (Exeter Road)	Roadside	303290	111059

As with the diffusion tube monitoring, these monitoring sites are situated in built up areas at roadside locations within 3m of the kerbside and within 0-2m of the building facades of residential properties (or are at equivalent locations to nearby residential properties if a suitable monitoring position was not available) and therefore there is relevant public exposure. These sites represent potential worst-case, 'hot-spot' locations for air pollution in the Mid Devon area where there may be an impact on residents, in particular from emissions of nitrogen dioxide and particles (PM_{10}) associated with road vehicles.

The monitoring stations are equipped with continuous (real-time) analysers capable of measuring the following pollutants and providing 15-minute averages 24-hours per day/365 days per year:

- Cullompton monitoring station – nitrogen dioxide (NO_2), particles (PM_{10}) and ozone (O_3). Monitoring commenced April 2003 (NO_2 from August 2004).

- Crediton monitoring station - nitrogen dioxide (NO_2) and particles (PM_{10}). Monitoring commenced April 2003.

The Cullompton monitoring station was installed as part of the detailed assessment discussed in section 2.1 above. In order to meet the data requirements of a detailed assessment for NO_2 a new real-time NO_2 analyser was installed and commissioned in August 2004 to complement the expanded diffusion-tube monitoring network within the town. This monitoring station was already equipped with a PM_{10} and Ozone (O_3) analyser having been previously been used at other locations within the district and the analysers have been retained at Cullompton. Ozone pollution is of district or regional-level interest and subject to national instruments not local control.

The Crediton monitoring station was installed as part of the detailed assessment of NO_2 and PM_{10} reported in April 2004[7] and is located along the Exeter Road link where exceedences of the UK objectives for NO_2 and PM_{10} were recorded during the assessment and the monitoring station is now within the Crediton Air Quality Management Area (AQMA) formally adopted in September 2004.

The results for each of the continuous monitoring stations are given in Table 10 below.

Table 10: Cullompton and Crediton continuous monitoring results 2003-2005

Nitrogen dioxide results (NO_2)						
Id	**Location**	**Monitoring Period**	**Ratified Mean ($\mu g/m^3$)**	**Number of 1-hour means >200$\mu g/m^3$**	**Predicted Annual Mean 2005 ($\mu g/m^3$)*****	**Predicted Annual Mean 2010 ($\mu g/m^3$)*****
MS1	Cullompton (Station Road)	1/8/04-5/4/05*	52.86*	0	-	-
MS2	Crediton (Exeter Road)	1/4/03-31/12/03	59.71	51	56.60	46.56
		1/1/04-31/12/04	53.81	2	52.46	43.17
Particles results (PM_{10})						
Id	**Location**	**Monitoring Period**	**Ratified Mean ($\mu g/m^3$)**	**Number of 24-hour means >50$\mu g/m^3$**	**Predicted Annual Mean 2004 ($\mu g/m^3$) and number of 24-hour mean exceedences*****	**Predicted Annual Mean 2010 ($\mu g/m^3$) and number of 24-hour mean exceedences*****
MS1	Cullompton (Station Road)	1/4/03-31/12/03	22.79	15	22.64 (7)	21.13 (5)
		1/1/04-31/12/04	19.85	10	-	19.75 (3)
MS2	Crediton (Exeter Road)	1/4/03-31/12/03	40.75	60	38.99 (73)	35.84 (54)
		1/1/04-31/12/04	39.57	80	-	36.80 (68)
Ozone results (O_3)						
Id	**Location**	**Monitoring Period**	**Ratified Mean ($\mu g/m^3$)**	**Number of 8-hour means >100$\mu g/m^3$**		
MS1	Cullompton (Station Road)	1/4/03-31/12/03	40.27	247		
		1/1/04-31/12/04	31.10	4		

Results in red exceed the relevant 2004, 2005 and/or 2010 (provisional) specific UK air quality objective for the pollutant concerned based upon >9 months monitoring data. See section 1.4 of this report.

* The monitoring period shown is the same as that for the exposure period for the diffusion tube monitoring locations in Cullompton as reported in section 2.1 above for comparison purposes. Since monitoring commenced in August 2004 for this pollutant a 12-month/annual mean is not currently available for comparison with the annual mean UK air quality objective.

** Results for PM_{10} are corrected by a factor of 1.3 at this monitoring location due to the specific analyser type used in order to give the results gravimetric equivalency and enable comparison against the UK objective for this pollutant.

*** These are forward estimates based upon annual mean monitoring data (where available) obtained in 2003 and 2004 (year used shown in brackets) and have been calculated using correction factors published in Boxes 6.6 and 8.6 of Defra Technical Guidance LAQM.TG(03)[4] for nitrogen dioxide and particles respectively. These are national generic factors based upon estimated improvements to emissions from the national vehicle fleet due to introduction of the Euro 3/III and Euro 4/IV emission standards which are statutory for all new four-wheel road vehicles from 2000 and 2005 respectively. Since the nitrogen dioxide (NO_2) period mean for the Cullompton monitoring station (MS1) is for eight-months data only then no calculation of future predicted concentrations has been carried out for results obtained to date at these locations. Such calculations will be completed after 12-months monitoring data has been obtained in July 2005.

Full details of the continuous monitoring techniques, including data ratification and QA/QC are included in Appendix 1 and all monitoring locations are shown in Appendix 2.

The short-term trend (2003-04) for the continuous monitoring is shown in the relevant graphs in section A1.4 (Appendix 1) for illustrative purposes only and insufficient data is available to interpret trend for these pollutants at the monitoring locations.

Conclusions from continuous nitrogen dioxide monitoring

Cullompton

Preliminary results from the new analyser at the Cullompton monitoring station in Station Road indicate that it is unlikely that the 2005 annual mean UK objective of 40µg/m^3 for nitrogen dioxide will be met at this monitoring location. This result contrasts that of the nearby diffusion tube monitoring location also in Station Road (10m south), which is marginally below the UK objective over the same monitoring period. This illustrates the possible spatial variation in pollutant concentrations along a short stretch of the same road link. As with the diffusion tube monitoring, this data is contributing to the on-going detailed assessment in Cullompton due for completion after end-July 2005.

Crediton

Results for Exeter Road, Crediton indicate a continuance of exceedences of the annual mean objective at the monitoring location, however, the short-term trend (2003-04) indicates that concentrations fell by 9.9% (closely comparable to the co-located and other nearby diffusion tubes in Exeter Road). As with the diffusion tube results, this reduction has been mirrored nationally and is likely to be attributable to less settled weather conditions during the summer of 2004 compared to the extended calm conditions experienced during the summer of 2003. The current and predicted monitoring results do indicate nonetheless that concentrations remain above the UK objective along Exeter Road and therefore AQMA should remain in place.

Conclusions from continuous particle monitoring

Cullompton

Results from the Cullompton monitoring station in Station Road indicate that current and predicted particle concentrations are well within the annual mean and 24-hour UK objectives and therefore the on-going detailed assessment in Cullompton should only focus on nitrogen dioxide concentrations.

Crediton

Results for Exeter Road, Crediton indicate that there continues to a be a large number of exceedences of the 24-hour mean UK objective of 50 µg/m^3 (35 permitted exceedences) and there was no significant decline in annual mean concentrations over the short-term (2003-2004). The predicted monitoring results for 2010 indicate that concentrations and exceedence numbers will remain high and above that of the 2004 and provisional 2010 UK objectives and therefore the AQMA should remain in place.

Conclusions of ozone continuous monitoring

Cullompton

The 2003 monitoring in Cullompton showed a significant number of exceedences of the 2005 UK objective of 100 µg/m^3 (247 exceedences compared to a permitted 10). The exceptionally high ozone concentrations during 2003 where reflected across the UK and Europe and where due to the favourable hot/calm weather conditions during the extended summer heatwave. Ozone is a secondary photochemical pollutant associated with a complex atmospheric chemistry and high concentrations are usually associated with stable atmospheric conditions, extended sunlight hours and high temperatures.

The 2004 monitoring in Cullompton showed a more typical annual mean and a much lower number of exceedences of the 2005 UK objective (within the permitted 10) as would be typical of an urban setting where higher nitrogen dioxide concentrations may inhibit ozone formation. The reduction in ozone concentrations/objective exceedences is very likely to be as a result of the cooler, less settled, more typical summer weather conditions experienced in 2004.

2.3 Air quality complaints 2003-2004

Environmental Health Services dealt with the following complaints in the Mid Devon area during the calendar years 2003 and 2004:

Table 11: Air quality complaints in Mid Devon

Complaint type	2003	2004
Part B/Part A(2) premises (odour or point/fugitive emissions)	70	12
Dust	3	6
Fumes/Gases	6	2
Smoke inc. bonfires	22	21
Odour - agricultural premises	6	3
Odour - industrial premises	6	11
Odour - other sources	21	7
TOTAL	134	62

This shows a significant reduction in complaints in 2004 compared to 2003. Most of this reduction was due to the closure of an animal rendering Part B premises in November 2003 (this site was responsible for over 50 complaints during 2003). Exceptionally calm, hot weather conditions during the summer of 2003 also meant that a higher than usual number of varied odour complaints were received during that period (see Odour – other sources).

3. NEW LOCAL DEVELOPMENTS

3.1 Industrial Processes

A Progress Report should address any local developments that might affect air quality. This includes new Part A/A(1), A(2) or B commercial/industrial processes, of types specified in Appendix 2(E) of LAQM.TG(03)[4]. It is also relevant to include any processes or installations with substantially changed emissions in addition to any new landfill sites or quarries with relevant public exposure. It is only necessary to consider developments that have actually been granted planning permission.

Part A/A(1) industrial processes

One new Part A(1) process was authorized/permitted for operation since the previous Updating and Screening Assessment report. This is the Lloyd Maunder Ltd abattoir in Willand. A review of the A(1) permit application adequately identified point and fugitive emission sources and none are considered significant in respect of local air quality management following criteria within technical guidance LAQM.TG(03)[4].

None of the existing three Part A/A(1) processes (John Heathcoat & Co. textile factory at Tiverton, Devon Valley paper mill at Hele and St Regis paper mill at Cullompton) within the Mid Devon area underwent significant changes likely to result in an increase in process emissions of 30% or more, since the Updating and Screening Assessment report[6] in May 2003. This is based upon a review of public register emissions data and other information received from the Environment Agency.

Mid Devon has recently received an application for consultation in respect of the following 4 new Part A(1) installations:

- Dairy/Milk Treatment Process (Milk Link, Crediton)
- Landfill site (Viridor Waste Management – Broadpath)
- Animal Feed Mill (Lloyd Maunder – Uffculme)
- Animal Feed Mill (ABN – Cullompton)

The Milk Link process in Crediton was considered in the previous USA report in respect of potentially significant boiler emissions and no significant changes to emissions have been identified. This site is now within the boundary of the Crediton Air Quality Management Area (AQMA) and any relevant air quality issues will be addressed in the formal Mid Devon response to the A(1) permit application and the Environment Agency is being consulted on relevant issues as the AQMA Action Plan is developed (see section 4.1 of this report), however, it is not expected that this process makes a significant local contribution to air pollution within the town.

The Broadpath landfill site has no significant current point or fugitive emission sources for the majority of the pollutants within the scope of Local Air Quality Management. However, proposed landfill gas engines at the site may be significant and an air quality impact assessment has been requested via the A(1) permit application consultation process.

The two animal feed processes above are both current Part B processes and will remain so until the Environment Agency A(1) permits have been formally issued (expected to be later in 2005). There are no new or significantly increased emissions from these sites.

Part A2 industrial processes

One new Part A(2) industrial process (South West Galvanizers, Crediton) has been permitted in the Mid Devon area since the last Updating and Screening Assessment report. This was a previous Part B process and there have been no significant process changes or increases in emissions based upon a review of the public register and the A(2) permit application.

The following current Part B sites have applied to become Part A(2) installations:

- Roadstone coating plant (Aggregate Industries - Westleigh Quarry, Burlescombe)
- Animal carcass incineration (BG Pearce – near Hittisleigh)

The roadstone coating plant at Westleigh has submitted a 'thin' application in order to comply with changes to the scheduling of this sector under the PPC regulations and enable the plant to continue with the use of waste/recovered oil up to the A(2) compliance date in December 2005. It is expected that the application will be withdrawn by December 2005 and the plant will switch to gas-oil or other fuels which are not derived from waste/recovered oil with a subsequent improvement in emissions.

The A(2) application submitted by BG Pearce in respect of their animal carcass incineration plant does not identify any significant process changes and has also been submitted to comply with changes to the scheduling of this sector under the PPC regulations. As an existing site, regular inspections and review of monitoring data provided under the current Part B permit do not identify any significant changes to incinerator emissions or operating procedures.

Therefore, the above A(2) applications do not represent a change in previous or current emissions from the plants.

Part B industrial processes

There are 10 new Part B industrial processes which have been authorised or permitted in Mid Devon since the last Updating and Screening Assessment (USA) Report[6] in May 2003. All these processes are small waste oil burners (<0.5 MW) and are not associated with significant air emissions or significant local impact on background pollutant concentrations.

No previously existing Part B processes underwent significant changes likely to increase their emissions by 30% or more, since the last report. This is based upon a review of the Mid Devon public register and other information supplied by Mid Devon District Council Environmental Protection staff.

There are currently 36 Part B processes in the Mid Devon area.

Vapour recovery systems at petrol stations are Part B processes and are relevant in the context of benzene emissions. Local Authorities are required to identify new petrol stations where:

- Petrol throughput is greater than 2000 m^3, and
- There is a busy road nearby (> 30,000 vehicles per day), and
- There is relevant public exposure (within 10m of the forecourt pumps), and
- Stage 2 vapour recovery is not installed.

There are no new petrol stations in the Mid Devon area meeting the above criteria.

3.2 Other Industrial Processes

New Landfill, Quarrying and Mineral Processes

There have been no new landfill, quarrying or mineral processes starting operation or significantly changed in the Mid Devon area since the last Updating and Screening Assessment (USA) Report[6] in May 2003.

New Fuel Storage Depots

There have been no new major fuel storage depots starting operation, either in or close to, the Mid Devon area, since the last Updating and Screening Assessment (USA) Report[6] in May 2003.

Small Boilers and Combustion Plant

There have been are no new small boilers or combustion plants starting operation in the Mid Devon area (excluding the small waste oil burners discussed above) since the last Updating and Screening Report[6] in May 2003. This is based upon an examination of planning applications and Clean Air Act approvals.

3.3 Industrial Process Closures

There have been no significant industrial process/plant closures in the Mid Devon area since the last Updating and Screening Report[6] in May 2003. The following Part B process Authorisations have been revoked and the processes are no longer operating:

- BOCM Pauls (animal feed mill) – Crediton
- Bolham Road garage (petrol filling station) – Tiverton
- Lloyd Maunder (animal remains rendering plant) - Willand
- Mike Ackland Motors (small waste oil burner) – Loxbeare Cross

3.4 Transport

New developments relating to roads or other transport are relevant to air quality as they may have an impact on ambient levels of Carbon monoxide, Benzene, Nitrogen dioxide and Particles.

New road developments

- No significant new roads have been constructed or proposed since the previous Updating and Screening Report[6] in May 2003.

- No roads have been identified for which updated traffic data have revealed that the annual average daily traffic flow (AADT) is significantly higher (25% or more) than previously measured.

- No roads have been identified which have AADT greater than 10,000 vehicles per day, but which were omitted from the previous Updating and Screening Report.

Significant changes to existing road layouts

No significant road layout changes have been identified.

Significant Changes to Annual Average Daily Traffic Flow (AADTF)

No roads have been identified with annual average daily traffic flow (AADTF) greater than 10,000 vehicles per day, which have experienced large increases (25% or more) in traffic flow, since the previous Updating and Screening Report[6].

Newly identified public exposure to vehicle emissions

Local Authorities are required to consider whether there are any of the following in their area, either newly constructed (since the last Updating and Screening Assessment or Progress Report), or newly identified:

Narrow congested streets meeting the following criteria:

- Residential properties within 5m of the kerb.
- Average traffic speeds are 50kph or less.
- The carriageway is less than 10m wide, and
- AADT >10,000 vehicles per day.

Busy streets where people may spend 1 hour or more close to traffic meeting the following criteria:

- Public exposure for 1 hour or more within 5m of the kerb
- AADT >10,000 vehicles per day.

There are no new, or newly identified streets meeting these criteria since the previous Updating and Screening Assessment report[6] in May 2003.

Other transport sources

As well as road transport, public exposure to emissions other transport sources such as planes, buses, trains, ships should also be considered.

Trains

There are no new, or newly identified, locations where diesel locomotives are regularly stationary for five minutes or more and:

- There is potential for public exposure within 15m of the locomotives
- There are more than two occasions a day when diesel locomotives are stationary with engines running for more than 15 minutes.

Airports

There are no major airports in the Mid Devon area (or within 1km of the District boundary) which have a throughput of more than 1 million passengers per year and/or 100,000 tonnes of freight.

Bus stations

There are no newly identified bus stations with more than 1000 bus movements per day, and no bus stations where movements have increased to more than 1000 per day since the previous Updating and Screening Report[6] in May 2003.

Shipping

The Mid Devon area is land-locked and therefore, there are no ports with more than 5,000 shipping movements per year within the Mid Devon area (or within 1km of the District boundary).

3.5 Residential, Commercial and Community

Air quality is a material consideration for the development control process and new significant residential, commercial and community developments may result in on-site and off-site (usually traffic related) emissions which may impact on current ambient levels.

Robust procedures are in place to examine all relevant planning applications to determine the need for an air quality impact assessment (AQIA). Working closely with the Development Control service has enabled AQIA's to be submitted as supporting information with the proposed development application enabling consideration and recommendations to be made prior to determination of the application. Mid Devon also has provided a full range of its own monitoring data to support the AQIA's completed by consultants on behalf of applicants. Under Mid Devon policy, all AQIA must be based upon valid traffic data and where possible an approved Traffic Impact Assessment.

A number of significant residential and commercial developments have been granted planning permission since the previous Updating Screening and Assessment report[6] in May 2005 and a further number of development sites identified in the current Local Plan remain under scrutiny for potential air quality impact.

Mid Devon is also working closely with other local authorities in Devon (via the Devon air Quality Management Group) to produce Devon-wide planning guidance

Development sites considered, or under consideration, since the previous Updating and Screening and Assessment report include:

New Tesco Store and Petrol Filling Station – Station Road, Cullompton

A full AQIA was conducted in 2004 which utilised ADMS-Road dispersion modeling with verification using Mid Devon and additional monitoring data.

The AQIA concluded that the proposed development will only have a minimal impact on local air quality with little difference between 'with development' and 'without development' scheme results. No exceedences of the relevant air quality objectives for nitrogen dioxide and particles.

Benzene concentrations at the nearest sensitive receptor to the proposed Petrol Filling Station (PFS) were predicted not to exceed the more stringent air quality objective for 2010, however, Stage II petrol vapour controls at the Petrol Station were recommended.

New Tesco Store and Petrol Filling Station – Blundells Road, Tiverton

As with the proposed store and PFS in Cullompton a full AQIA was conducted in 2004 using the same methodology described above.

The AQIA also concluded that the proposed development will only have a minimal impact on local air quality with little difference between 'with development' and 'without development' scheme results. No exceedences of the relevant air quality objectives for nitrogen dioxide and particles.

Benzene concentrations at the nearest sensitive receptor to the proposed Petrol Filling Station were predicted not to exceed the more stringent air quality objective for 2010, however predicted concentrations were significantly close to the 5 $\mu g/m^3$ objective value. As a result, a requirement to submit technical proposals for the installation of Stage II petrol vapour controls at the Petrol Station have been included as a specific condition within the development planning permission.

New residential housing and commercial development – Shiphams site, Station Approach, off Exeter Road, Crediton

The proposed development is within the boundary of the Crediton Air Quality Management Area (AQMA) and the approved traffic impact assessment identified a clear resultant increase in traffic movements along Exeter Road where the air quality objectives for nitrogen dioxide and particles are already being exceeded.

An AQIA was conducted using the latest version of DMRB[10] validated using Mid Devon monitoring data. On this occasion, dispersion modeling was proposed, however, unacceptable model uncertainty due to difficulties modelling Exeter Road (a narrow, up-gradient street canyon) meant that this methodology was not used. A wide number of receptor locations around the development and along Exeter Road were considered however and the AQIA concluded that the proposed development would result in a slight increase nitrogen dioxide and particle concentration at receptor locations. This increase was not considered sufficient to render the in-development AQMA Action Plan unworkable or sufficiently large to warrant an objection to the development on air quality

ground. However, mitigation and compensation recommendations were made by the Environmental Protection Officer (Environmental Health Services) in light of AQIA conclusions. The full text of the relevant recommendations is given below.

"I concur with the modelled impact of the proposed development. From the information provided it has been concluded that the development will result in a small worsening of air quality within the Credition Air Quality Management Area (AQMA) at existing sensitive receptor locations along Exeter Road. The AQMA and in particular Exeter Road is a location where air quality is already poor with exceedences of Government Statutory Air Quality Objectives.

Therefore, Air Quality is a material consideration as clearly defined by PPS23 with particular importance given the presence of the AQMA. In terms of the specific development proposal, air quality should be considered to be a moderate-high consideration.

As a result of the above, I propose that there are insufficient grounds to recommend refusal of the application for air quality reasons. However, the following mitigation and compensation measures are recommended.

Mitigation measures to be dealt with under future Full or Reserved Matters application(s):

1. *Consideration of development layout to maximise the distance of residential units from Exeter Road link and the Petrol Filling Station.*
2. *Heating systems designed to minimise energy consumption and reduce pollution emissions.*
3. *Environmental performance of buildings to be assessed and optimised using the BRE Environmental Assessment Method (BREEAM) or equivalent.*
4. *Careful design and review of ventilation positions.*
5. *Careful design and review of discharge flues from heating systems in order to ensure good dispersion of the emission.*
6. *Future occupant(s) of new office space should be encouraged to develop a green travel plan for employees.*

Mitigation/Compensation measures to be considered as part of a s106 agreement at a level appropriate to the development size:

1. *Provision of financial assistance to support the development or implementation of the Crediton AQMA Action Plan.*
2. *Provision of full funding to cover low-cost monthly nitrogen dioxide diffusion tube monitoring (tube and analysis cost only) for a period of 2-years (24 months) at a single location within or adjacent to the development site (post development completion).*
3. *Support of public transport links between Station Approach and the High Street/Town Centre e.g. Crediton Town bus"*

New residential development site – Winswood, west of Exeter Road, Crediton

This development site is currently allocated within the Local Plan for residential development of approximately 80 units and a formal planning application is expected to be submitted shortly. Concerns have been raised by the Environmental Protection Officer in respect of the potential placement of new residential units close to Exeter Road and the impact of additional movements on Dokum Road, Fulda Crescent, Park Road, Exeter Road and the High Street within the town.

The applicants have commissioned an Air Quality Impact Assessment (AQIA) and Mid Devon have made available all ratified monitoring data for Exeter Road and the High Street. This AQIA is currently under preparation no further information can be provided at this stage.

Community Sites

Two new potentially significant community developments have been completed since the previous Updating and Screening Assessment report[6] in May 2003:

- Tiverton Community Hospital
- Exe Valley Leisure Centre (Tiverton)

Both of the above developments represented a redevelopment and replacement of existing sites with no significant local change to traffic movements and neither are located near to sensitive receptor locations. As a result, Air Quality Impact Assessments were not required to support the relevant planning applications and the developments are not considered likely to have resulted any significant impact upon local air quality.

There have been no other new significant community developments such as schools, stations or major car parks since the previous Updating Screening and Assessment report.

4. CREDITON AIR QUALITY MANAGEMENT AREA (AQMA) ACTION PLAN AND DEVON LOCAL TRANSPORT PLAN

4.1 Crediton AQMA Action Plan development progress

The Crediton AQMA was adopted by Mid Devon District Council on the 20 September 2004 and came into operation on the 8 November 2004, more details of which are given section 1.5 of this report. Since the adoption of the AQMA, Mid Devon has undertaken significant progress towards the development of an Action Plan, a formal requirement following the adoption of the AQMA. Key milestones and dates are given below.

- *October 2004 – AEAT commissioned to conduct a Further Assessment and Source Apportionment of nitrogen dioxide and particles along Exeter Road and the High Street, Crediton.*

- *November 2004 – Devon County Council commence collation of latest traffic statistics for Exeter Road and the High Street, Crediton and commission new surveys where applicable to support the Further Assessment and Source Apportionment exercise.*

- *November 2004 - Stakeholder/Interested Parties Workshop held in Crediton*

  The workshop was attended by a wide range of stakeholders and interested parties including local residents, local elected councilors (Town, District and County), officers from Environmental Health, Forward Planning and Corporate Management Team (Mid Devon District Council), officers from Scientific laboratory, Highways and Transport Planning (Devon County Council) and representatives of the Mid Devon Primary Care Trust. The local Crediton Chamber of Commerce was invited to attend but did not do so.

  The workshop, which was led and facilitated by Beth Conlan from AEAT, resulted in clear proposals for the conception, structure and membership of a Crediton Air Quality Steering Group to oversee the development of the Action Plan. The workshop was also a valuable opportunity seek the views of stakeholders and obtain initial ideas for potential action plan measures. The key outcomes from the workshop were recorded in an 'Outcomes' document, copies of which were distributed after the workshop to all invitees/attendees. This document also put forward a draft project plan and timetable for the development of a draft Action Plan by June 2006.

- *January 2005 - Confirmation of membership of the Crediton Air Quality Steering Group and first meeting held*

  The Steering Group has permanent membership of representatives of the following: Mid Devon District Council (Environmental Health and Corporate Management Team), Crediton Town Council, Devon County Council (Highways) and a local resident. The structure of the Group has been kept deliberately flexible and representatives from other organisations, bodies etc will be invited to attend the Group and key project stages.

The initial meeting of the Group enabled the Project Plan to refined with key milestones and/or consultation dates identified. Agreement was reached to set-up a Stakeholder focus group from June/July 2005.

- *March 2005 – Devon County Council traffic assessment complete and provided to AEAT. Additional ratified monitoring data and other misc. information also provided by Mid Devon enabling the Further Assessment to commence*

  As the time of completion of this report the AEAT Further Assessment and Source Apportionment report was expected in draft form by mid-May 2005

- *March 2005 – wide public/stakeholder consultation exercise conducted aimed at gathering potential ideas for Action Plan measures*

  The consultation exercise involved the production of an 'ideas response form' delivered to a large number of residents, businesses and voluntary groups in and around Crediton. This was in addition to information displays and forms being sited on the Mid Devon District Council website and also at three public locations in the town with publicity for the consultation/information gathering exercise.

  The consultation was considered a success and responses are currently under analysis. Over 1300 ideas for potential Action Plan measures have been put forward in 180 completed response forms. As identified in the project plan, measures will be collated, ranked by popularity and put forward for further consideration. A summary of the consultation outcomes will also be published shortly.

- *March 2005 - Defra SCE funding bid submitted for Action Planning capital expenditure*

  The bid identifies funding provision requirements for capital costs associated with specific project plan tasks including the modelling of potential action plan measures (e.g. highways/parking infrastructure changes), website development for 'live' reporting of air quality monitoring data and action plan consultation costs.

  Mid Devon is awaiting notification from Defra regarding the outcome of this bid.

- *April 2005 – Confirmation that the production of a draft Action Plan by June 2006 has been given due status as a specific goal within the Mid Devon District Council Corporate Plan 2005-2010.*

  The inclusion of the Action Plan as a specific Mid Devon corporate goal (Goal B1.3) highlights the importance given to Crediton Air Quality by Mid Devon and will enable cross-department working at all levels with additional resources including staffing being provided to support the project. The corporate goal project initiation document includes the project plan developed by the Crediton Air Quality Steering Group.

4.2 Crediton AQMA and the review of the Devon Local Transport Plan

The recently published addendum, LAQM.PGA(05)[8], to the Local Air Quality Management guidance makes it clear that local authorities should seek to integrate air quality action plans with local transport plans (LTPs). In common with most other Local Transport Authorities in England, Devon County Council is required to submit its provisional second round report (LTP2) by the 29 July 2005 and the final LTP2 by 31 March 2006. Under LTP guidance, air quality is one of four priority areas for consideration. The LTP is a vital mechanism for Devon County Council in achieving funding for proposed transport schemes from Central Government over the plan period.

Mid Devon District Council is working closely with Devon County Council (DCC) to seek integration of its Crediton AQMA Action Plan with LTP2 and representatives of DCC Highways are members of the Crediton Air Quality Steering Group. The on-going Further Assessment and Source Apportionment should provide valuable information to help target key transport sources and develop potential traffic-related Action Plan measures where road traffic emissions (as expected) are demonstrated to make-up a significant proportion of local nitrogen dioxide and particle concentrations.

However, the development of the Action Plan timetabled for completion in draft by the end of June 2006 does not coincide with the statutory timetable presented by the Government for the completion a draft or final LTP2 report. As a consequence, full integration of the Action Plan (where applicable) may not be possible until a later LTP2 Annual Progress report in 2007.

The final Action Plan may also contain measures (e.g. educational or promotional schemes) which are not directly applicable to the LTP2 and therefore it is initially proposed that that whilst there will integration between the two strategic plans where applicable, only the final Action Plan will include all packages of measures that are aimed at addressing the AQMA air quality issues in Crediton.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions from new monitoring data

Since the last Updating and Screening Report[6] of May 2003, the diffusion tube sampling of nitrogen dioxide (NO_2) has been extended to take in 16 sites covering Crediton, Cullompton Tiverton and Willand. This is supplemented by the on-going continuous monitoring for particles and nitrogen dioxide at Crediton and Cullompton (the latter site have been upgraded to include nitrogen dioxide in August 2004). From the new monitoring data (in respect of those pollutants for local concern) discussed in this report is possible to conclude:

- There are no current or future predicted exceedences of the UK Air Quality Objective for nitrogen dioxide at the monitored locations in Tiverton or Willand

- There are current exceedences of the UK Air Quality Objective for nitrogen dioxide at monitored locations in Station Road, Higher Street and Fore Street in Cullompton. These are preliminary results (less than 12 months data) produced in respect of the on-going Detailed Assessment of this pollutant in Cullompton.

- There are current and predicted exceedences of the relevant UK Air Quality Objectives for nitrogen dioxide and particles at monitored locations within the Crediton Air Quality Management Area.

6.2 Conclusions from new local developments

Mid Devon District Council has identified potentially significant residential, commercial and community development proposals since the last Updating and Screening report and put in place key measures or procedures to ensure that the air quality impact of these developments is fully taken into account and mitigating/compensation measures put in place as appropriate.

Further air quality impact information is awaited shortly in respect of a major proposed housing development in Crediton (Winswood site west of Exeter Road) which has the potential to influence nitrogen dioxide and particle levels in the Crediton Air Quality Management Area (AQMA), especially along Exeter Road.

No other relevant new developments within the Mid Devon area have been identified as requiring assessment at this stage, since the previous Updating and Screening Report[6].

6.3 Recommendations

The Progress Report has not identified any sources that require further assessment, other than the pre-existing on-going Detailed Assessment for nitrogen dioxide in Cullompton.

The Progress Report has reported new monitoring data that supports continuance of the Crediton AQMA and the requirement to produce an Action Plan.

Therefore, there is no need for Mid Devon District Council to proceed to a detailed assessment for any of the pollutants for local concern within the scope of Local Air

Quality Management. The next report to be completed will be a Detailed Assessment report for Cullompton later in 2005 and an Updating and Screening Assessment Report in April 2006.

7. REFERENCES

1. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Working Together for Clean Air, January 2000 (The Stationary Office Limited)
2. The Air Strategy for England, Scotland, Wales and Northern Ireland: Addendum, February 2003 (The Stationary Office Limited)
3. Part IV of the Environment Act 1995 Local Air Quality Management. Policy Guidance LAQM.PG(03), February 2003 (The Stationary Office Limited)
4. Part IV of the Environment Act 1995 Local Air Quality Management. Technical Guidance LAQM.TG(03), February 2003 (The Stationary Office Limited)
5. Part IV of the Environment Act 1995 Local Air Quality Management. Progress Report Guidance LAQM.PRG(03), December 2003 (The Stationary Office Limited)
6. Updating and Screening Assessment Report, May 2003 (Mid Devon District Council)
7. Crediton Air Quality Detailed Assessment Report, April 2004 (Mid Devon District Council)
8. Part IV of the Environment Act 1995 Local Air Quality Management. Policy Guidance Addendum LAQM.PGA(05), March 2005 (The Stationary Office Limited)
9. UK NO_2 Diffusion Tube Network Instruction Manual. Version 1.4, November 2000 (AEA Technology plc)
10. Design Manual for Roads and Bridges. Vol.11, February 2003 (The Highways Agency)
11. Compilation of Diffusion Tube Collocation Studies carried out by Local Authorities, November 2002 (Air Quality Consultants Limited, AQC)
12. Site Operators Manual Automatic Urban and Rural Network, November 2003 (netcen)

8. PROGRESS REPORT CONSULTATION

This Progress Report has the following circulation for consultation/information:

External

(i) Defra (statutory consultee and for formal appraisal)

(ii) Devon County Council (Highways and Transport Planning)

(iii) All neighbouring local authorities (West Somerset DC, Taunton Deane BC, East Devon DC, Exeter City Council, Teignbridge DC, North Devon DC and West Devon DC)

(iv) Environment Agency Devon Area Office

(v) Mid Devon Primary Care Trust

(vi) Crediton Town Council

(vii) Cullompton Town Council

Internal

(i) Development Control

(ii) Forward Planning

(iii) Operations Service

(iv) Elected members

Other

(i) Crediton Air Quality Steering Group

The report will also be published on the Mid Devon District Council website.

9. ABBREVIATIONS AND GLOSSARY

AADTF or AADT	Annual Average Daily Traffic Flow (vehicles per day)
AQC	Air Quality Consultants Ltd
AQIA	Air Quality Impact Assessment
AQMA	Air Quality Management Area
API	Advanced Pollution Instruments
AURN	Automatic Urban and Rural (air quality monitoring) Network
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges Screening Model
ET	Enviro Technology Services plc
ISO	International Standards Organisation
LAQM	Local Air Quality Management
LTP	Local Transport Plan (LTP2 refers to current second round review)
m	metre
Mid Devon	Mid Devon District Council (MDDC)
MW	mega watts
netcen	National Environmental Technology Centre, part of AEA Technology plc
NO_2	nitrogen dioxide
NOx	nitrogen oxides
O_3	ozone
OS	Ordnance Survey
PM_{10}	particulate matter with a (equivalent aerodynamic) diameter of ten microns (10 µm) or less
R&P	Rupprecht and Patashnick Co. Inc
QA/QC	Quality Assurance and Quality Control
TEOM	Tapered Element Oscillating Microbalance (PM_{10} monitoring technique)
SCE	Supported Capital Expenditure allocation
µg/m^3	micrograms per cubic metre in air (a concentration of 1 µg/m^3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant)
UKAS	United Kingdom Accreditation Service
USA	Updating and Screening Assessment Report (see Reference 6.)
UWE	University of the West of England
WASP	Workplace Analysis Scheme for Proficiency

APPENDIX 1: DETAILS OF MONITORING DATA IN MID DEVON

A1.1 Nitrogen dioxide diffusion tube monitoring technique

(A) Description of monitoring technique

Monitoring for nitrogen dioxide has been completed using the following specification of passive diffusion tubes:

- Standard environmental monitoring nitrogen dioxide tubes
- Tube preparation method: 50% Triethanolamine (TEA) in deionised water
- Supplier and analysing laboratory: Gradko International Ltd

These tubes were exposed for one-month periods in accordance with LAQM.TG (03)[4] guidance.

(B) Laboratory QA/QC

Gradko International Ltd are an experienced and long-standing supplier and analysing laboratory for passive air quality monitoring tubes in the UK.

Laboratory procedures include for system blanks and calibration runs at prescribed intervals. The laboratory has specific UKAS accreditation (testing no. 2187) for the analysis of nitrogen dioxide diffusion tubes using documented in-house reference methods GLM3 and 6. A copy of the UKAS accreditation schedule is available from the Council or from the laboratory on request.

Gradko also participate in independent proficiency testing (inter-laboratory round-robin exercises) via the WASP scheme.

The WASP scheme is carried out quarterly using an accurately doped tube (of known concentration to WASP). The doped tube is analysed 'blind' by the laboratory and the reported results then compared by WASP against the true concentration and comparisons are also made with other laboratories participating in the survey. The WASP results indicate the laboratory results are good in terms of accuracy and precision (performance category 1 using the Running Performance Index criteria). A copy of the WASP performance results the two most recent rounds is available from the Council or from the laboratory on request.

(C) Tube handling procedures

The Mid Devon NO_2 diffusion tube monitoring is completed in full accordance with the UK NO_2 Diffusion Tube Network Instruction Manual[9], although results are not completed as part of the UK network.

Prior to sampling, the NO_2 tubes are stored in cool location within the supplied packaging until use. All handling is carried out in a clean, well-ventilated environment. The tube end caps are not removed until the tube has been placed at the monitoring location at the start of the monitoring period.

Once sampling is completed, tubes are recapped with the storage caps and returned as quickly as possible to the clean storage environment. All tubes are then re-enclosed in the supplied packaging and returned to Gradko for analysis within 24 hours.

A 'field' blank tube is analysed with each monthly batch of tubes. The field blank is an unexposed tube from the same batch as the exposed tubes and undergoes the same handling and transport (including travel to and from the monitoring sites). The purpose of this tube is to determine any inadvertent NO_2 contamination of the tubes, before and after exposure. Any resultant contamination found on the analysed field blank is then used to 'blank correct' the reported results for the exposed tubes.

(D) Data ratification

All reported results are well within the documented limit of detection and uncertainty of the measurement technique and all results are laboratory blank corrected.

All results are examined on a monthly basis to identify any spurious data (e.g. very high or very low data) and any suspect data is investigated further. NO_2 monitoring data tends to follow a comparable trend across a number of local monitoring sites, with concentration trend, but not concentration level, similar across all monitoring locations. Therefore, all results are inter-compared for trend, thus providing further evidence of a suspect individual result if other monitoring locations are following a comparable trend excluding the result in question.

At all times, monitoring sites are regularly assessed to identify changes that may positively or negatively affect the monitoring results. Examples include roadworks, local new combustion sources, road closures and vegetation cover. Site conditions during the relevant monitoring periods are always taken into account during data ratification.

NO_2 diffusion tubes provide a cost-effective means of monitoring a wide range of monitoring locations. However, the accuracy of tubes is variable depending on the tube handling procedures, the specific tube preparation/adsorbent mixture and the analysing laboratory.

A recent study by Air Quality Consultants in November 2002[11] on behalf of Defra looked at the various common NO_2 tube preparations (10%, 20% and 50% TEA in either water or acetone, analysed by GMSS or Gradko) and statistically examined the results of NO_2 diffusion tube/chemiluminescence analyser co-location studies completed by 23 local authorities across the UK (covering 44 years worth of annual comparisons). The study concluded that, of the preparation methods studied, all NO_2 tubes under-read (negative bias) and that it was possible to establish a default correction factor specific to the laboratory and preparation method. Since the publication of this report, further work has been conducted on behalf of Defra by Air Quality Consultants (AQC) and the University West of England (UWE) to collate and assess data from nitrogen dioxide collocation studies across the UK. This work is regularly updated as new studies are completed (see www.uwe.ac.uk/aqm/review)

As a result of the AQC/UWE work, new annual mean correction factors are now available for the specific Gradko/50% TEA in water combination of tubes as used by Mid Devon. These latest correction factors have been retrospectively applied to the diffusion tube data obtained from the two long-term monitoring sites (1999 onwards) at Exeter

Road and the High Street. For diffusion tube data collected at all monitoring sites in Mid Devon after April 2003, a local correction factor has been used based upon the Mid Devon collocation study at Exeter Road following commissioning of the real-time monitoring station. For post-April 2003 data, a monthly correction factor has been obtained by applying the following calculation:

Correction factor = CM/DM

Where, CM is the ratified continuous chemiluminescence monitor mean and DM is the raw monthly mean for the average of the collocated triplicate diffusion tubes. In all cases it was possible to match the continuous monitoring data period and the diffusion tube monthly exposure period to within 1-hour.

No correction factor is available from the above sources for 2002. As a result, for 2002 an average of the 2000 and 2001 correction factors was used and for the period January-March 2003 (immediately prior to commissioning of the local monitoring station) the national AQC/UWE derived factor for 2003 has been applied. In summary the following factors have been used for the relevant diffusion tube results:

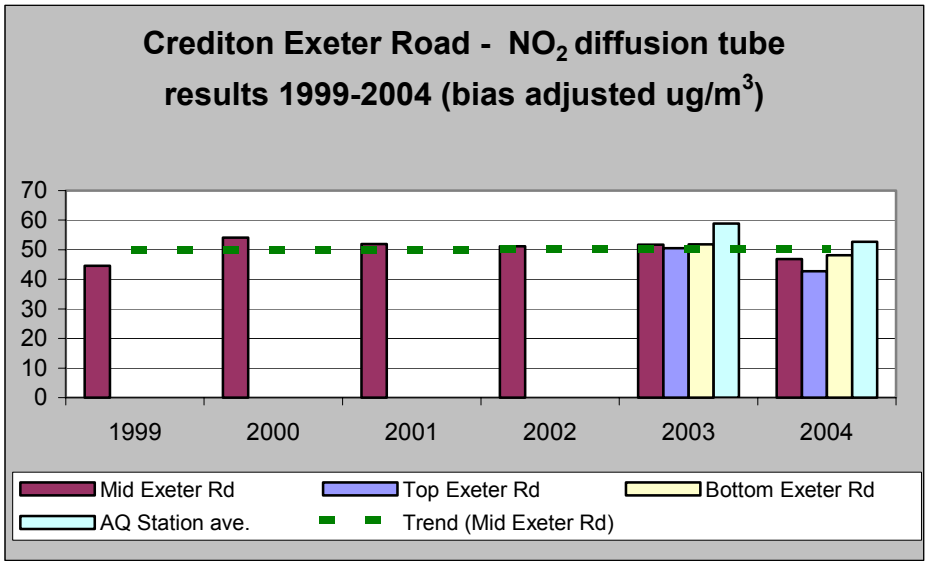
Table 12: Nitrogen dioxide diffusion tube bias-adjustment correction factors

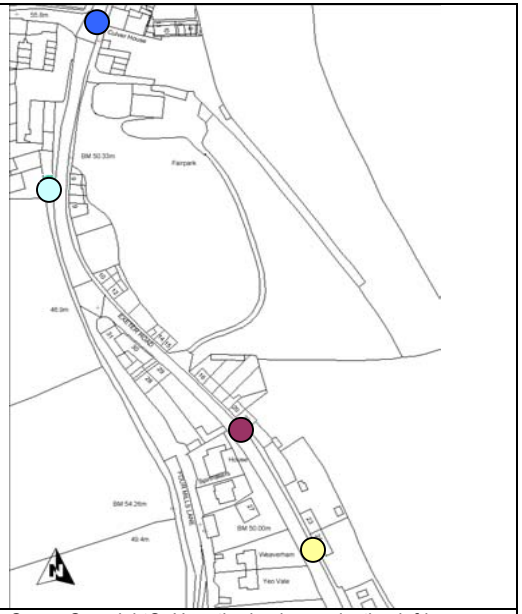
Monitoring period	Correction factor	Source
Annual mean 1999	1.345	AQC/UWE via Helpdesk
Annual mean 2000	1.330	AQC/UWE via Helpdesk
Annual mean 2001	1.360	AQC/UWE via Helpdesk
Annual mean 2002	1.345	AQC/UWE via Helpdesk
Monthly mean January-March 2003*	1.060	AQC/UWE via Helpdesk
April 2003	1.088	MDDC collocation
May 2003	1.450	MDDC collocation
June 2003	1.259	MDDC collocation
July 2003	1.265	MDDC collocation
August 2003	1.066	MDDC collocation
September 2003	1.134	MDDC collocation
October 2003	1.199	MDDC collocation
November 2003	0.983	MDDC collocation
December 2003	1.110	MDDC collocation
January 2004	1.045	MDDC collocation
February 2004	1.360	MDDC collocation
March 2004	1.226	MDDC collocation
April 2004	1.055	MDDC collocation
May 2004	1.060	MDDC collocation
June 2004	1.005	MDDC collocation
July 2004	1.004	MDDC collocation
August 2004	1.183	MDDC collocation
September 2004	1.224	MDDC collocation
October 2004	1.160	MDDC collocation
November 2004	1.215	MDDC collocation
December 2004	0.860	MDDC collocation

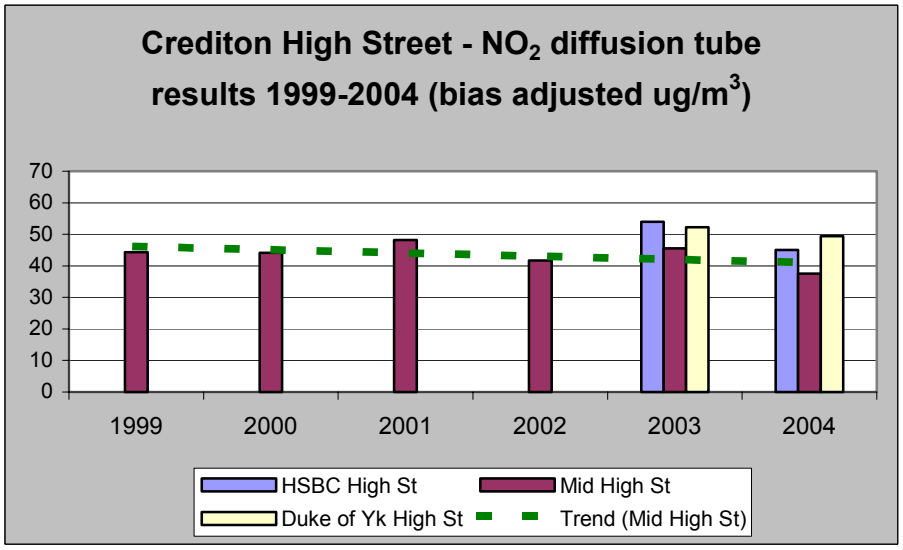
* applied to results for long-term monitoring sites for monthly means for January – March 2003 only and is based on 4 UK studies during 2003 including data from the Exeter Road site for April – December 2003 supplied by MDDC to AQC/UWE. Thereafter, the local monthly collocation correction factors applied.

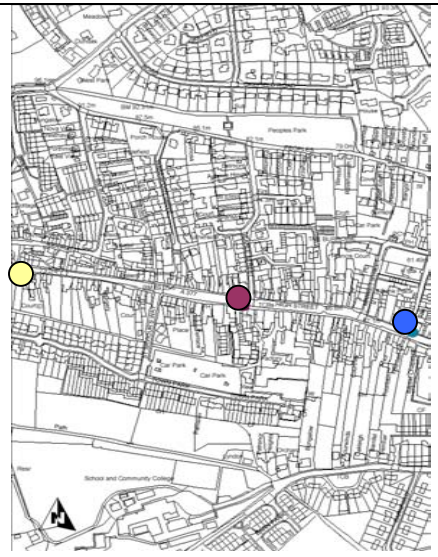
Therefore, for data ratification purposes the above correction factors have been applied to all Mid Devon NO_2 diffusion data following completion of the preliminary ratification steps outlined above.

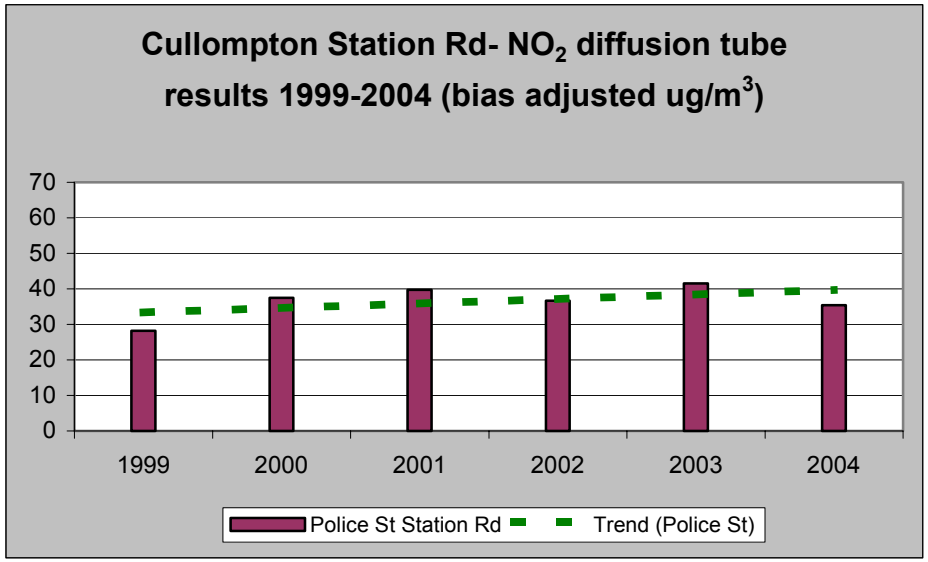
A1.2 Nitrogen dioxide diffusion tube annual mean monitoring results and long-term trend

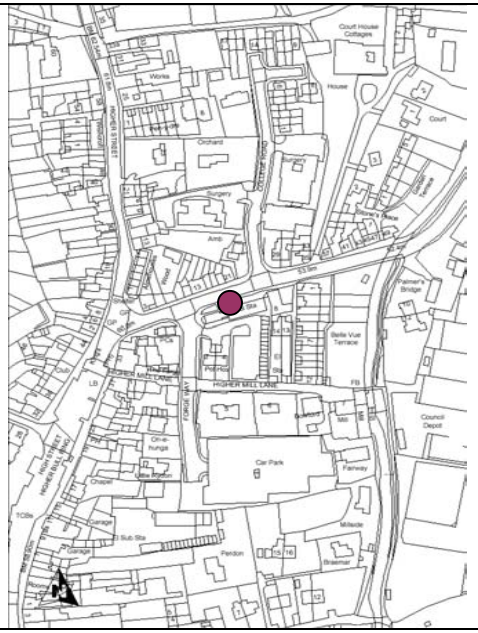












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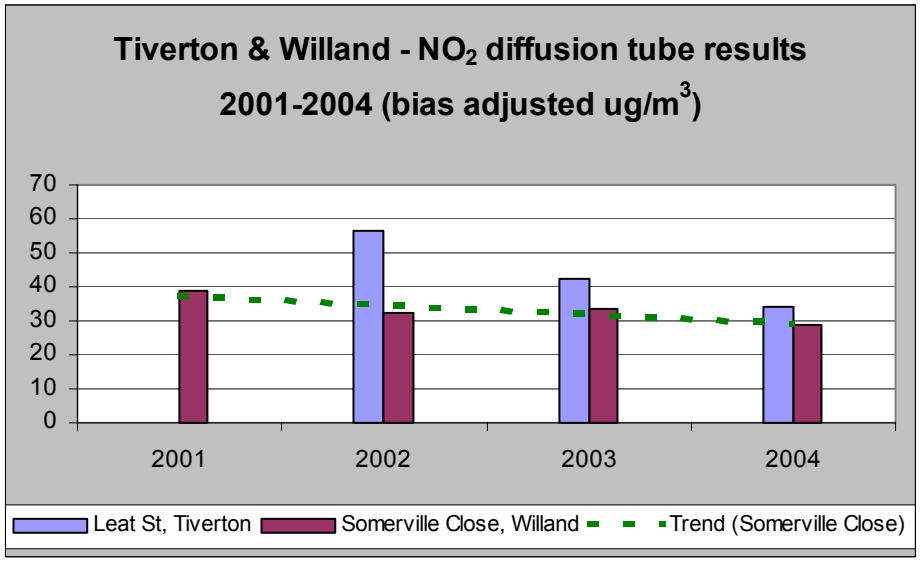
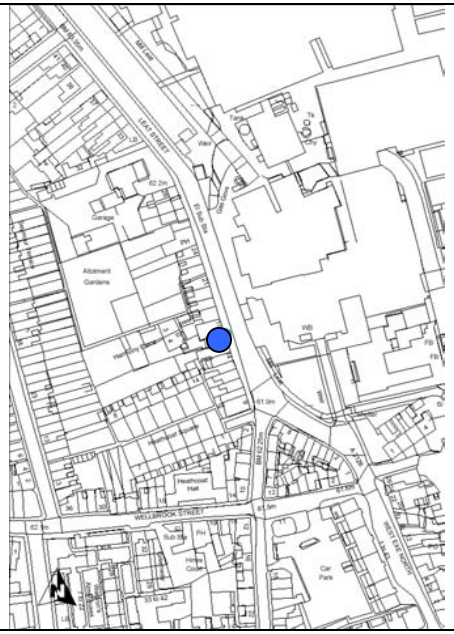
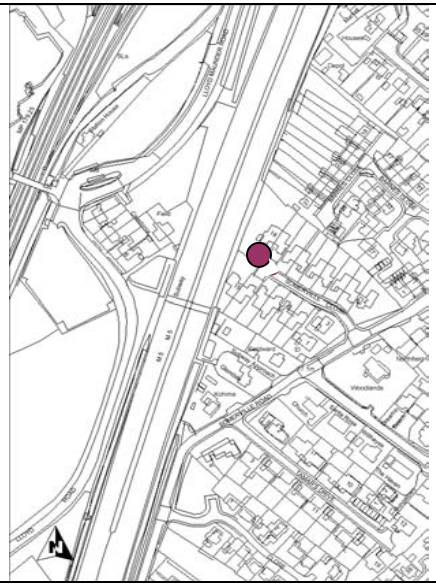




See graph above for Willand data	

A1.3 Nitrogen dioxide, Ozone and Particles real-time continuous monitoring

(A) Description of the monitoring techniques

Monitoring has been completed using the following specification of continuous automatic real-time analysers:

- Particles (PM_{10}) using an R&P TEOM 1400AB (tapered element oscillating microbalance) analyser with Graseby Andersen 10µm sampling head (Crediton Monitoring Station)
- Particles (PM_{10}) using an BAM (Beta Attentuation Microbalance) analyser with Graseby Andersen 10µm sampling head (Cullompton Monitoring Station)
- Nitrogen oxides (including NO_2) using an API M200A chemiluminescence analyser (Crediton and Cullompton Monitoring Stations)
- Ozone using an API M400 ultra-violet absorption analyser (Cullompton Monitoring Station)

These are sophisticated automatic monitoring systems housed in a purpose built J-type air-conditioned enclosure. The analysers measure and record real-time nitrogen dioxide, ozone and PM_{10} measurements which are formatted into 15-minute and 1-hour averages. This enables both short-term and long-term average measurements to be made which are of a high accuracy and resolution.

The TEOM does not have direct equivalency with gravimetric derived data. Therefore, the national default adjustment factor of 1.3 has been applied to the monitoring data in order to ensure the data has gravimetric equivalency.

The above analysers are in common use throughout the UK and are type-approved by NETCEN for use on the national AURN network of monitoring sites.

(B) Equipment maintenance and calibration

The aim of monitoring is to ensure that a high-level of accurate data capture is obtained. Therefore, all automatic monitoring equipment has routine (fortnightly) on-site checks and maintenance visits following documented procedures. These procedures have been drawn up in accordance with equipment manuals, manufacturer instructions and the UK Automatic Network Site Operators Manual[12]. Routine visits include regular filter changes, sampling head cleaning and airflow/analyser test function checks at set intervals. These site visits are carried out by, or are supervised by, a trained, designated Mid Devon officer. Additionally, during each routine site visit, a two-point calibration of the nitrogen dioxide analyser is carried out using a zero-air scrubber and a Nitric Oxide (NO) calibration gas (mid-range). The NO gas is supplied by Messer UK Ltd and the concentration of the gas is traceable to national standards and is supplied with a calibration/tolerance certificate. Data from the zero and mid-point calibration provides the main calibration data used to adjust the raw monitoring data but is not used to adjust the analyser data slope and offset factors. The corrected monitoring results are also used for nitrogen dioxide diffusion tube validation using the collocated triplicate tubes, as discussed in more detail elsewhere in this report.

All analysers and related equipment (e.g. sample pumps, air conditioning units etc) are subject to independent routine maintenance and support via a service contract with a specialist service provider (Enviro Technology Services plc, ET). This includes six-monthly maintenance/service and equipment check visits by manufacturer-approved engineers following national protocols and traceable QA/QC procedures. The service provider is also ISO 9001 accredited and carries out similar or identical support work for the national AURN network of NO_2 and PM_{10} analysers. Also as part of the six-monthly ET site visit, a full multi-point calibration is carried out on the nitrogen dioxide analyser, using zero-air, NO and

NO_2 gas (again traceable to national standards) meaning the analyser data slope and offset factors are reset. In addition to multi-point calibration the following checks are carried out:

- Linearity
- Noise
- Response time
- Leaks and flow check
- Converter efficiency
- Stability of the on-site gas calibration cylinder

Non-routine site visits (e.g. as a result of equipment failure or spurious data) are also carried by the above service provider to the same standards. Contract arrangements ensure that visits are carried out within 48 hours of the notification of call-out in order minimise data loss.

All routine and non-routine site visits are fully documented to detail all works carried out including any adjustments, modifications and repairs completed.

The nitrogen dioxide and ozone analysers also have an autocalibration check function (zero and single span point). Span calibration is checked using an internal permeation tube. This is used to rapidly assess analyser stability and faults, however to permeation device is not sufficiently stable or reliable to be used as a calibration device. All calibrations are carried out as detailed above.

(C) Data processing

Both analysers are connected to a data telemetry and handling package (Opsis Enviman™ using the ComVisioner™ and Reporter™ modules) enabling full data manipulation and frequent checks on data measurements. Data is stored on internal dataloggers and downloaded to a PC via a modem and telephone line. Instrument self-test parameters and filter loading status and internal autocalibration data can be viewed in addition to the collected monitoring data.

User-defined options in the Enviman™ communication package means that incoming data has been set-up for automatic screening in order to ensure representative averages are derived from sufficient raw data. For the purposes of deriving 1-hour means, a minimum of 45 minutes data must be available in each hour (3 x 15 minute means). For the purposes of deriving 24-hour means then a minimum of 18 hours data (18 x 1 hour means) must be available in each day.

(D) Data validation and ratification

Following data processing, all collected data is screened or validated by visual examination to see if there are any spurious or unusual measurements. Where causes of such measurements are known (e.g. planned maintenance visits, sampling head cleaning and known equipment/power failures etc) then the affected data is deleted from the dataset. Any remaining suspicious data, such as large spikes, 'flat-lines' and excessive negative data is 'flagged' for more detailed investigation. At all times an original raw dataset is kept in the data processing software enabling any amendments to the data to be traced and to ensure it is possible to re-examine the original collected data at a later date.

Data validation is routinely carried out at approximate fortnightly intervals and non-routinely at any time. Nitrogen dioxide data is adjusted in accordance with the zero-mid point calibration carried out on a fortnightly basis (see section *B* above).

Data validation is followed by a more thorough and detailed check known as data ratification. Ratification is carried at approximate 3-monthly intervals and involves a critical, in-depth review of all information relating to the individual analyser dataset and monitoring location in order to amend, verify or delete data as appropriate. A wide range of variables, inputs and information sources are used to complete the ratification process, as detailed below:

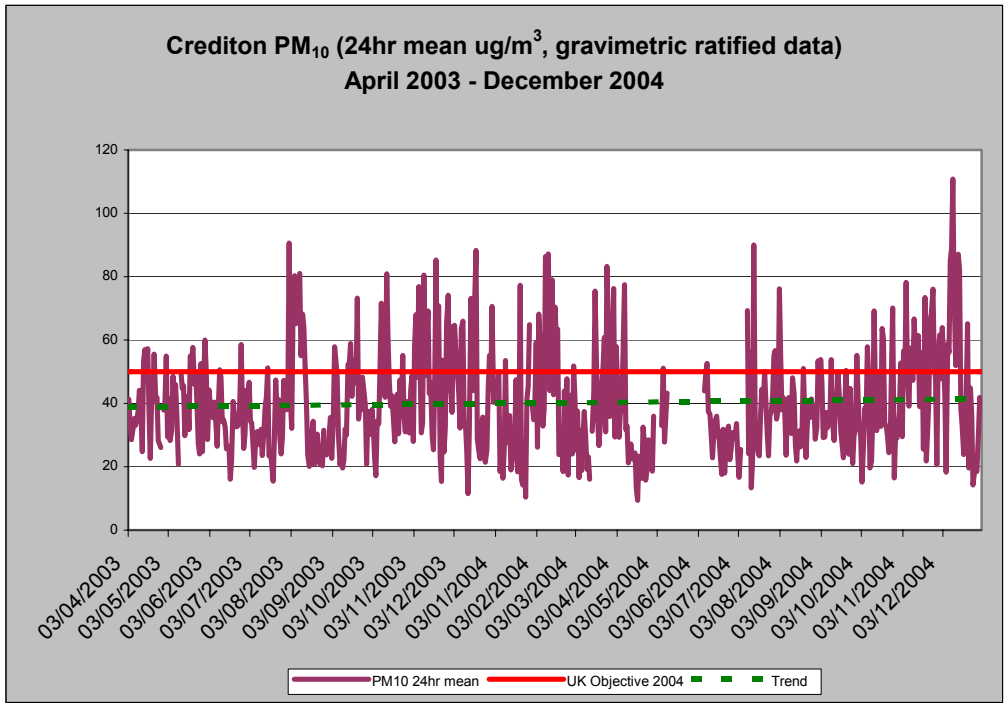
- Instrument history and local site visit reports (to determine effects from recorded previous or current analyser characteristics and problems)
- Data/baseline drift
- Negative or out-of-range data
- Pollutant spikes or other unusual short-term trends
- Data capture rates and distribution of missing or suspect data
- Local events and/or pollution sources (to determine any short-medium term effects on pollutant levels including unusual traffic or commercial/industrial related sources)
- Diurnal trends (to determine if daily and weekly pollutant trends are normal e.g. traffic rush-hour patterns)
- Meteorological phenomena (to determine any unusual data when examined against typical weather conditions and to determine the effect or cause relating to short-term phenomena such as electrical storms or temperature inversions)
- Comparisons with AURN monitoring sites (e.g. national and southwest urban centre sites and a rural site) and other locally available data to determine if similar or different pollutant trends are recorded – allowing for local 'spikes' and concentration differences
- Notes from short-term data inter-comparison work with locally collected data in Devon and Somerset (e.g. discussions with South Somerset District Council regarding local 'spikes' recorded using identical ET API and R&P TEOM analysers in Somerton and Yeovil) and discussions via the Devon Air Quality Management Group
- Enviro Technology service visit data including QA audit and service reports

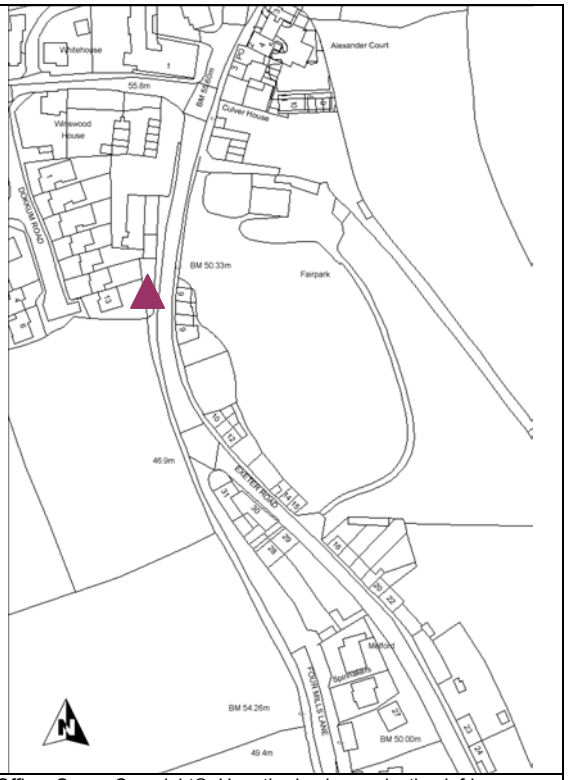
When data ratification has been completed then the data is then available for further statistical and critical examination for reporting purposes. An important principle of the data ratification process is that data is always retained unless there are specific reasons for not doing so.

(E) Data presentation

For reporting purposes, all 15-minute, 1-hour, 24-hour means are calculated in accordance with guidelines in LAQM.TG(03)[4].

A1.4 Continuous monitoring results and short-term trend





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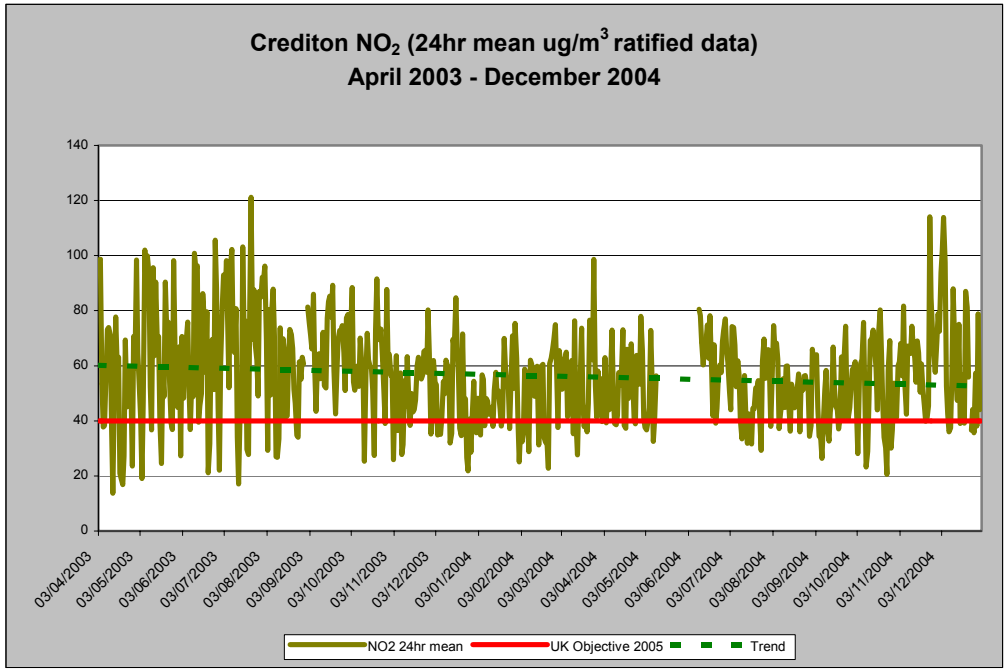
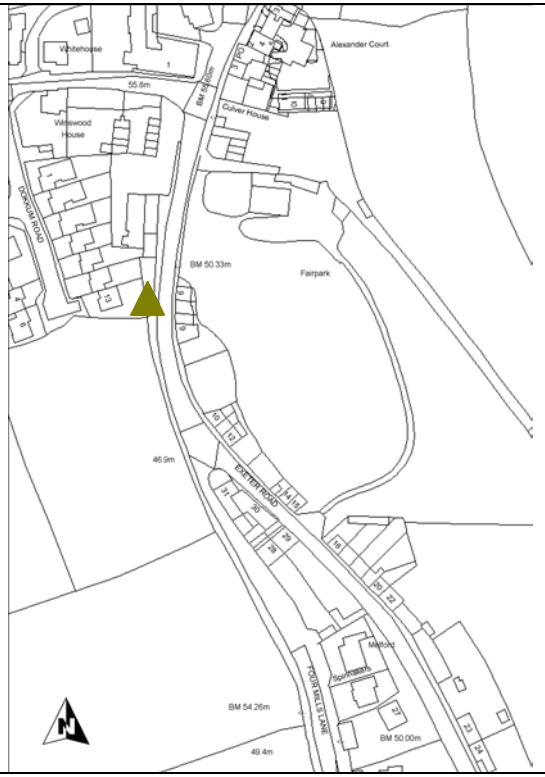
Crediton particles (PM_{10}) monitoring data summary		
	TEOM (uncorrected)	**TEOM (gravimetric)***
Mean 2003**	31.25 µg/m^3	40.62 µg/m^3
Mean 2004	30.44 µg/m^3	39.57 µg/m^3
Data capture 2003 (%)**	74.25	
Data capture 2004 (%)	91.22	
No. of 24hr mean objective exceedences (50 ug/m^3) 2003	24	60
No. of 24hr mean objective exceedences (50 ug/m^3) 2004	38	80
*Corrected by default factor of 1.3 ** April – December only		





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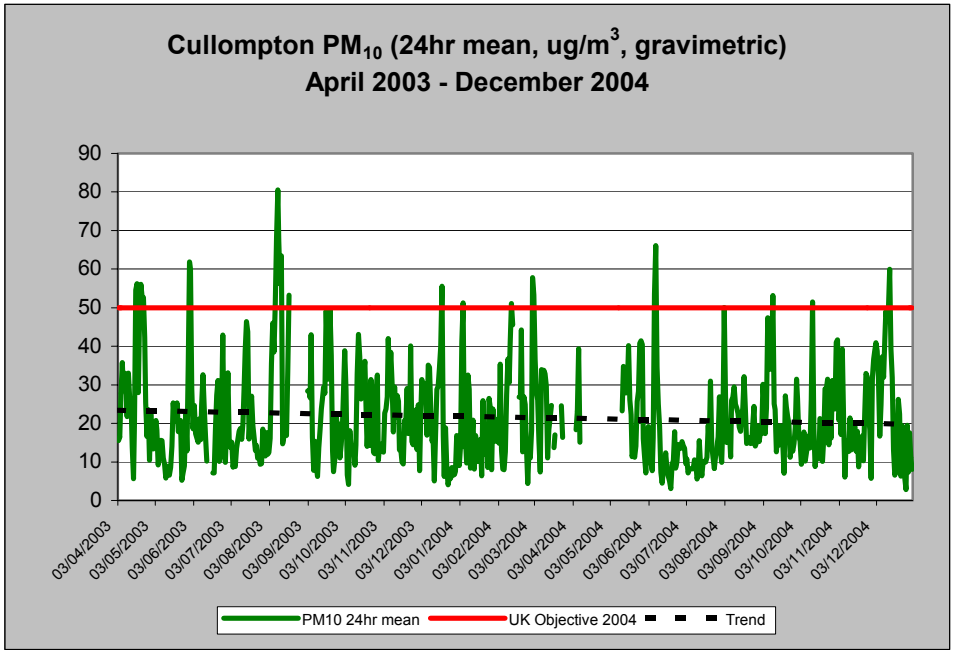
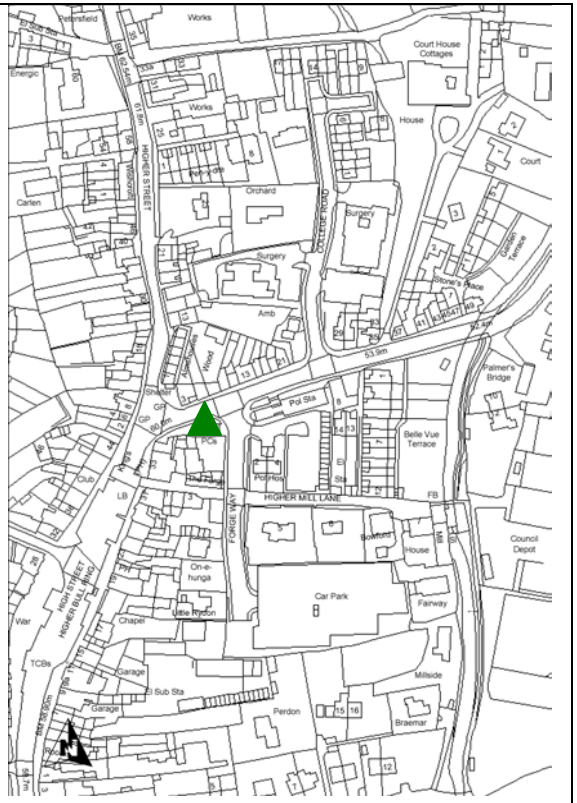
Crediton nitrogen dioxide (NO_2) monitoring data summary	
	ET API M200A Chemiluminescent
Mean 2003*	59.71 µg/m^3
Mean 2004	53.81 µg/m^3
Data capture 2003 (%)*	76.21
Data capture 2004 (%)	86.08
No. of 1hr mean objective exceedences (200 ug/m^3) 2003*	51
No. of 1hr mean objective exceedences (200 ug/m^3) 2004	2
* April – December only	





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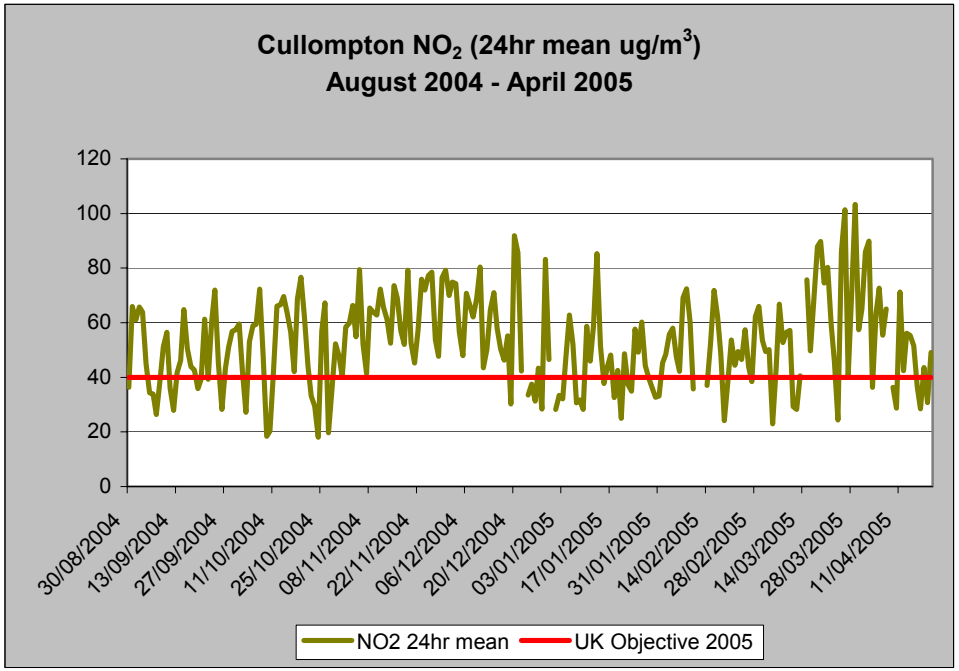
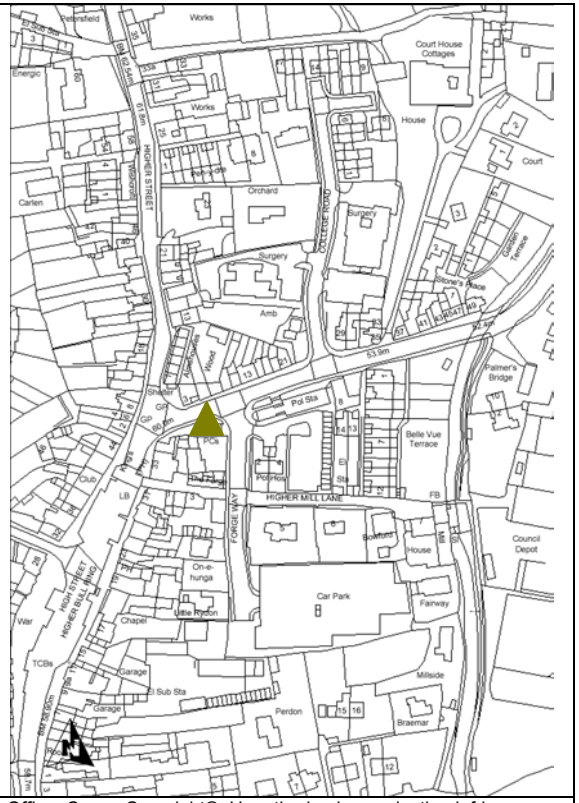
Cullompton particles (PM_{10}) monitoring data summary	
	BAM Beta Attenuation
Mean 2003*	22.79 µg/m^3
Mean 2004	19.85 µg/m^3
Data capture 2003 (%)*	74.68
Data capture 2004 (%)	90.12
No. of 24-hr mean objective exceedences (50 ug/m^3) 2003*	15
No. of 24-hr mean objective exceedences (50 ug/m^3) 2004	10
* April – December only	





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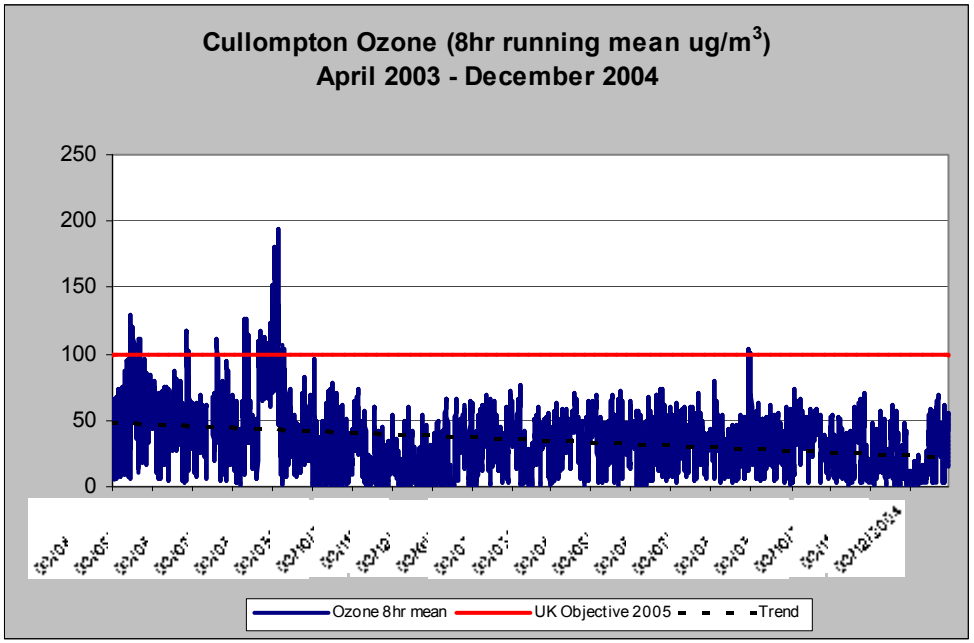
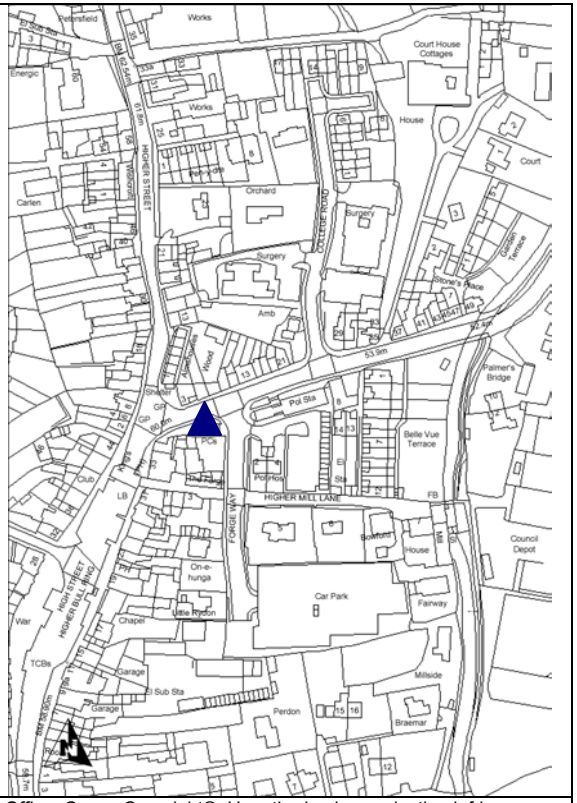
Cullompton nitrogen dioxide (NO_2) monitoring data summary	
	ET API M200A Chemiluminescent
Mean of monitoring period (August 2004- April 2005)	52.86 µg/m^3
Data capture for monitoring period (%)	91.24
No. of 1hr mean objective exceedences (200 ug/m^3) for monitoring period	0





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Cullompton ozone (O_3) monitoring data summary	
	ET API M400 UV
Mean 2003*	40.27 µg/m^3
Mean 2004	31.10 µg/m^3
Data capture 2003 (%)*	76.71
Data capture 2004 (%)	96.28
No. of 8hr mean objective exceedences (100 ug/m^3) 2003*	247
No. of 8hr mean objective exceedences (100 ug/m^3) 2004	4

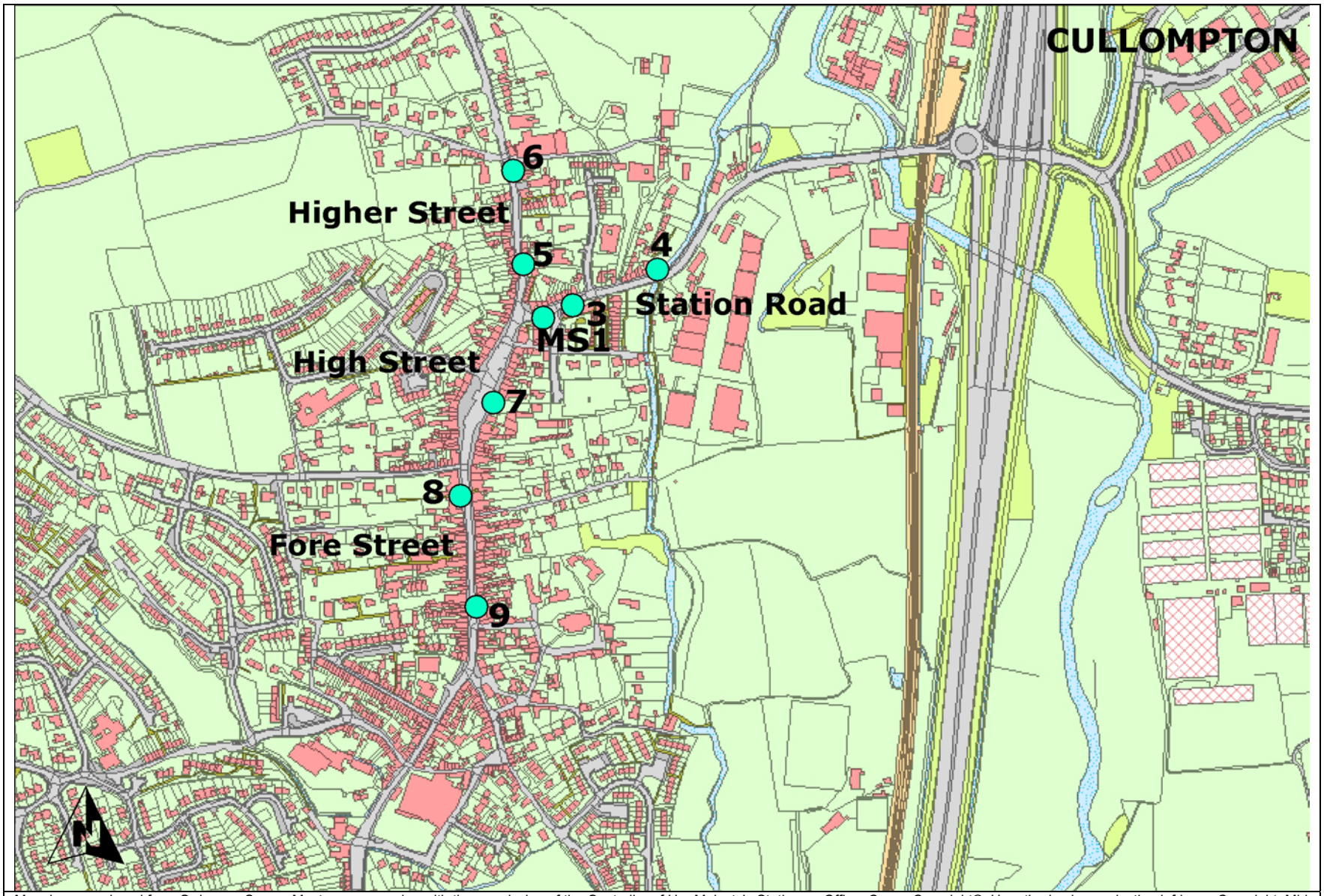
APPENDIX 2: LOCATION FIGURES

A2.1 Air Quality Monitoring Sites

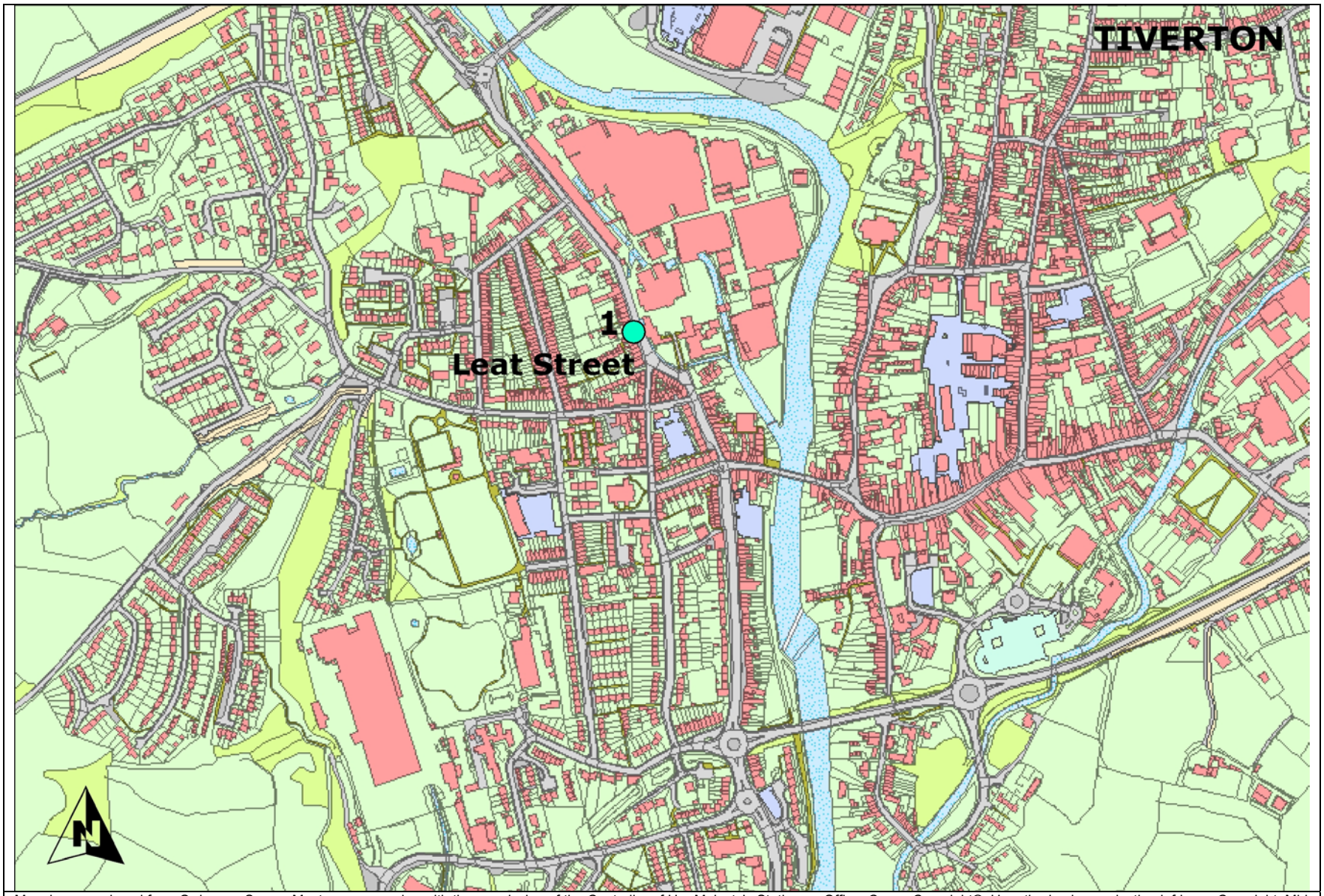
All monitoring site labels on the following figures correspond to the ‘id’ (site code) given in the relevant tables within this report.

Crediton air quality monitoring sites

Cullompton air quality monitoring sites



Tiverton air quality monitoring site



Willand air quality monitoring site