Local Air Quality Management
Environment Act 1995

DETAILED ASSESSMENT OF NITROGEN DIOXIDE - ROLLE STREET, BARNSTAPLE and BRAUNTON

North Devon Council
Environmental Health and Housing Services
Prepared May 2010

Detailed Assessment of Nitrogen Dioxide Levels in Rolle Street Barnstaple, and Braunton

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

May 2010

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Executive Summary

This report concludes that the measured bias adjusted annual mean concentration of Nitrogen Dioxide for 2009 is below the threshold limit for Rolle Street, Barnstaple and that there is a borderline exceedance in Braunton.

North Devon Council do not therefore intend to declare an Air Quality Management Area for Rolle Street, Barnstaple, but do intend to declare an AQMA for Braunton.

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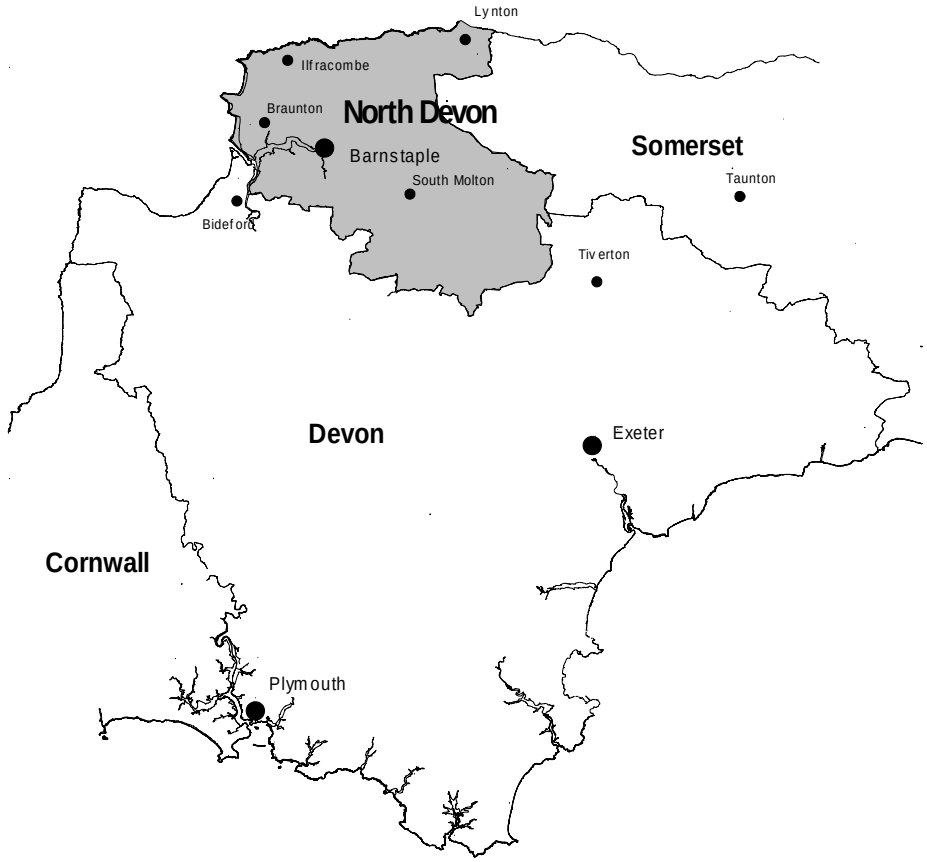
1. INTRODUCTION

1.1 Description of Local Authority Area

The North Devon district occupies the northern most part of the county of Devon and borders the western borders of Somerset and the Bristol Channel, covering an area approximately 1,085 square kilometres (419sq miles). The area is characterised by a rugged northern Bristol Channel coast, the sandy beaches of the West Coast, the estuarine and valley landscapes of the River Taw and the open moorland and farmland of the Exmoor fringes. The district includes approximately one-third of the area of Exmoor National Park. The character of the North Devon district is inextricably linked to its natural landscape, which is its most prized asset. The landscape is highly valued by residents and tourists alike and incorporates numerous Sites of Special Scientific Interest, Areas of Outstanding Natural Beauty and Heritage Coastline.



The population of the area in 2000 was approximately 91,800 with approximately half the residents living in the four main settlements of Ilfracombe, Braunton, South Molton and Barnstaple, which is also the regional centre for northern Devon. The remainder of the population lives in the open countryside or in one of the numerous villages and hamlets of the area.

The area has an extensive rural road network and is connected to the rest of the region by the A39, A361 and A377 roads. There is also a regional rail connection between Barnstaple and Exeter, which runs along the valley of the River Taw.

Employment in the district is concentrated in the main settlements. There is a strong dependence on the service industry, especially tourism related in the summer and also in the public administration, health and finance sectors, reflecting Barnstaple's role as a regional centre. There is also a healthy industrial base in the area and this is reflected in the 48 prescribed processes regulated under the Pollution Prevention and Control Regulations 2000, which are currently in operation within the administrative area of North Devon Council.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas and to determine whether or not the air quality objectives are likely to be achieved. Where exceedances are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

The purpose of this report then, is to present the findings of the detailed assessment of Nitrogen Dioxide which was undertaken during 2009, to enable a decision to be made regarding whether or not North Devon Council intend to declare an AQMA for either of the sites concerned.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043) and are shown in Table 1. This table shows the objectives in units of micrograms per cubic metre µg/m^3 (milligrammes per cubic meter, mg/m^3 for Carbon Monoxide) with the number of exceedances in each year that are permitted (where applicable).

Table 1: Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England

Pollutant	Air Quality Objective		Date to be Achieve by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$ 5.00 $\mu g/m^3$	Running annual mean Running annual mean	31.12.2003 31.12.2010
1, 3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon Monoxide	10.0 $\mu g/m^3$	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$ 0.25 $\mu g/m^3$	Annual mean Annual mean	31.12.2004 31.12.2008
Nitrogen Dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year 40 $\mu g/m^3$	1-hour mean Annual mean	31.12.2005 31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$ not to be exceeded more than 35 times a year 40 $\mu g/m^3$	24-hour mean Annual mean	31.12.2004 31.12.2004
Sulphur Dioxide	350 $\mu g/m^3$ not to be exceeded more than 24 times a year 125 $\mu g/m^3$ not to be exceeded more than 3 times a year 266 $\mu g/m^3$ not to be exceeded more than 35 times a year.	1-hour mean 24-hour mean 15-minute mean	31.12.2004 31.12.2004 31.12.2005

1.4 Summary of Previous Review and Assessments in Relation to Nitrogen Dioxide Levels

In relation to Nitrogen Dioxide specifically, it is important to acknowledge the findings of the previous reviews and assessments which have been undertaken as part of the LAQM Process.

These findings are summarised below:-

- The Updating and Screening Assessment (USA) produced in 2002/03 concluded that monitoring results for Nitrogen Dioxide identified potential exceedances of the annual mean objective at several locations in

Barnstaple. However, these locations were likely to see significant reductions in road traffic numbers, should the proposed "Western Bypass and Downstream Bridge" be constructed. As this was scheduled for completion by early 2006, it was considered that a detailed assessment for Nitrogen Dioxide was not necessary at that time.

- The Progress Report (produced in 2005) confirmed that construction of the "Western Bypass and Downstream Bridge" had commenced. The predicted reductions in road traffic in central Barnstaple were still expected to be achieved, however compliance with the annual mean objective for Nitrogen Dioxide at Rolle Street was expected to be approximately 12 months later than started in the 2003 USA.

- The Updating and Screening Assessment (produced in 2006) concluded that monitoring results for Nitrogen Dioxide identified potential exceedances of the annual mean objective at several locations in Barnstaple. However, these locations were likely to see significant reductions in road traffic numbers on completion of the "Western Bypass and Downstream Bridge". As this was scheduled for completion by May 2007, it was considered that a detailed assessment for Nitrogen Dioxide was not necessary at that time.

- The Progress Report (produced in 2007) concluded that 2 of the 16 sites monitored in 2006 were equal to the threshold limit for Nitrogen Dioxide and one site exceeded the limit. The "Western Bypass and Downstream Bridge" project was completed in May 2007 and had been forecast to have a significant effect on traffic flows in and around Barnstaple. It was, therefore, stated that the effects of the completion of this project on the Nitrogen Dioxide levels at these sites would be able to be fully assessed during the following year's LAQM Progress Report.

- The Progress Report (produced in 2008) concluded that 3 of the 16 sites monitored in 2007 exceeded the threshold limit for Nitrogen Dioxide. It was therefore determined that a detailed assessment of Nitrogen Dioxide should be undertaken at the following sites:-

  Rolle Street 2, Barnstaple
  The Square, Braunton
  The London Inn, Braunton

The presentation of these results are the subject of this report.

2. NITROGEN DIOXIDE MONITORING

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

There are no automatic monitoring sites in North Devon.

2.1.2 Non-Automatic Monitoring

Nitrogen Dioxide is routinely measured by diffusion tube at 16 locations in the North Devon District and the current monitoring programme has been in place since 2000.

This monitoring programme was expanded for the purposes of undertaking the detailed assessment by installing additional monitoring sites in and around the areas concerned, in order to help identify the potential boundaries of an AQMA, should one have to be declared.

Identification of these additional monitoring sites was undertaken in accordance with the relevant technical guidance and in consultation with DEFRA, via air quality helpdesk. Details of these new monitoring sites are included in Table 2.

It should be noted that sites DA1 – DA6 and the sites identified as 12 and 13 are located in Braunton and sites DA7 – DA11 and the sites identified as 2 and 3 are located in and around Rolle Street in Barnstaple.

The exact locations of all the diffusion tubes are more easily understood by viewing the maps attached as Appendix B to this report.

Table 2: Details of Non-Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	Relevant Exposure? *(Y/N with approximate distance (m) to relevant exposure)*	Distance to Kerb of Nearest Road *(N/A if not applicable)*
DA1	Kerbside	SS 49052 BNG 358855	NO_2	Y (10m)	0.5m
DA2	Kerbside	SS 48916 BNG 36188	NO_2	Y (10m)	0.5m
DA3	Kerbside	SS 48712 BNG 36059	NO_2	Y (5m)	0.5m
DA4	Kerbside	SS 48881 BNG 36760	NO_2	Y (5m)	0.5m
DA5	Kerbside	SS 48822 BNG 36876	NO_2	Y (5m)	0.5m
DA6	Kerbside	SS 48313 BNG 36646	NO_2	Y (5m)	0.5m
12	Kerbside	SS 48896 BNG 36714	NO_2	Y (5m)	0.5m
13	Kerbside	SS 48731 BNG 36642	NO_2	Y (5m)	0.5m
DA7	Kerbside	SS 55693 BNG 33470	NO_2	Y (5m)	0.5m
DA8	Kerbside	SS 55510 BNG 33817	NO_2	Y (5m)	0.5m
DA9	Kerbside	SS 55315 BNG 33541	NO_2	Y (5m)	0.5m
DA10	Kerbside	SS 55253 BNG 33703	NO_2	Y (5m)	0.5m
DA11	Kerbside	SS 54632 BNG 34064	NO_2	Y (10m)	0.5m
2	Kerbside	SS 55533 BNG 33615	NO_2	Y (10m)	0.5m
3	Kerbside	SS 55421 BNG 33652	NO_2	Y (10m)	0.5m

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

The results of the diffusion tube monitoring undertaken for the detailed assessment in 2009 are shown in Table 3.

The bias adjustment factor applied to the annual mean concentration was 0.90, as calculated from the spreadsheet available at www.airquality.co.uk, inputting “Gradko” as the analysing laboratory, “20% TEA in water” for the preparation and 2009 for the year.

In accordance with advice issued by the air quality helpdesk, all sites with a collection efficiency of >75% have been bias adjusted only. Sites with a collection efficiency of <75% have had a short-term adjustment factor applied prior to the bias adjustment factor, as have all sites with a collection efficiency of <100% and an annual mean concentration of >36 $\mu g/m^3$. The calculations associated with determining the appropriate short-term correction factor are included as Appendix C to this report.

The measured bias adjusted annual mean concentration of Nitrogen Dioxide for 2009 is below the threshold limit value for Rolle Street, as can be seen in Table 3. North Devon Council do therefore not intend to declare an Air Quality Management Area for this location. If North Devon Council has any reason to believe that the threshold limit value will be exceeded in future, it will consider a further detailed assessment at that time.

The measured bias adjusted annual mean concentration of Nitrogen Dioxide for 2009 shows a borderline exceedance for site 13 located in Braunton. Through consideration of the historical data which is presented in Table 4 and through consultation with DEFRA via the air quality helpdesk, North Devon Council has reached the decision that they do intend to declare an AQMA for this location.

Table 3: Results of Nitrogen Dioxide Diffusion Tubes 2009

Site ID	Location	Data Capture 2009 %	Annual Mean Concentrations 2009 ($\mu g/m^3$) Adjusted for Bias
DA1	Exeter Road, Vellator, Braunton	70	17.09
DA2	Exeter Road, Braunton Parklyn	100	23.05
DA3	South Street, Braunton	80	13.49
DA4	East Street, Braunton	40	20.59
DA5	Broadgate Close, Braunton	90	18.89
DA6	Saunton Road, Braunton	100	15.83
12	The Square, Braunton	100	39.68
13	The London Inn, Braunton	92	40.81
DA7	High Street, Barnstaple	70	16.60
DA8	Fairview, Barnstaple	80	18.78
DA9	Pottington Road, Barnstaple	80	10.42
DA10	Braunton Road, Barnstaple	100	22.19
DA11	Chaddiford Lane, Barnstaple	100	16.23
2	Roll Street 1, Barnstaple	83	30.60
3	Roll Street 2, Barnstaple	58	35.08

Table 4: Results of Nitrogen Dioxide Diffusion Tubes for Sites 12 and 13 - 2006 – 2008

Site ID	Location	Annual Mean Concentrations ($\mu g/m^3$) Adjusted for Bias		
		2006	2007	2008
12	The Square, Braunton	35.54	41.72	44.08
13	The London Inn, Braunton	40.40	42.87	45.44

3. CONCLUSIONS AND PROPOSED ACTIONS

3.1 Conclusions from Detailed Assessment Monitoring Data

North Devon Council do not intend to declare an AQMA for Rolle Street.

North Devon Council do intend to declare an AQMA in relation to site 13 in Braunton.

3.2 Proposed Actions

In relation to Rolle Street (sites DA7 – 11, 2 and 3), as the decision has been made not to declare an AQMA in this location, the additional diffusion tubes which were installed to inform this detailed assessment shall be removed, following the acceptance by DEFRA of this report.

In relation to Braunton (sites DA1-6, 12 and 13), as the intention to declare an AQMA in this location has been made, the additional diffusion tube monitoring shall continue in their current locations.

Following the acceptance by DEFRA on this report, consideration shall be given to relocating the tubes specifically associated with sites DA1-6 in order to provide a more robust set of data in relation to identifying the potential boundaries of the AQMA.

The matter of declaring an AQMA shall be progressed in accordance with the content of “Local Air Quality Management – Technical Guidance LAQM TG(09)” and shall include the following:-

- A 4-month consultation period where we will consult with the statutory consultees of our intention to declare an AQMA.

- Production of a “Further Assessment” which will identify the exact geographical extent of the AQMA, through the collation of more detailed monitoring and traffic data. If necessary, we shall expand the monitoring network throughout this period in order to provide a robust evidence base in order to quantify the link between traffic and our monitoring results.

- An “Action Plan Progress Report” shall be submitted annually, together with the routine Progress Reports and Updating Screening and Assessments.

- Within 18 months of the AQMA having been declared, a draft “Local Air Quality Action Plan” (LAQP) shall be submitted, detailing the options in relation to reducing Nitrogen Dioxide levels specifically in the AQMA.

It is important to acknowledge that the relevant partner organisations shall be consulted and involved throughout the above.

References

"Local Air Quality Management – Technical Guidance LAQM.TG(09)", Department for Environment, Food and Rural Affairs, London, 2009.

Appendices

Appendix A: QA/QC Data

Appendix B: Map showing Diffusion Tube Locations

Appendix C: Short-term Adjustment Factor Calculations

Appendix A

QA/QC Data

Diffusion Tubes are supplied and analysed by Gradko Laboratories, using a 20% TEA in water preparation.

The bias adjustment factor applied to the annual mean concentration was 0.90, as calculated from the spreadsheet available at www.airquality.co.uk, inputting “Gradko” as the analysing laboratory, “20% TEA in water” for the preparation and 2009 for the year.

Calculation of the short-term adjustment factors is included separately as Appendix C to this report.

QA/QC of diffusion tube monitoring
Gradko Laboratories’ internal analysis procedures are assessed annually by UKAS to confirm compliance with ISO 17025.

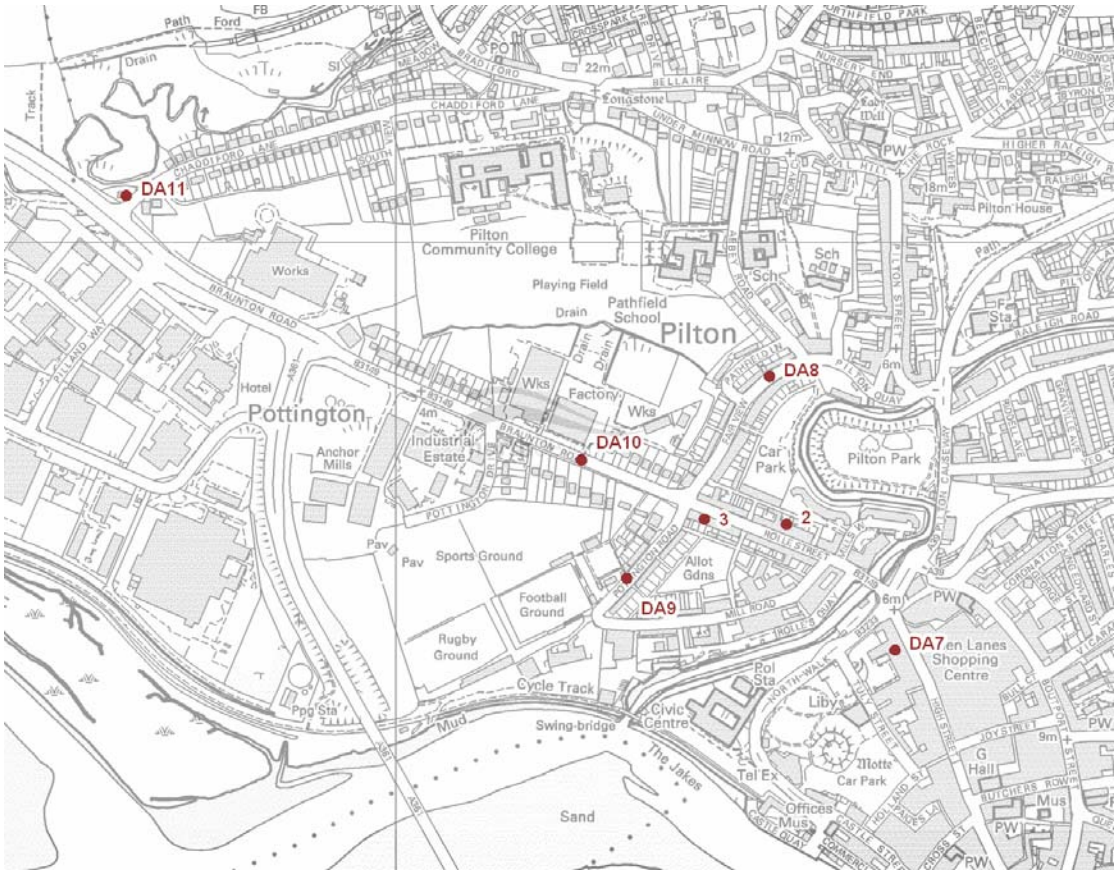
Furthermore, Gradko’s NO_2 diffusion tube procedures have been amended to follow the guidelines of the DEFRA Harmonisation document related to the preparation, extraction, analysis and calculation procedures for NO_2 passive diffusion tubes.

Appendix B

Maps Showing Approximate Diffusion Tube Locations

Detailed Assessment Diffusion Tube Monitoring Locations – Rolle Street, Barnstaple and Braunton

Detailed Assessment Diffusion Tube Monitoring Locations – Rolle Street, Barnstaple



Detailed Assessment Diffusion Tube Monitoring Locations – Braunton

Appendix C

Short Term Adjustment Factor Calculations

Site DA1															
Monthly Mean NO_2 2009															
Site Name	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Units**	**Annual Average**	**Period Mean**	**Correction Factor**
Bournemouth	26	30	19	16	11	13	8	9	14	17	12	25	μgm^{-3}	16.67	12.57	1.33
Bristol St Paul's	46	45	36	29	21	19	19	20	24	33	26	44	μgm^{-3}	30.17	24.29	1.24
Charlton Mackrell	17	14	8.6	8.5	5.8	6.9	4.4	4	9.4	9.4	6.6	13	μgm^{-3}	9.03	6.40	1.41
														Average correction factor		**1.33**

Site DA4															
Monthly Mean NO_2 2009															
Site Name	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Units**	**Annual Average**	**Period Mean**	**Correction Factor**
Bournemouth	26	30	19	16	11	13	8	9	14	17	12	25	μgm^{-3}	16.67	12.67	1.32
Bristol St Paul's	46	45	36	29	21	19	19	20	24	33	26	44	μgm^{-3}	30.17	24.00	1.26
Charlton Mackrell	17	14	8.6	8.5	5.8	6.9	4.4	4	9.4	9.4	6.6	13	μgm^{-3}	9.03	6.37	1.42
														Average correction factor		**1.33**

Site DA7															
Monthly Mean NO_2 2009															
Site Name	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Units**	**Annual Average**	**Period Mean**	**Correction Factor**
Bournemouth	26	30	19	16	11	13	8	9	14	17	12	25	μgm^{-3}	16.67	16.29	1.02
Bristol St Paul's	46	45	36	29	21	19	19	20	24	33	26	44	μgm^{-3}	30.17	30.43	0.99
Charlton Mackrell	17	14	8.6	8.5	5.8	6.9	4.4	4	9.4	9.4	6.6	13	μgm^{-3}	9.03	8.81	1.02
														Average correction factor		**1.01**