



Progress Report for Air Quality

April 2008

BRECKLAND COUNCIL AIR QUALITY PROGRESS REPORT January – December 2007

1.0 INTRODUCTION

- 1.1 Part IV of the Environment Act 1995 requires local authorities to review and assess the current, and likely future, air quality in their areas. Where a local authority considers that one or more of the air quality objectives for a range of pollutants, as prescribed in regulations, is unlikely to be met by the required date, it must declare an air quality management area (AQMA), covering the area where the problem is expected. It must then draw up an action plan setting out the measures it intends to take in pursuit of the air quality objectives in the area.
- 1.2 The Air Quality Regulations 2000 and (Amendment) Regulations 2002 specify the pollutants which must be included in the reviews and assessments of air quality. These are; carbon monoxide (CO), benzene, 1,3-butadiene, nitrogen dioxide (NO₂), lead, sulphur dioxide (SO₂) and PM₁₀ (fine particles less than 10µm in diameter). Appendix 1 shows the standards and objectives for these pollutants.

2.0 BACKGROUND

- 2.1 Breckland Council has been monitoring air quality since 1994 when the network of NO₂ diffusion tubes was established. Originally 10 tubes were placed in each of the five Breckland towns at a roadside and a background site. These measured, respectively, monthly averages of NO₂ concentrations for the worst possible case which would be experienced while e.g. shopping in town, and for more typical exposure e.g. while out in the garden.
- 2.2 The diffusion tube network was expanded to cover areas around Thetford and surrounding villages and upgraded to include continuous monitoring equipment for NO₂, PM₁₀ and ozone at East Wretham Heath, when the Fibrowatt power station was built in 1997. Part funded by the power station for 5 years, and with the result that no discernable environmental impact on air quality was detected; the diffusion tube network was reduced to the five towns and some additional areas where traffic was thought to lead to elevated levels of NO₂.
- 2.3 The continuous monitoring station was retained, and is now operated and maintained by Breckland Council as part of our air quality monitoring programme.
- 2.4 Breckland Council produced an Upgrading and Screening Assessment (USA) in 2003 which identified an exceedence of the objective for PM₁₀ in the area around East Wretham Nature Reserve. Following on from this a "Detailed Assessment" was carried out in 2004, using data from 2003. A further exceedence resulted in the declaration of an Air Quality Management Area in 2005, for which the Council carried out a "Further Assessment" in 2006. This concluded that there was likely to be a local source that contributed to the overall PM₁₀ concentrations. However, because there had been no more than the permitted number of exceedences for 2005/06 that

monitoring would continue for another 2 years and then the AQMA be revoked. Appendix 2 shows the timetable for future rounds of review and assessment

3.0 PURPOSE OF THIS REPORT

3.1 As well as the Further Assessment for PM₁₀ local authorities are required to produce "Progress Reports". The purpose of these is to:

- provide continuity and make the three-yearly (USA) work that much easier;
- provide regular and useful indicators for local authority bench-marking, quality of life or sustainability indicators (or equivalent);
- help maintain the profile of local air quality management within the local authority
- provide for information needs in relation to planning and transport planning processes (i.e. transport plan annual reviews, development control); and
- justify the expenditure on air quality modelling and monitoring.

3.2 Progress Reports are not required to be as exhaustive as the USA, but should update on annual monitoring and relevant developments in the years between the USA.

4.0 SCOPE OF THIS REPORT

4.1 The Progress Report carried out in 2007 stated that there were no sources in the Breckland Council area that would lead to an exceedence of the objectives for CO, benzene, 1,3-butadiene, NO₂, lead or SO₂.

4.2 All new developments, domestic, commercial, industrial and transport related, are assessed for potential emissions of these pollutants and in the period covered by this report there have been no such developments that would be likely lead to an exceedence of the relevant objective.

4.3 However there are some very local spots where traffic congestion leads to elevated levels of NO₂ and these are monitored to ensure that appropriate action can be taken if levels approach the annual average of 40µg/m³. Above this level, an exceedence of the objective is likely. Monitoring consists of a district wide network of diffusion tubes which measure monthly averages of nitrogen dioxide. If NO₂ concentrations approach the annual average of 40µg/m³ then additional continuous monitoring would be carried out to determine whether remedial measures are required.

4.4 The Detailed Assessment produced in 2004 that identified actual exceedences for PM₁₀ was followed by a Further Assessment in 2006 which found no more than the permitted number of exceedences and recommended further monitoring.

4.5 This Progress Report updates on the monitoring carried out by Breckland Council between January and December 2007.

5.0 MONITORING RESULTS JANUARY – DECEMBER 2007

- 5.1 **Nitrogen dioxide (NO₂).** The objective for NO₂ is 200 micrograms per cubic metre (µg/m³) or less, when expressed as an hourly mean, not to be exceeded more than 18 times a year to be achieved by 31st December 2005 and 40 µg/m³ or less, when expressed as an annual mean, to be achieved by 31st December 2005.
- 5.2 There is a continuous NO_x analyser at East Wretham within the AQMA. Results are not included because it encountered a number of technical problems in 2007 and loss of data. A new analyser has been obtained and results will be available for the 2009 Air Quality Upgrading and Screening Assessment.
- 5.3 Breckland Council maintains a district wide network of diffusion tubes which measure monthly averages of NO₂. There is also a mobile monitoring station at East Wretham near Thetford which houses continuous analysers for NO, NO₂ and NO_x, ozone, PM₁₀ and meteorological data. The station has been at the same site since 1997.
- 5.4 **NO₂ monitoring results.** Diffusion Tubes are supplied and analysed by Gradko International, Winchester, using 50% TEA (triethanolamine) in water and are typically exposed for four week periods timed to coincide with calendar months as far as possible. This is for ease of interpretation when viewing the results. Annual means for diffusion tubes in each of the five Breckland towns from 2003 until 2007 are shown in Figure 1 below (not bias adjusted).

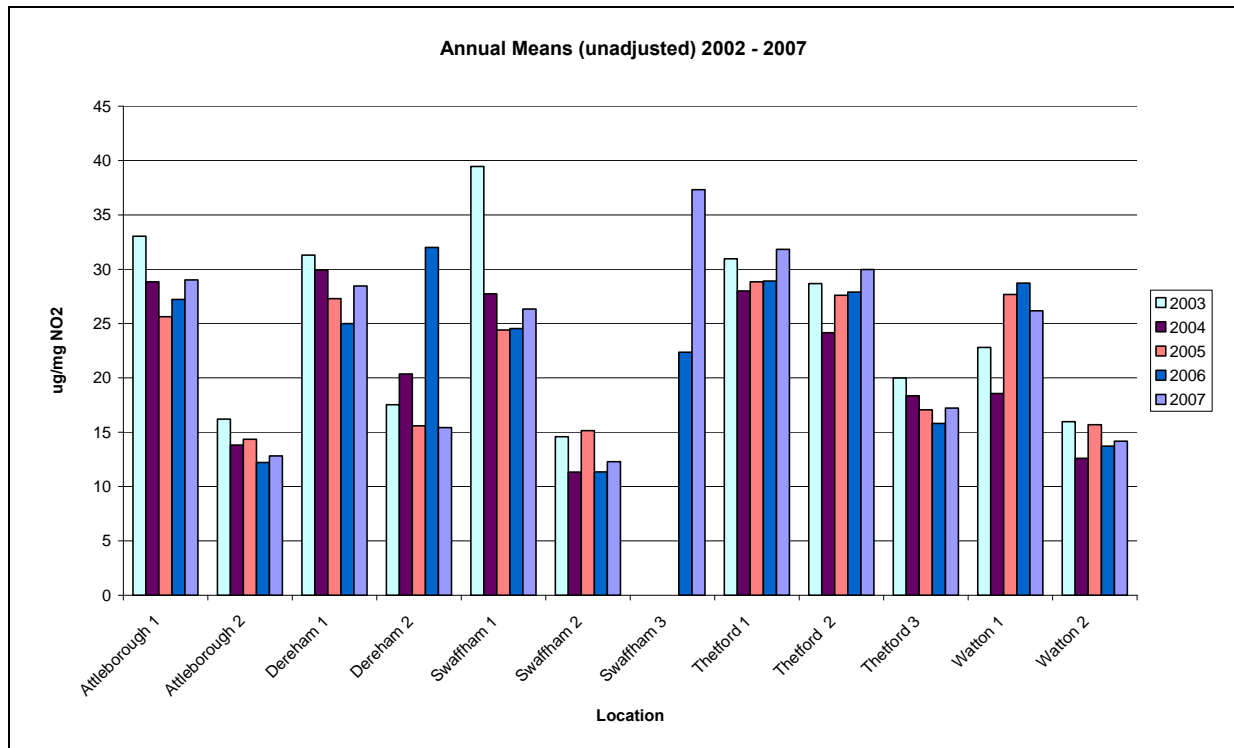


Figure 1. Annual mean NO₂ results for 2003 – 2007 for Breckland Towns

- 5.5 Bias adjustment is the calculation of a factor which is then used to take into account the differences between continuous monitoring and diffusion tubes and the various laboratories and methods of analysis. The factor is calculated by siting (collocating) three diffusion tubes alongside a continuous analyser and comparing the results. This can be found by using local collocation results or those provided by University of West of England database (UWE). For 2007 the UWE factor was used. From 2008 Breckland will be using local collocation factors. Figure 1 is shown with no bias adjustment and Figure 2 below shows both bias adjusted and non- adjusted.
- 5.6 In 2006 a further site was added in Swaffham to allow comparison of air quality before and after the installation of a mini roundabout. The roundabout was completed late in 2006. This site suffers from repeated vandalism and the mean result for 2007 shown in Figure 1 is based on only 10 months data and for 2006 on only six. The missing months in 2007 are January and December when the concentration is expected to be higher. It is likely that the annual objective would have been exceeded if these months were included. Four additional sites close to the mini-roundabout were added to the tube network in February 2008 and early indications show that an exceedance of the annual objective at this location is likely to persist.
- 5.7 Figure 2 below shows the annual means for 2007 only, both unadjusted and bias adjusted using the UWE factor of 1.09. With bias adjustment added the annual mean objective is exceeded at the Swaffham site. See Appendix 2 for all results.

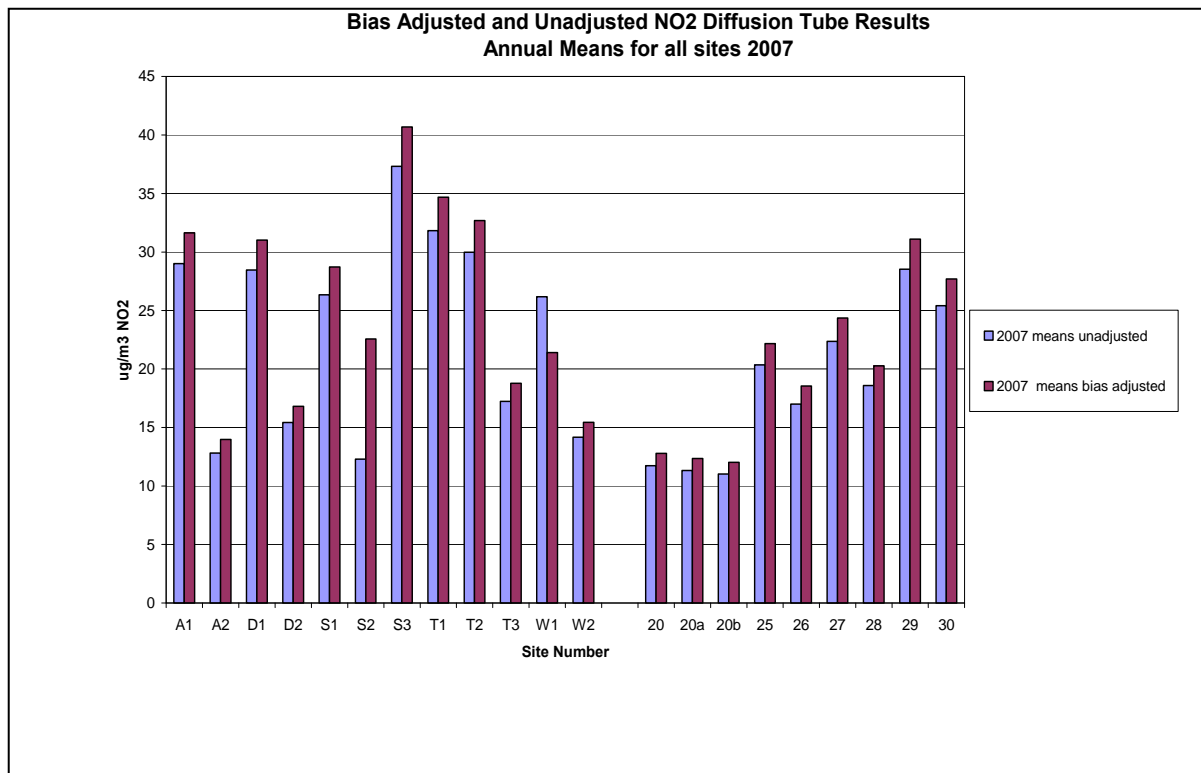


Figure 2. Annual mean NO₂ results for 2007 bias adjusted and non bias adjusted.

- 5.8 **Particulate monitoring results.** The objective for PM₁₀ is 50 micrograms per cubic metre (µg/m³) or less, when expressed as a 24 hour mean, not to be exceeded more than 35 times a year to be achieved by 31st December 2004. 40 µg/m³ or less, when expressed as an annual mean, to be achieved by 31st December 2004.
- 5.9 Between January and December 2007 there were 11 days when the 24 hour mean exceeded 50 µg/m³
- 5.10 There is also a provisional objective for 2010 which is not yet in the Air Quality Regulations and this is for all parts of England, except London, a 24 hour mean of 50 micrograms per cubic metre (µg/m³) not to be exceeded more than 7 times per year and an annual mean of 20 µg/m³, both to be achieved by the end of 2010.
- 5.11 The following charts show the daily mean results for PM₁₀ from January until December 2007.
- 5.12 The 11 days in 2007 on which there was an exceedence of the 24 hour mean in Breckland can be seen on the charts below. It would appear that the results for Norwich and Breckland are broadly similar with occasional excursions for each of the sites.

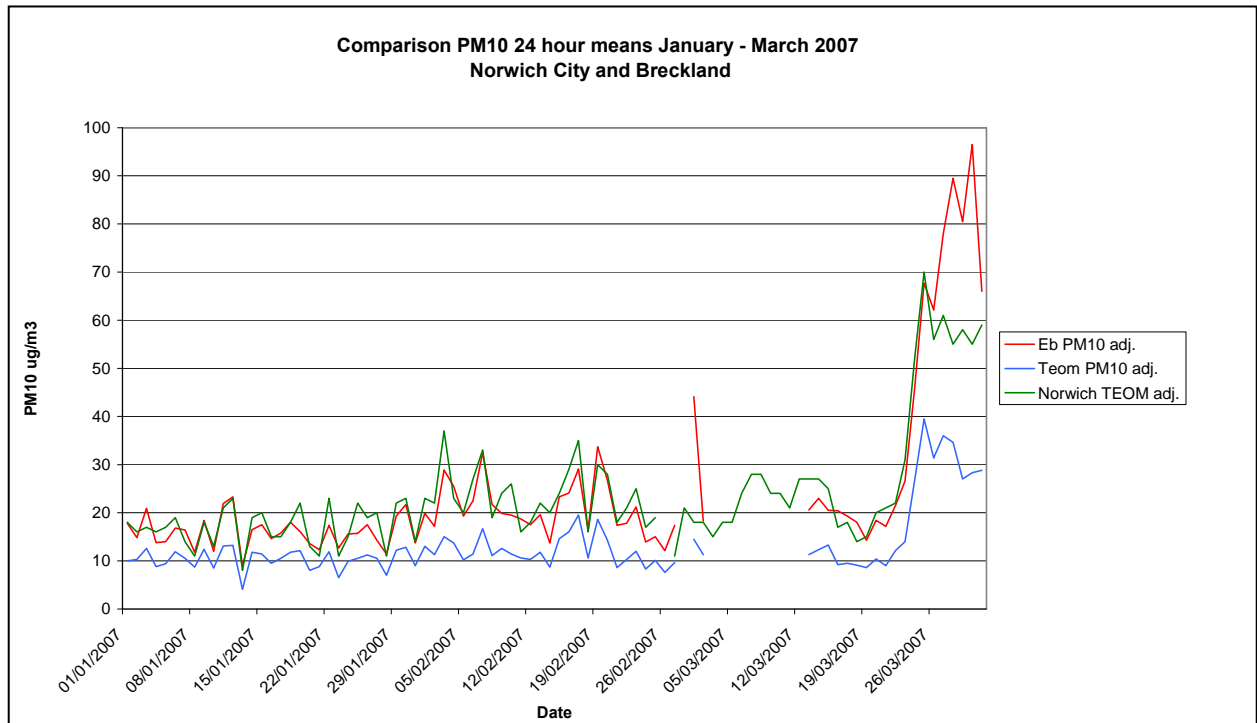


Figure 3. Comparison of 24 hr means TEOM adjusted for Norwich centre and Breckland for quarter one of 2007. Data capture Beta attenuation and TEOM = 88%.

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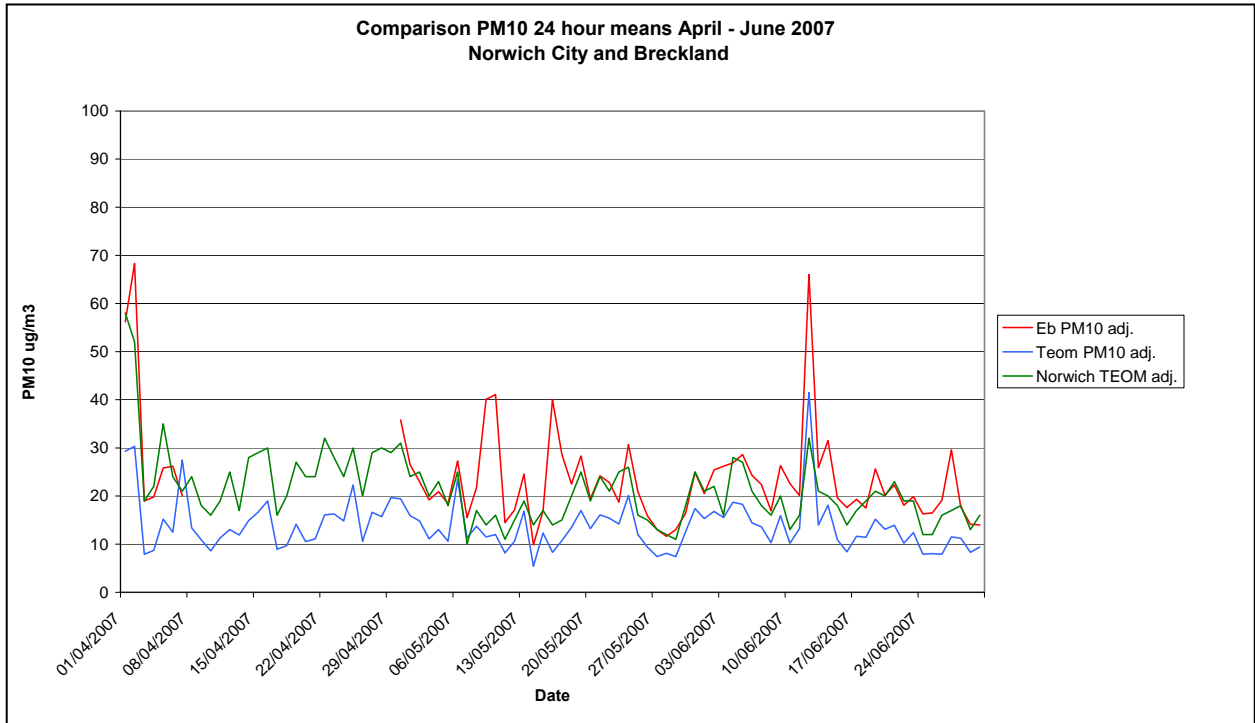


Figure 4. Comparison of 24 hr means TEOM adjusted for Norwich centre and Breckland for quarter two of 2007. Data capture Beta attenuation = 76% TEOM = 100%

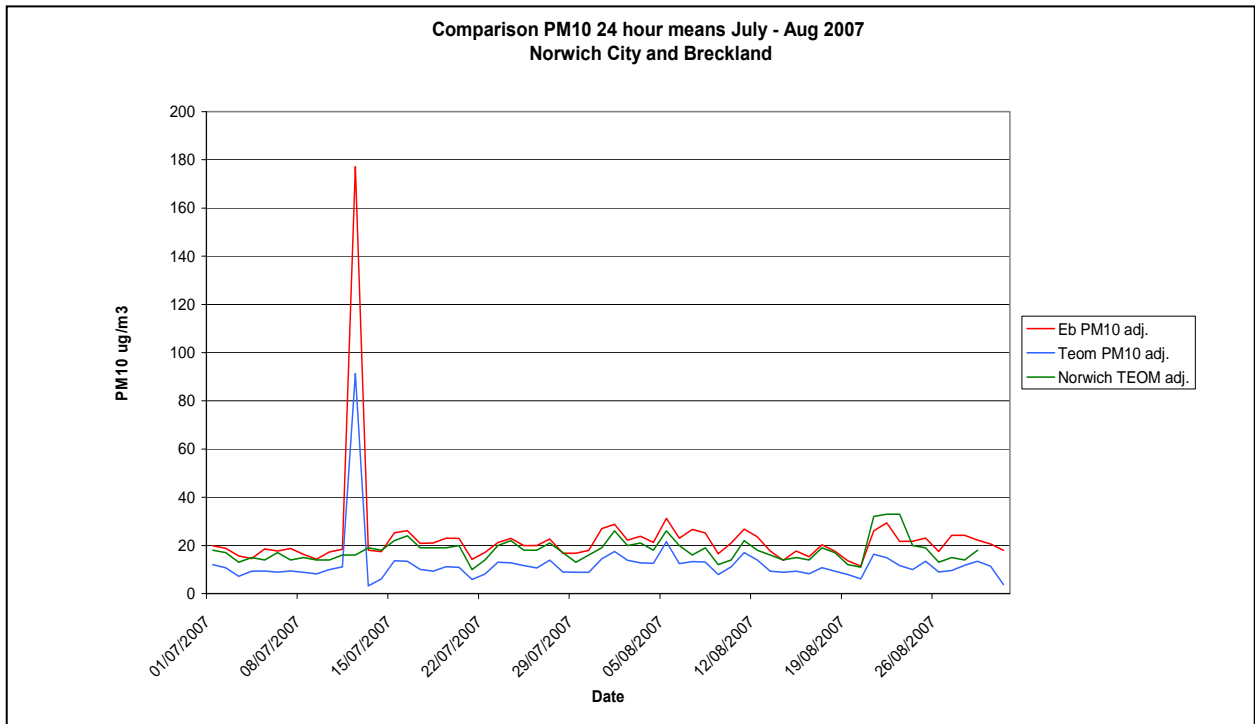


Figure 5. Comparison of 24 hr means TEOM adjusted for Norwich Centre and Breckland for first two months of quarter three of 2007. Data capture Beta attenuation and TEOM = 66%

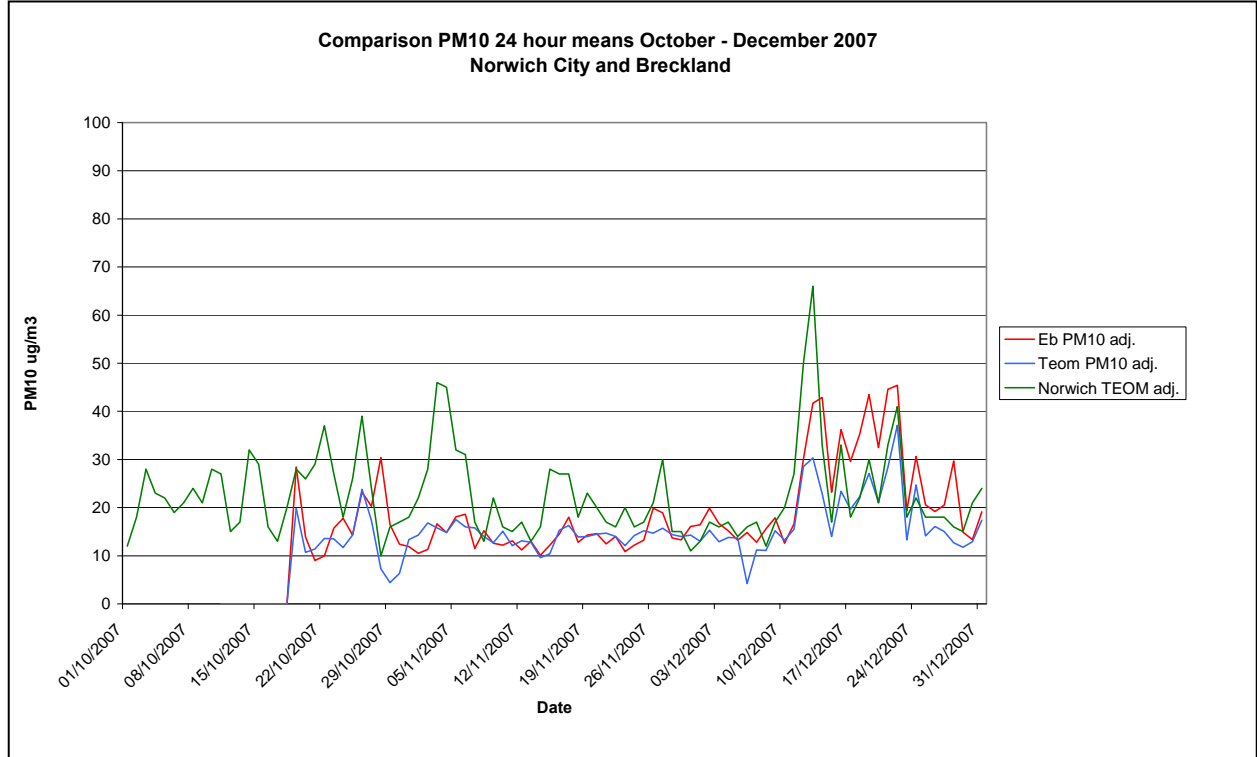


Figure 6. Comparison of 24 hr means TEOM adjusted for Norwich centre and Breckland for quarter four of 2007. Data capture Beta attenuation and TEOM = 81%

- 5.13 Norwich centre data was used as a comparator and shows that the trends are quite similar.
- 5.14 Earlier air quality studies have indicated that up to 20-30% of secondary PM₁₀ (formed by chemical reactions in the atmosphere) and 50% or more of coarse PM₁₀ (largely made up of “natural” components such as sea salt and soil) may come from Europe (Chatterton 2000). This would explain the similar trends in the data, which are overlaid in Breckland by apparently very local events from sources not identified.

6.0 Conclusions

- 6.1 For all measured pollutants with the exception of NO₂ at Swaffham, air quality in Breckland in 2007 meets the current national standards and is not likely to exceed the objectives for 2005.
- 6.2 Using diffusion tubes it was shown that the NO₂ Swaffham annual objective was exceeded. Purchase and siting of an additional continuous analyser for NO_x is being pursued and will hopefully be completed in summer 2008. This will allow better data to be obtained and a detailed assessment to be made.

- 6.3 There were 11 exceedences of PM₁₀ in 2007. There were 15 in 2006 and it would seem that results for the years 2003 and 2004 upon which the AQMA was declared were exceptional and have not been repeated. The reasons for the exceedences are not well understood and monitoring is continuing.
- 6.4 The next scheduled Air Quality Report will be an Updating and Screening Assessment and is due at the end of April 2009

APPENDIX I

Summary of the Objectives of the UK Air Quality Strategy

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m ³	Running Annual Mean	31 December 2003
Benzene	5 µg/m ³	Annual Mean	31 December 2010
1,3-Butadiene	2.25 µg/m ³	Running Annual Mean	31 December 2003
Carbon monoxide Authorities in England, Wales and Northern Ireland only ^a	10 mg/m ³	Maximum Daily Running 8 Hour Mean	31 December 2003
Lead	0.5 µg/m ³	Annual Mean	31 December 2004
	0.25 µg/m ³	Annual Mean	31 December 2008
Nitrogen dioxide ^c	200 µg/m ³ Not to be exceeded more than 18 times per year	1 Hour Mean	31 December 2005
	40 µg/m ³	Annual Mean	31 December 2005
Nitrogen Oxides **	(V) 30 µg/m ³	Annual Mean	31 December 2000
Ozone *	100 µg/m ³	Running 8 hour Mean Daily maximum of running 8 hr mean not to be exceeded more than 10 times per year	31 December 2005
Particles (PM₁₀)	50 µg/m ³ Not to be exceeded more than 35 times per year	24 Hour Mean	31 December 2004
	40 µg/m ³	Annual Mean	31 December 2004
Sulphur dioxide	350 µg/m ³ Not to be exceeded more than 24 times per year	1 Hour Mean	31 December 2004
	125 µg/m ³ Not to be exceeded more than 3 times per year	24 Hour Mean	31 December 2004
	266 µg/m ³ Not to be exceeded more than 35 times per year	15 Minute Mean	31 December 2005
	(V) 20 µg/m ³	Annual Mean	31 December 2000
	(V) 20 µg/m ³	Winter Mean (01 October – 31 March)	31 December 2000

Notes:

a. In Northern Ireland none of the objectives are currently in regulation. Air Quality (Northern Ireland) Regulations are scheduled for consultation early in 2003.

c. The objectives for nitrogen dioxide are provisional.

d. Measured using the European gravimetric transfer sampler or equivalent.

µg/m³ - micrograms per cubic metre

mg/m³ - milligrams per cubic metre

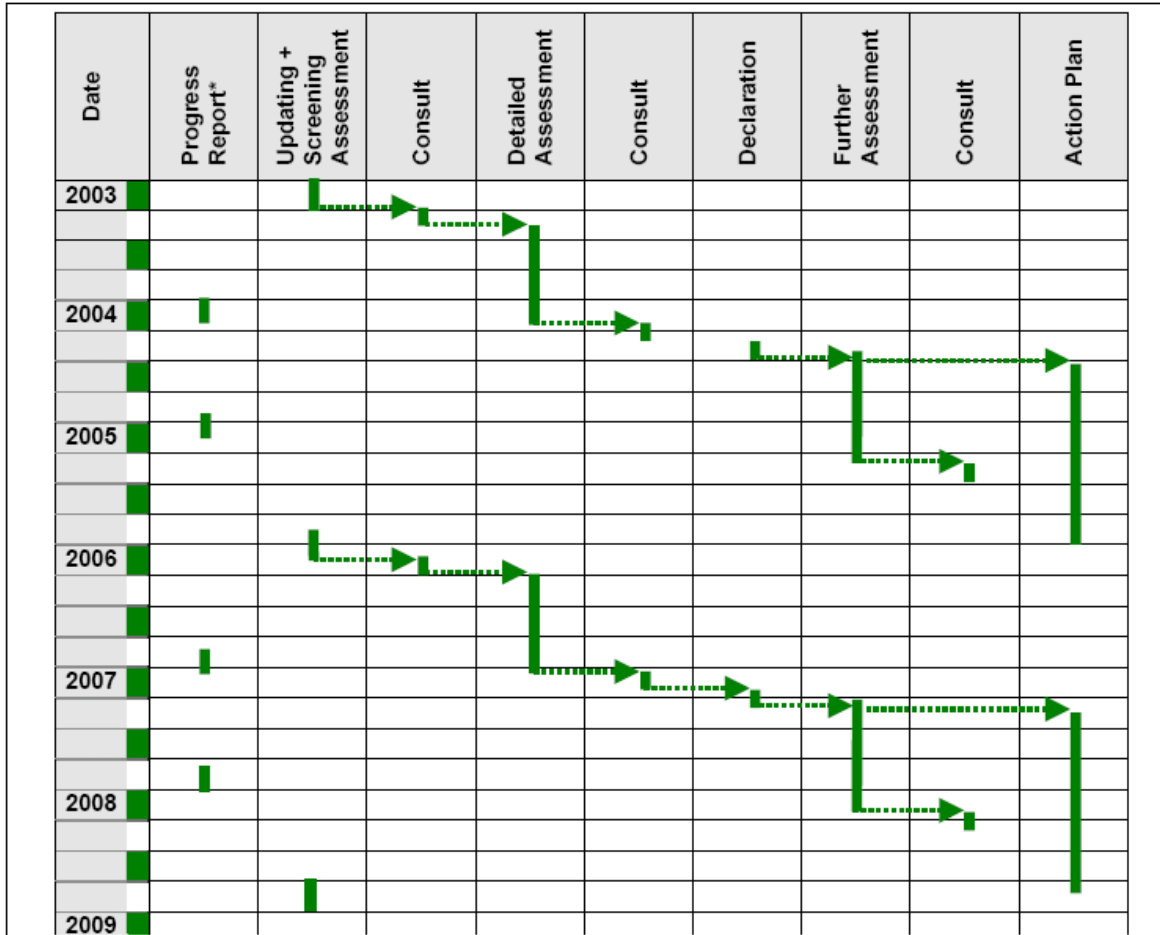
*Ozone is not included in the Regulations

** Assuming NO_x is taken as NO₂

(V) These standards are adopted for the protection of vegetation and ecosystems. All of the remainder are for the protection of human health.

Objectives for Scotland and/or Northern Ireland only have been omitted

APPENDIX 2



Timetable for Reviews and Assessments of Air Quality

Source: Defra Progress Report Guidance LAQM.PRG(03)

APPENDIX 3

Site Number	Location	Grid Reference	Annual average raw data ($\mu\text{g}/\text{m}^3$)	Bias Adjusted using Gradko Collocation database(raw data x 1.09)
A1	Attleborough 1	604550, 295125	29.01	31.62
A2	Attleborough 2	603843, 294085	12.82	13.98
D1	Dereham 1	598920, 313267	28.46	31.02
D2	Dereham 2	599283, 313599	15.42	16.81
S1	Swaffham 1	581985, 309004	26.34	28.71
S2	Swaffham 2	581809, 307618	12.29	13.39
S3	Swaffham 3	582048, 308605	37.32	40.68
T1	Thetford 1	587126, 283336	31.82	34.68
T2	Thetford 2	586846, 282721	29.98	32.68
T3	Thetford 3	587036, 284579	17.22	18.77
W1	Watton 1	591747, 300796	26.17	28.52
W2	Watton 2	591885, 300622	14.17	15.44
20	Wretham SSSI	591315, 288704	11.73	12.79
20a	Wretham SSSI	591315, 288704	11.33	12.35
20b	Wretham SSSI	591315, 288704	11.02	12.01
25	Station Road Wendling	593122, 313026	20.34	22.17
26	Attleborough Station Road	605247, 294767	17.00	18.53
27	Clover Fields Thetford	587880, 283411	22.35	24.36
28	Epsom Gardens Dereham	599193, 312241	18.59	20.26
29	Montpelier Drive Thetford	585356, 282979	28.52	31.09
30	Well Cottage Thetford (A11)	589196, 285204	25.41	27.70

Bias adjusted annual averages for NO₂ diffusion tubes 2007

Bold type indicates “major road” sites, all others are “background” all measured at the façade.

The Bias Adjustment Method was carried out using Gradko laboratory, 50% TEA in water and the year 2007, resulting adjustment factor is 1.09.

Bibliography

LAQM TG(03) 2003, *Part IV of the Environment Act 1995 local air quality management technical guidance*. DEFRA publications London

Breckland Council, 1999 *Stage One air quality review and assessment*. Breckland Council technical library - Dereham office

Breckland Council, 2000 *Stage two air quality review and assessment*. Breckland Council technical library - Dereham office

Breckland Council, 2004 *Detailed Assessment for PM₁₀*. Breckland Council technical library - Dereham office

Chatterton, T., (2000) *The Relative Contribution Of Local And Distant Sources Of Particulates To Eastern England*. Report submitted to Breckland Council.

DEFRA (2003) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum*. Defra Publications: London

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