Progress Report for Air Quality

June 2007

BRECKLAND COUNCIL AIR QUALITY PROGRESS REPORT January – December 2006

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 (NO_2), lead, sulphur dioxide (SO_2) and PM_{10} (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 NO_2 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 NO_2 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 NO_2, PM_{10} 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 NO_2.

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 PM_{10}. 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 PM_{10} 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 PM_{10} 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 USA carried out in 2006 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, NO_2, lead or SO_2.

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 NO_2 and these are monitored to ensure that appropriate action can be taken if levels approach the annual average of 40$\mu g/m^3$. 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 NO_2 concentrations approach the annual average of 40$\mu g/m^3$ 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 PM_{10} was followed by a Further Assessment in 2006 which found no more that 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 2006.

5.0 MONITORING RESULTS JANUARY – DECEMBER 2006

5.1 **Nitrogen dioxide (NO_2)**. The objective for NO_2 is 200 micrograms per cubic metre (µg/m^3) 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/m^3 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 but this has been experiencing technical problems and is to be replaced in summer of 2007. The data will then be of more use.

5.3 Breckland Council maintains a district wide network of diffusion tubes which measure monthly averages of NO_2. There is also a mobile monitoring station at East Wretham near Thetford which houses continuous analysers for NO, NO_2 and NO_x, ozone, PM_{10} and meteorological data. The station has been at the same site since 1997.

5.4 **NO_2 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 from 2000 until 2004 are shown in Figure 1 below (not bias adjusted).

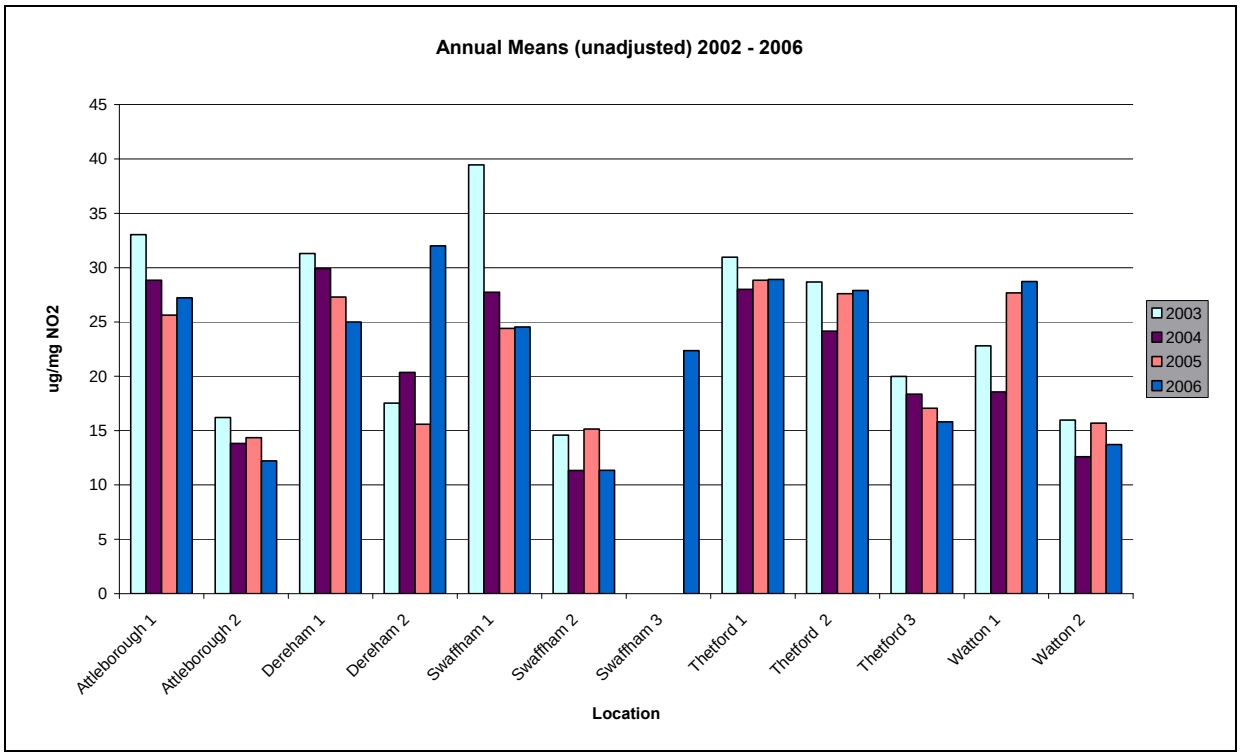


Figure 1. Annual mean NO_2 results for 2002 – 2006 for Breckland Towns

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). Because the continuous analyser at East Wretham is not subject to an external quality control procedure, and we are not part of the National Network, the factor derived by the UWE was used. Figure 1 is shown with no bias adjustment.

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 and there have only been 2 results since this, although these appear to be slightly elevated. Figure 1 above does not show any clear trends but all means over the 4 year period are well below the 40ug/m3 annual objective for 2005.

5.7 Figure 2 below shows the annual means for 2006 only, both unadjusted and bias adjusted using the UWE factor.

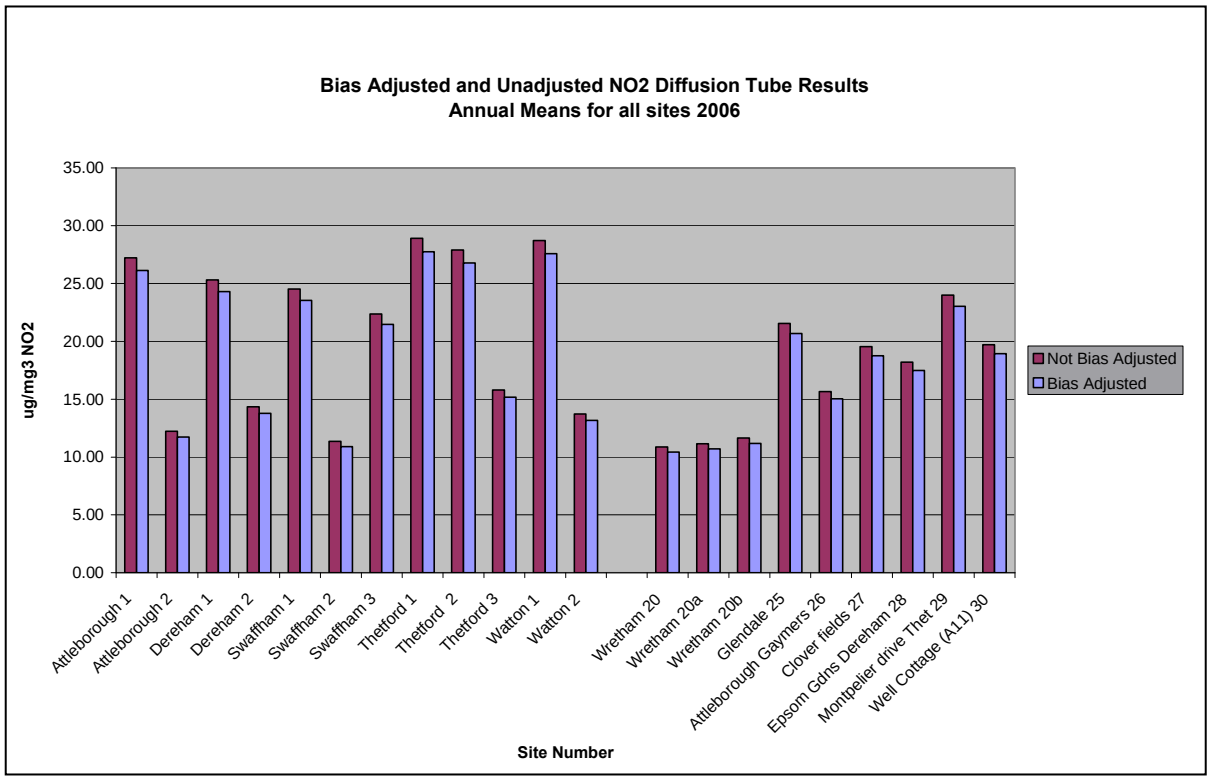


Figure 2. Annual mean NO_2 results for 2006 bias adjusted and non bias adjusted.

5.8 **Particulate monitoring results. The objective for PM_{10}.** is 50 micrograms per cubic metre (µg/m^3) 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/m^3 or less, when expressed as an annual mean, to be achieved by 31st December 2004.

5.9 Between January and December 2004 there were 15 days when the 24 hour mean exceeded 50 µgm3

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 ((g/m^3) not to be exceeded more than 7 times per year and an annual mean of 20(g/m^3, both to be achieved by the end of 2010.

5.11 The following charts show the daily mean results for PM_{10} from January until December 2006.

5.12 The 10 days in 2006 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.

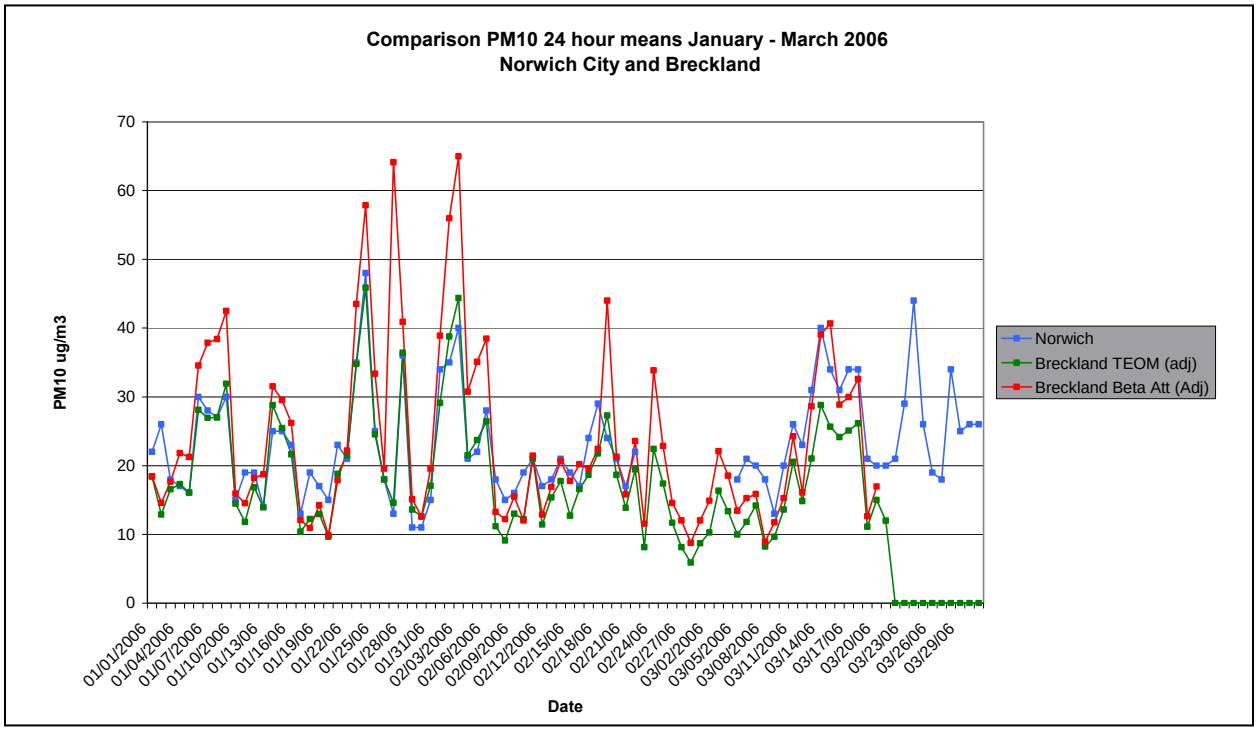


Figure 3. Comparison of 24 hr means TEOM adjusted for Norwich centre and Breckland for the first quarter of 2006.

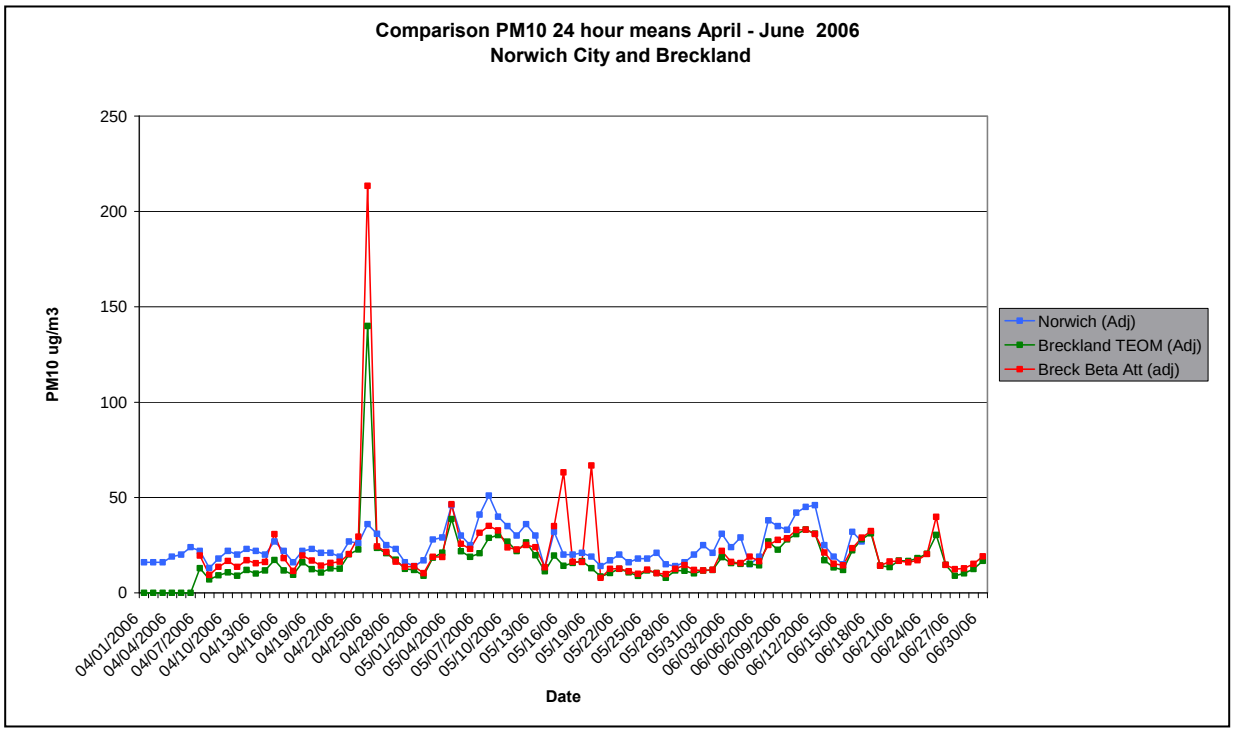


Figure 4. Comparison of 24 hr means TEOM adjusted for Norwich centre and Breckland for the second quarter of 2006.

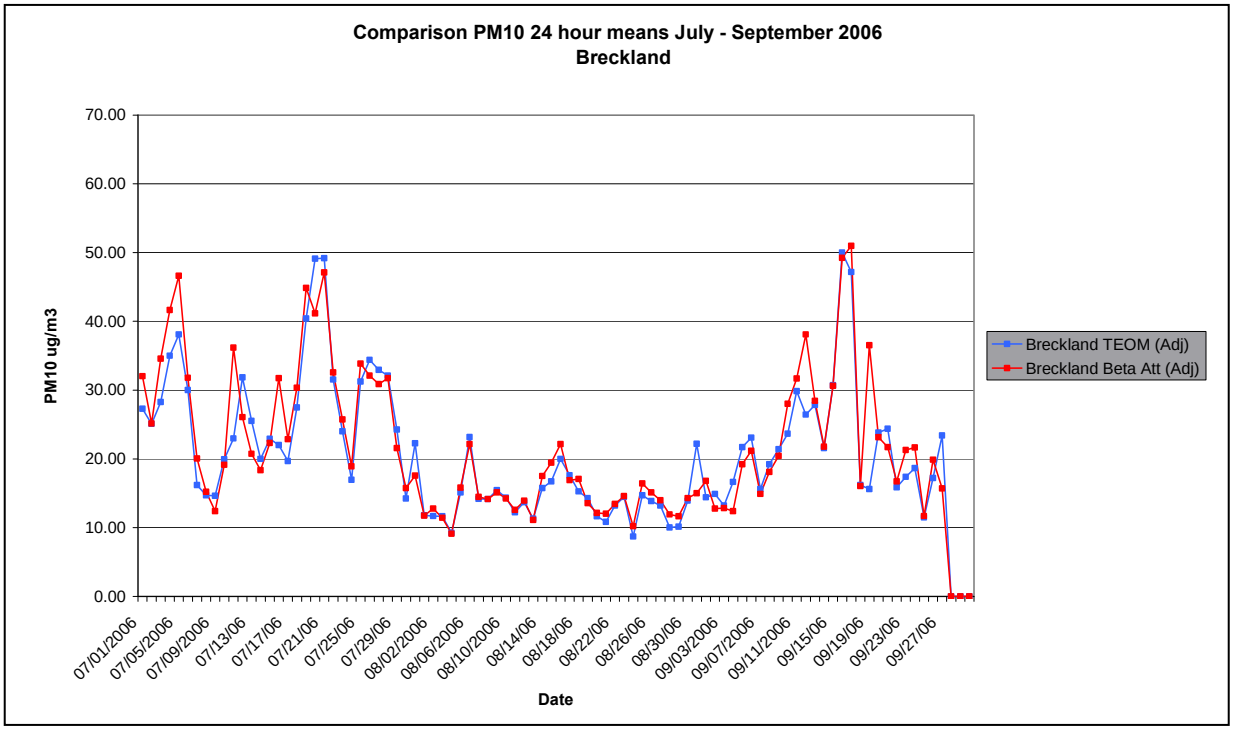


Figure 5. Comparison of 24 hr means TEOM adjusted for Breckland for the third quarter of 2006. Norwich data not available for this period.

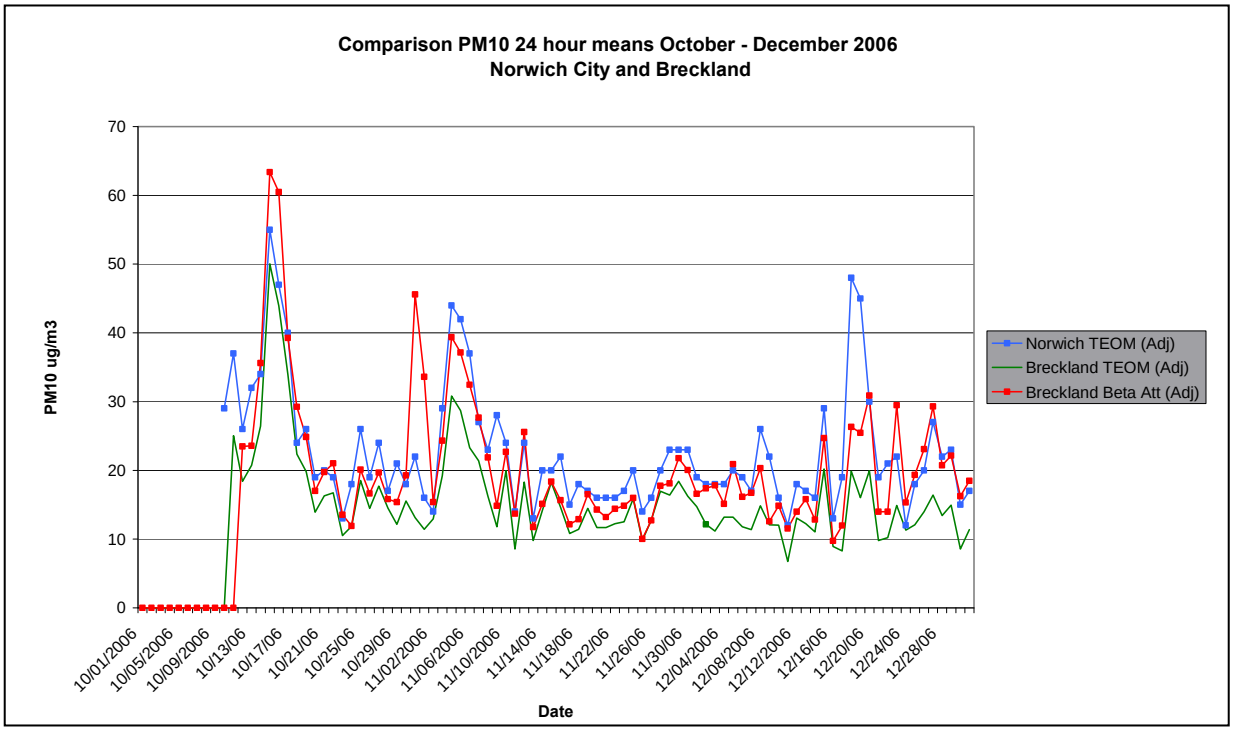


Figure 6. Comparison of 24 hr means TEOM adjusted for Norwich centre and Breckland for the fourth quarter of 2006.

5.13 Norwich centre data was used as a comparator and was available for three of the four quarters shown.

5.14 Earlier air quality studies have indicated that up to 20-30% of secondary PM_{10} (formed by chemical reactions in the atmosphere) and 50% or more of coarse PM_{10} (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, air quality in Breckland in 2004 meets the current national standards and is not likely to exceed the objectives for 2005.

6.2 Because of exceedences of PM_{10} in 2002 and 2003, and as the result of the Detailed Assessment carried out in 2004, an Air Quality Management Area has been declared in East Wretham. The reasons for the previous exceedences are not well understood and so additional monitoring is continuing.

6.3 The next Progress Report is due at the end of April 2008

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 (PM_{10})	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/m^3 - micrograms per cubic metre

mg/m^3 - milligrams per cubic metre

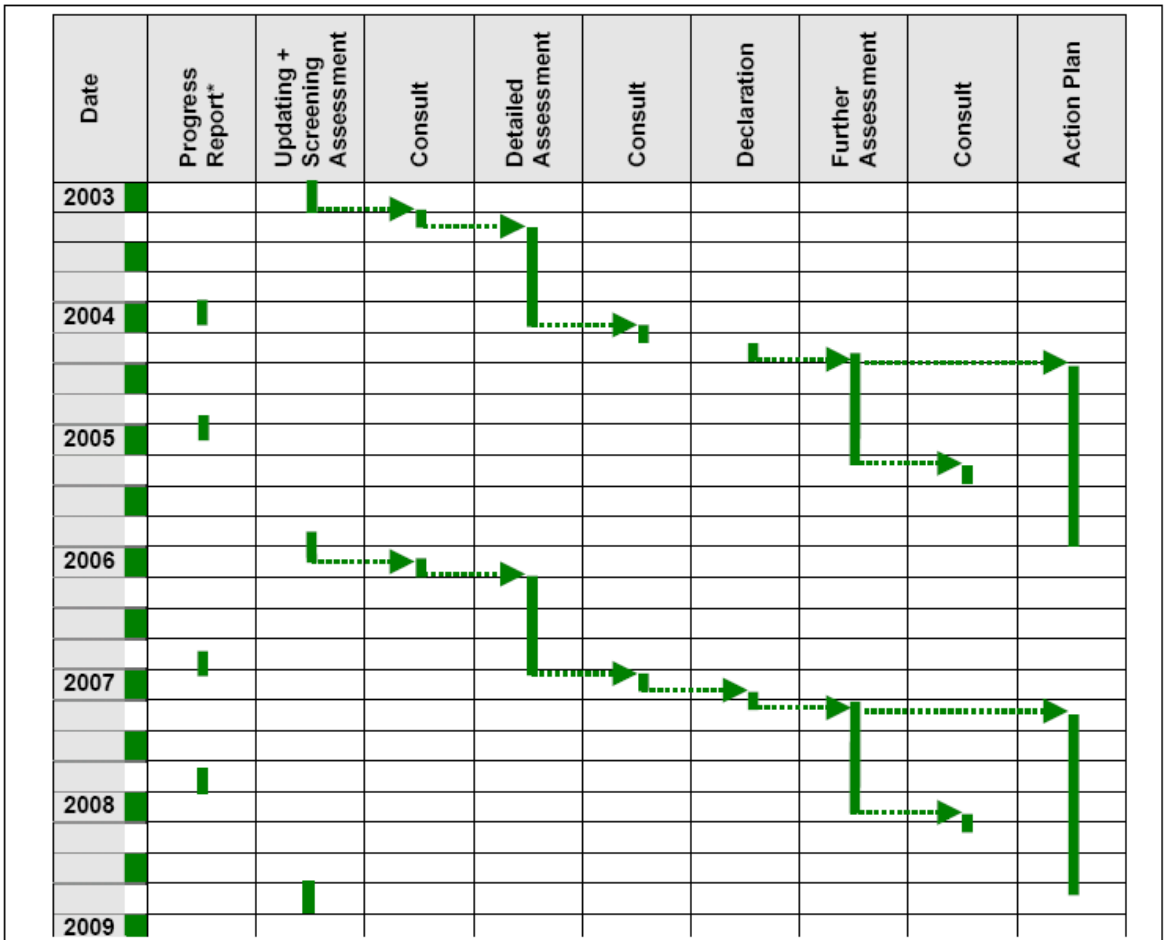
*Ozone is not included in the Regulations

** Assuming NO_x is taken as NO_2

(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	Annual average raw data (µg/m3)	Bias Adjusted using Gradko Collocation database(raw data x 0.96)
A1	**Attleborough 1**	**27.22**	26.13
A2	Attleborough 2	**12.22**	11.73
D1	**Dereham 1**	**25.32**	24.30
D2	Dereham 2	**14.35**	13.78
S1	**Swaffham 1**	**24.53**	23.54
S2	Swaffham 2	**11.35**	10.90
S3	Swaffham 3	**22.37**	21.47
T1	**Thetford 1**	**28.90**	27.74
T2	**Thetford 2**	**27.90**	26.78
T3	Thetford 3	**15.80**	15.17
W1	**Watton 1**	**28.72**	27.57
W2	Watton 2	**13.72**	13.17
20	Wretham SSSI	**10.88**	10.44
20a	Wretham SSSI	**11.15**	10.71
20b	Wretham SSSI	**11.65**	11.18
25	Station Road Wendling	**21.55**	20.68
26	Attleborough Station Road	**15.66**	15.03
27	Clover FieldsThetford	**19.54**	18.75
28	Epsom Gardens Dereham	**18.20**	17.48
29	Montpelier Drive Thetford	**24.00**	23.04
30	Well Cottage Thetford (A11)	**19.71**	18.93

Bias adjusted annual averages for NO2 diffusion tubes 2004

Bold type indicates roadside sites, all others are "background"

The Bias Adjustment Method was carried out using Gradko laboratory, 50% TEA in water and the year 2006, resulting adjustment factor is 0.96.

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

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For copies of the above documents or any further information please contact:

Zandra Waterford
Environmental Health and Housing
Elizabeth House
Walpole Loke
Dereham
NR19 1EE
Tel; 01362 656350
Email zandra.waterford@breckland.gov.uk