
Appendix 1

Summary of the Health Effects of the Pollutants Covered by the Air Quality Strategy

| Pollutant | Main Health Effects |
|---------------------------|--|
| Carbon monoxide | Exposure to very high concentrations may promote the formation of carboxyhaemoglobin in the blood, which reduces the capacity to carry oxygen. Effects are most pronounced in those suffering from an existing disease which affects the delivery of oxygen to the heart or brain. |
| Benzene | A genotoxic human carcinogen, related to excess risk of leukaemia. |
| 1,3-butadiene | A genotoxic human carcinogen, linked to cancers of the lymphoid system and blood forming tissues, lymphomas and leukaemia. |
| Lead | Exposure to very high levels may result in toxic biochemical effects, causing problems in the synthesis of haemoglobin and the possible inhibition of intellectual development in infants as well as effects on the kidneys, gastrointestinal tract, joints and reproductive system, and acute or chronic damage to the nervous system. |
| Nitrogen dioxide | Short-term exposure to high concentrations may cause inflammation of respiratory airways. Long-term exposure may affect lung function and enhance responses to allergens in sensitised individuals. Asthmatics will be particularly at risk. |
| Sulphur dioxide | Very high concentrations may constrict respiratory airways by stimulating nerves in the lining of the nose, throat and lung. Asthmatics and those with chronic lung disease will be particularly at risk. |
| Airborne particles | Long-term exposure to particulate matter is associated with a marked reduction in life expectancy, primarily due to increased heart and lung disease and lung cancer mortality. Impaired lung function in both children and adults has also been identified. Short-term exposure is associated with increased mortality in particularly susceptible individuals. |

Appendix 2

Summary of the First Round of Review and Assessment

| | |
|--------------------------|---|
| Stage 1 | December 1998 |
| Benzene | No further assessment required. |
| 1,3 butadiene | No further assessment required. |
| Carbon monoxide | Stage 2 required. |
| Lead | No further assessment required. |
| Nitrogen dioxide | Stage 2 required. |
| PM ₁₀ | Stage 2 required. |
| Sulphur dioxide | Stage 2 required. |
| Appraisal Summary | Conclusions not accepted for benzene, 1,3 butadiene or lead. No evidence provided to show that Part A processes are not significant for these pollutants. Fugitive PM ₁₀ and SO ₂ from boilers >5MW not considered. States incorrect background PM ₁₀ concentration. |

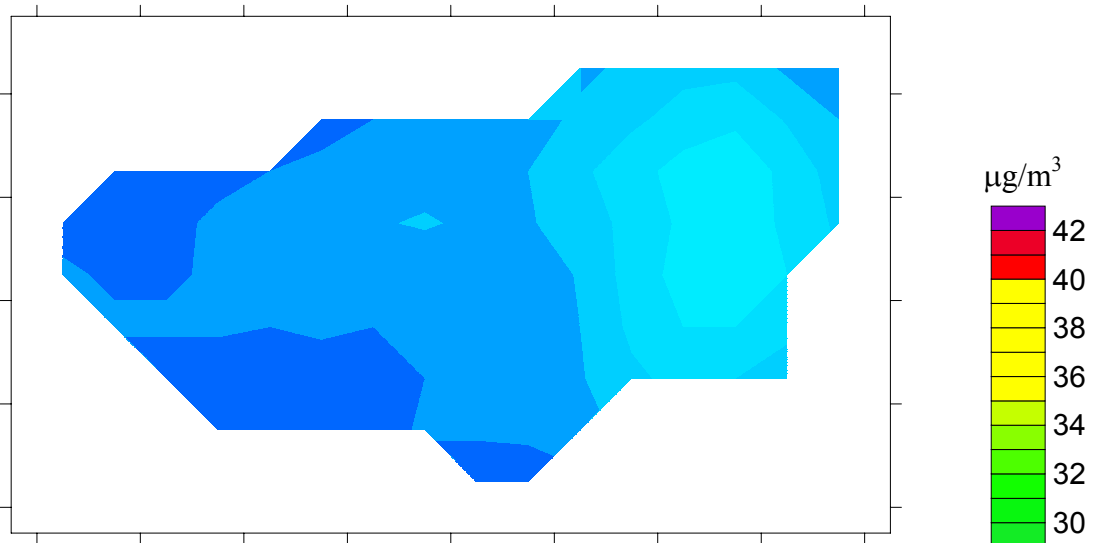
| | |
|--------------------------|---|
| Stage 2 | December 2000 |
| Benzene | Monitoring data show no problems. No part A or B processes within or near to Thanet. No need for further assessment. |
| 1,3 butadiene | No monitoring. No part A or B processes within or near to Thanet. No need for further assessment. |
| Lead | No part A or B processes open which emit significant quantities of lead. No need for further assessment. |
| Carbon monoxide | DMRB showed no exceedences. No part A or B processes within Thanet. Pfizer, Sandwich outside district considered but not significant. No need for further assessment. |
| Nitrogen dioxide | No measured exceedences using diffusion tubes. No continuous data. No exceedences predicted at relevant locations using the DMRB. No part A or B processes within Thanet. 1 process at Pfizer nearby. EA method indicated that this was not significant. No need for further assessment. |
| PM ₁₀ | No monitoring. No exceedences predicted at relevant locations using the DMRB. No Part A processes. Crematorium and cement and metal coating process potentially significant. Crematorium not significant, coating process insufficient information to assess. Pfizer not significant (based on EA guidance). No quarry or landfill sites. 2 cement batching plants with adequate controls. MoD fire training facility burns kerosene. This is potentially significant. Fire training facility needs further assessment. |
| Sulphur dioxide | No >5MW boilers. No part A or B processes within Thanet. Pfizer outside, based on EA method, not significant. No need for further assessment. |
| Appraisal Summary | Conclusions accepted for all pollutants other than PM ₁₀ and NO ₂ . No evidence that DMRB calculations were carried out correctly and that there is no potential exceedence measured at a relevant location. No evidence that the Fire Testing Establishment should not be considered for PM ₁₀ at Stage 3. |

| | |
|--------------|---|
| Notes | Further correspondence, showed that the DMRB calculations were carried out correctly. A report was provided which showed that a similar Fire Training Ground in Chorley would not lead to any exceedences of the PM ₁₀ objectives. Conclusions accepted. |
|--------------|---|

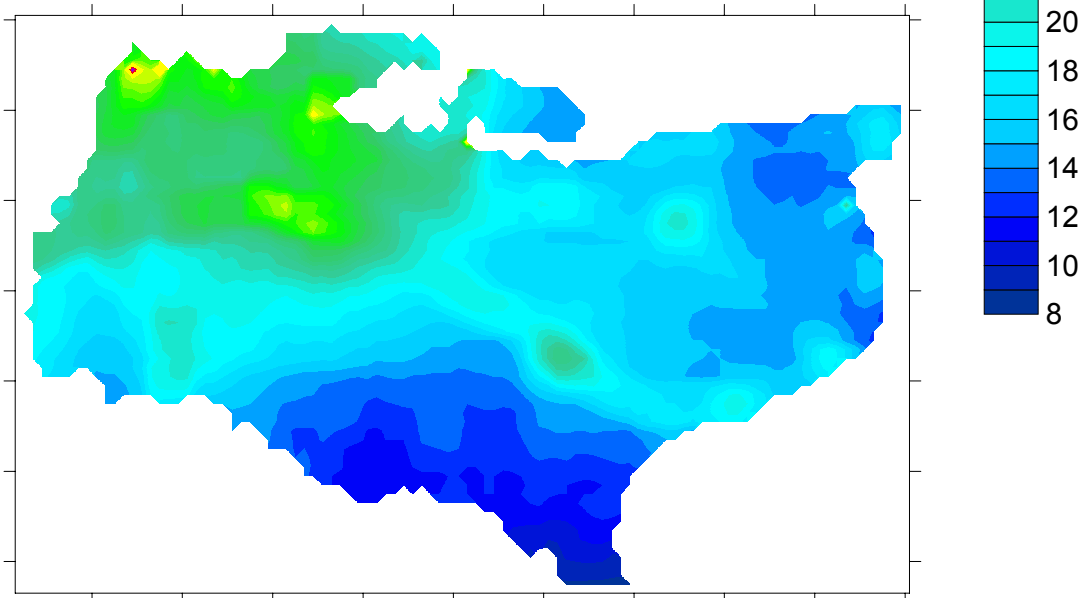
Appendix 3

Approximate Pictorial Representations of Projected Background Concentrations in Kent

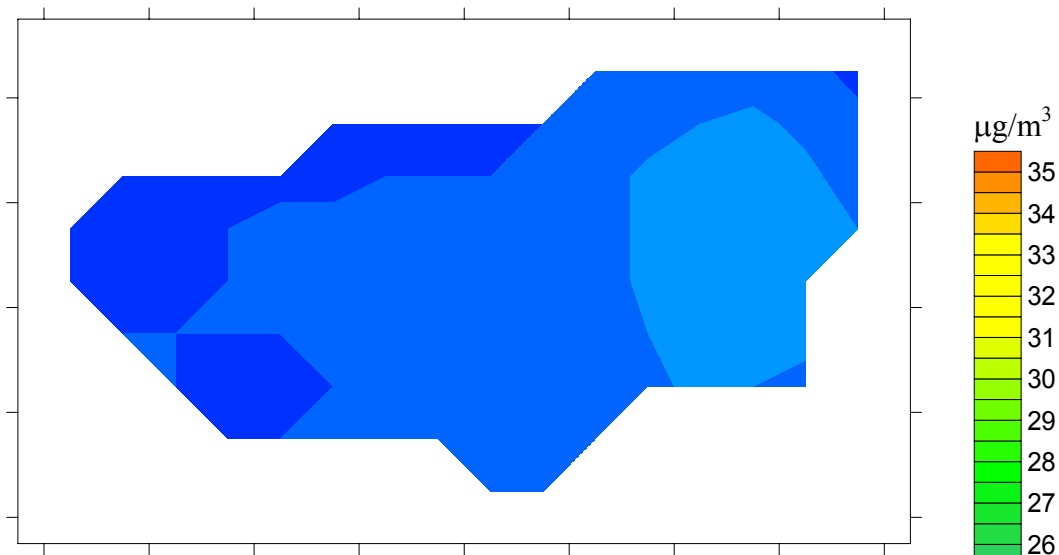
Projected 2005 Background NO₂ Concentrations: Thanet



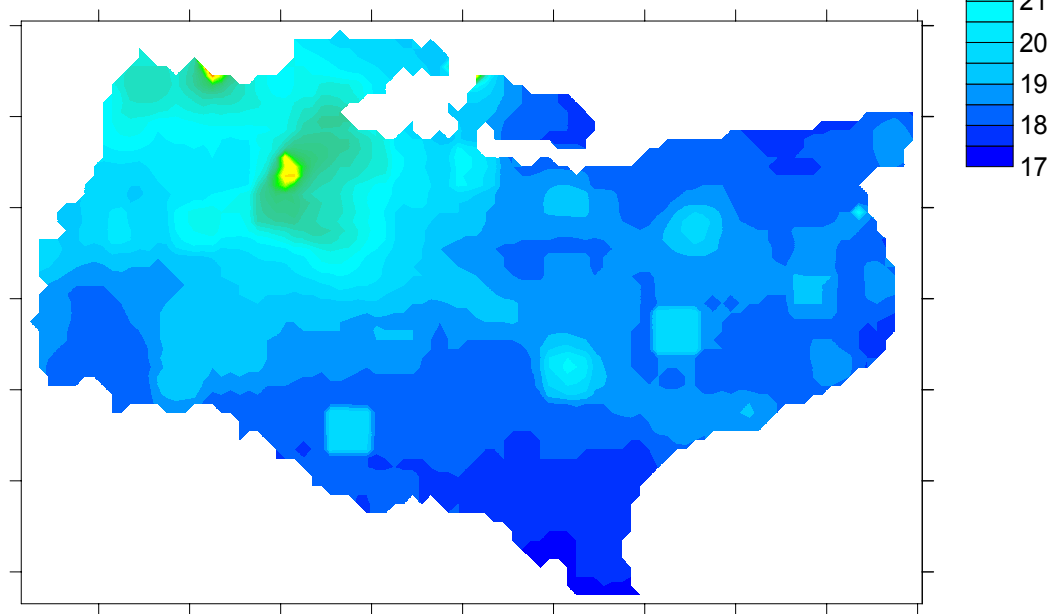
Projected 2005 Background NO₂ Concentrations: Kent



Projected 2004 Background PM₁₀ Concentrations: Thanet



Projected 2004 Background PM₁₀ Concentrations: Kent



Appendix 4

Summary of Data from the Kent & Medway Air Quality Monitoring Network and National Network Sites

Table 4.1 Carbon Monoxide Statistics from the Automatic Monitoring Stations

| | Roadside | | Background | |
|------|---|-----|------------|-----|
| | ZL1 | ZM2 | ZY2 | ZV1 |
| | Number of Exceedences of 11.65 mg/m³ as an 8-Hour rolling mean* | | | |
| 1997 | 0 | | | |
| 1998 | 0 | | | 0 |
| 1999 | 0 | 0 | 0 | 0 |
| 2000 | 0 | 0 | 0 | 0 |
| 2001 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 |
| | Data Capture (if <75%) (%) | | | |
| 1997 | | | | |
| 1998 | | | | |
| 1999 | | 39 | 39 | |
| 2000 | 67 | | | |
| 2001 | | | | |
| 2002 | | | | |

*The objective has now been reduced to 10 mg/m³ as an 8-hour rolling mean.

Table 4.2 Annual Mean Benzene Concentrations (µg/m³) at the KMAQMN Diffusion Tube Sites

| | Kerbside | | | | | | | | | | | | Background | | | | |
|------|---|------|------|------|------|------|------|------|------|------|------|------|------------|------|------|------|------|
| | DA01 | DA16 | ME01 | ME02 | ME07 | SH01 | SH12 | TH05 | TH10 | TH23 | TH26 | TH29 | TH31 | TH32 | TH33 | SH03 | SH04 |
| | Annual Mean Concentration (µg/m³) | | | | | | | | | | | | | | | | |
| | The 2003 objective is 16.25 µg/m³ as a running annual mean. | | | | | | | | | | | | | | | | |
| | The 2010 objective is 5 µg/m³ as an annual mean | | | | | | | | | | | | | | | | |
| 1998 | 10.4 | 9.6 | | | | 4.4 | | 16.3 | 11.7 | 9.3 | 13.1 | | | | | 1.9 | 1.3 |
| 1999 | 8.4 | 9.6 | 6.2 | 8.1 | 2.2 | 3.6 | | 12.0 | 11.1 | 7.3 | 11.1 | | | | | 3.2 | 1.1 |
| 2000 | 5.2 | 5.5 | 3.5 | 4.7 | 2.1 | 2.4 | | 5.0 | 4.7 | 3.5 | 4.4 | 1.1 | | | | 1.1 | 1.1 |
| 2001 | 4.5 | 4.4 | 3.4 | 4.7 | 2.1 | 2.0 | 2.7 | 4.7 | 4.6 | 3.5 | 3.3 | 3.3 | | | | 0.9 | 1.1 |
| 2002 | 4.0 | 3.8 | 2.9 | 2.9 | 2.3 | 1.2 | 1.5 | 3.1 | 3.5 | 2.2 | 3.1 | 1.1 | 0.7 | 0.8 | 0.7 | 0.8 | 0.9 |
| 2003 | 3.7 | 3.6 | 2.7 | 2.7 | 2.1 | 1.2 | 1.4 | 2.9 | 3.3 | 2.1 | 2.9 | 1.0 | 0.6 | 0.8 | 0.7 | 0.7 | 0.8 |
| 2010 | 2.7 | 2.7 | 2.0 | 2.0 | 1.6 | 0.9 | 1.0 | 2.2 | 2.5 | 1.5 | 2.1 | 0.7 | 0.5 | 0.6 | 0.5 | 0.6 | 0.6 |

Site Key

ZA2=Ashford Roadside; ZY1=Canterbury Background; ZY2=Canterbury Roadside; ZR1=Dartford Roadside; ZD1=Dover Roadside, Townhall; ZD2=Dover Roadside 2, Townwall St; ZD3=Dover Background, Langdon Cliff; ZD4=Dover Background, East Cliff; ZF1=Folkestone Suburban; ZG1=Gravesham Background; ZG2=Gravesham Roadside; ZG3=Gravesham Industrial Background; ZL1=Luton Background; ZM1=Maidstone Meteorological; ZM2=Maidstone Roadside; ZM3=Maidstone Rural; ZS1=Stoke Rural; ZH1=Thanet Rural; ZH2=Thanet Background; ZT1=Tonbridge Roadside; ZT2=Tunbridge Wells Background; ZT3=Tunbridge Wells Rural; ZR2= Dartford Roadside - Town Centre; ZR3= Dartford Roadside - St Clements; ZV1= Sevenoaks 2 – Greatness. GL=Gillingham Strand; RO=Rochester; WM=Wormdale; DA01=Lowfield Street, Dartford (Site 1); DA16=Princes Road (2), Dartford; ME01=High Street, Rainham (Site 1) (GI01); ME02=High St, Strood (Site 2) (RM37); ME07=Hollywood Lane, Strood (RM31); SH01=Cheriton Place (Site 1); SH12=Cheriton Road; TH05=The Broadway, Broadstairs; TH10=College Road, Margate; TH23=Cecil Square, Margate; TH26=King Street, Ramsgate (Site 5); TH29=Derwent Ave, Ramsgate; TH31=High Street, Manston; TH32=Bell Davies Drive, Manston; TH33=Hill House Drive, Manston; SH03=Bodenham Road (Site 3); SH04=Whitecliff Way (Site 5).

GL, RO and WM data supplied by Powergen all other sites are part of the Kent & Medway Air Quality Monitoring Network (KMAQMN)

Table 4.3 Benzene Data from the Monitor at Manston

| Year | Annual Mean Concentration $\mu\text{g}/\text{m}^3$ |
|------|--|
| 2002 | 0.69 |

Table 4.4 Maximum Running Annual Mean Concentration of 1,3-butadiene ($\mu\text{g}/\text{m}^3$)

| | Kerbside | Roadside | Suburban | Rural |
|------|------------------------|------------|---------------|---------|
| | London Marylebone Road | London UCL | London Eltham | Harwell |
| 2000 | 1.92 | 0.52 | 0.35 | 0.10 |
| 2001 | 1.63 | | | 0.11 |

Table 4.5 Annual Mean Lead-in-Air Concentrations ($\mu\text{g}/\text{m}^3$) at Three National Network Sites

| | Kerbside | Background |
|------|----------------------|------------|
| | London Cromwell Rd 2 | Cardiff |
| 2000 | 0.032 | 0.029 |
| 2001 | 0.031 | 0.028 |

Table 4.6 Nitrogen Dioxide Statistics from the KMAQMN Automatic Monitoring Stations

Exceedences of the Objectives are shown in bold

| Site | Roadside | | | | | | | | Industrial | | | | Background | | | | | | | | |
|-------|--|-----|-----------|-----------|-----|-----------|-----------|-----------|------------|----|----|----|------------|-----|-----|-----|-----|-----|-----|-----|-----|
| | ZY2 | ZD1 | ZG2 | ZM2 | ZT1 | ZR1 | ZR2 | ZR3 | ZA2 | GL | RO | WM | ZG3 | ZT2 | ZY1 | ZF1 | ZL1 | ZM3 | ZS1 | ZH2 | ZV1 |
| | Annual Mean Concentration $\mu\text{g}/\text{m}^3$ Objective = $40\mu\text{g}/\text{m}^3$ in 2005 | | | | | | | | | | | | | | | | | | | | |
| 1997 | | 52 | | | 54 | | | | | | | | | 29 | | 27 | 27 | | 23 | | |
| 1998 | | 50 | | | 57 | | | | | | | | | 29 | | 21 | 27 | | 23 | | 25 |
| 1999 | 25 | 48 | 50 | 48 | 54 | 65 | | | | | | | 33 | 27 | | 23 | 29 | 17 | 21 | | 23 |
| 2000 | 25 | 42 | 59 | 48 | 48 | 65 | | | | | | | 27 | 23 | 29 | 21 | 27 | 17 | 19 | | 21 |
| 2001 | 31 | 38 | 50 | 50 | 48 | 61 | | | | 27 | 22 | 19 | 33 | 25 | 19 | 21 | 25 | 19 | 21 | | 23 |
| 2002 | 29 | 40 | 50 | 46 | 42 | 59 | 48 | 50 | 33 | 25 | 21 | | 31 | 23 | 17 | 21 | 23 | 15 | 19 | 23 | 19 |
| 2005* | 26 | 37 | 46 | 42 | 21 | 55 | 44 | 46 | 30 | 23 | 20 | 17 | 29 | 21 | 16 | 20 | 23 | 14 | 18 | 21 | 18 |
| 2010* | 22 | 30 | 38 | 35 | 18 | 45 | 36 | 38 | 25 | 20 | 17 | 15 | 24 | 18 | 14 | 17 | 19 | 12 | 15 | 18 | 15 |
| | Number of Exceedences of $200\mu\text{g}/\text{m}^3$ as a 1-Hour Mean Objective = <19 exceedences in 2005 | | | | | | | | | | | | | | | | | | | | |
| 1997 | | 0 | | | 0 | | | | | | | | | 0 | | 0 | 0 | | 0 | | |
| 1998 | | 1 | | | 1 | | | | | | | | | 0 | | 0 | 0 | | 0 | | 0 |
| 1999 | 0 | 5 | 0 | 0 | 3 | 26 | | | | | | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 |
| 2000 | 0 | 1 | 4 | 0 | 0 | 47 | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| 2001 | 0 | 0 | 11 | 3 | 0 | 25 | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 0 | | | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Data Capture (if <75%) (%) | | | | | | | | | | | | | | | | | | | | |
| 1997 | | 56 | | | 72 | | | | | | | | | 70 | | 36 | | | | | |
| 1998 | | | | | | | | | | | | | | | | | | | | | |
| 1999 | 52 | | | 56 | | 50 | | | | | | | | | | | | | 55 | | |
| 2000 | | | | | | | | | | | | | | | 0 | | 64 | | | | |
| 2001 | | | | | | | | | | | | | | | | | | | | | |
| 2002 | | | | | | | 11 | 12 | | | | | | | | | | | | | 16 |

* Future projections based on factors in Review and Assessment Technical Guidance LAQM.TG(03), defra 2003

Table 4.7 Nitrogen Dioxide Data from Passive Diffusion Tubes in Thanet

| Site | Background | | | | | | Kerbside | | | | | | |
|---|------------|------|------|------|------|------|----------|------|------|------|------|------|------|
| | TH04 | TH16 | TH30 | TH31 | TH32 | TH33 | TH05 | TH10 | TH23 | TH26 | TH29 | TH35 | TH36 |
| Annual Mean Concentration $\mu\text{g}/\text{m}^3$. Objective = $40\mu\text{g}/\text{m}^3$ in 2005 | | | | | | | | | | | | | |
| 1993 | 11 | | | | | | | | | | | | |
| 1994 | 14 | 11 | | | | | 28 | 25 | | | | | |
| 1995 | 17 | 11 | | | | | 22 | 27 | | | | | |
| 1996 | 17 | 13 | | | | | 26 | 32 | | 29 | | | |
| 1997 | 14 | 14 | | | | | 26 | 28 | 26 | 29 | | | |
| 1998 | 16 | 13 | | | | | 27 | 30 | 30 | 29 | | | |
| 1999 | 15 | 16 | | | | | 33 | 35 | 30 | 33 | | | |
| 2000 | 20 | 18 | | | | | 34 | 34 | 40 | 32 | 21 | | |
| 2001 | 21 | 18 | 33 | | | | 34 | 35 | 38 | 34 | 22 | | |
| 2002 | 18 | 14 | 33 | 15 | 16 | 16 | 33 | 34 | 32 | 35 | 18 | 34 | 31 |
| 2005 | 17 | 13 | 30 | 14 | 15 | 15 | 30 | 31 | 29 | 32 | 16 | 31 | 29 |

* Adjusted for bias, using a correction factor of 0.836

* Future projections based on factors in Review and Assessment Technical Guidance LAQM.TG(03), defra 2003

| | |
|------|--|
| TH04 | St James' Avenue, Broadstairs (Site 4) |
| TH05 | The Broadway, Broadstairs |
| TH10 | College Road, Margate |
| TH16 | Earlesmede Cres., Cliffsend |
| TH23 | Cecil Square, Margate |
| TH26 | King Street, Ramsgate (Site 5) |
| TH29 | Derwent Ave, Ramsgate |
| TH30 | Marine Gardens, Margate |
| TH31 | High Street, Manston |
| TH32 | Bell Davies Drive, Manston |
| TH33 | Hill House Drive, Manston |
| TH35 | Margate Road (2), Ramsgate |
| TH36 | Ramsgate Road, Margate |

Table 4.8 Nitrogen Dioxide Data from the Automatic Monitor at Manston

| Year | Annual Mean Concentration $\mu\text{g}/\text{m}^3$ |
|------|--|
| 2002 | 17.8 |

Table 4.9 Sulphur Dioxide Statistics from the KMAQMN Automatic Monitoring Stations

| | Roadside | | Industrial | | | Background | | | | | | | |
|--|----------|-----|------------|------|------|------------|-----|-----|-----|-----|-----|-----|-----|
| | ZG2 | ZM2 | ZG3 | GL | RO | WM | ZD4 | ZD3 | ZL1 | ZM3 | ZF1 | ZS1 | ZV1 |
| Number of Exceedences of the 350 µg/m³ Hourly Mean Standard Objective = < 25 exceedences in 2004 | | | | | | | | | | | | | |
| 1997 | | | | | | | | | 0 | | 0 | 4 | |
| 1998 | | | | | | | | | 1 | | 0 | 1 | 4 |
| 1999 | 1 | 0 | 0 | | | | | | 1 | | 0 | 0 | 0 |
| 2000 | 0 | 0 | 0 | | | | | | 0 | | 0 | 0 | 0 |
| 2001 | | 0 | 0 | <25* | <25* | <25* | | 0 | 0 | | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | <25* | <25* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Number of Exceedences of the 125 µg/m³ 24-Hour Mean Standard Objective = < 4 exceedences in 2004 | | | | | | | | | | | | | |
| 1997 | | | | | | | | | 0 | | 0 | 1 | |
| 1998 | | | | | | | | | 0 | | 0 | 0 | 0 |
| 1999 | 0 | 0 | 0 | | | | | | 0 | | 0 | 0 | 0 |
| 2000 | 0 | 0 | 0 | | | | | | 0 | | 0 | 0 | 0 |
| 2001 | | 0 | 0 | <4* | <4* | <4* | | 0 | 0 | | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | <4* | <4* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Number of Exceedences of the 266 µg/m³ 15-Minute Mean Standard Objective = < 36 exceedences in 2005 | | | | | | | | | | | | | |
| 1997 | | | | | | | | | 23 | | 0 | 36 | |
| 1998 | | | | | | | | | 9 | | 0 | 7 | 37 |
| 1999 | 11 | 0 | 5 | | | | | | 11 | | 0 | 2 | 0 |
| 2000 | 0 | 0 | 2 | | | | | | 1 | | 0 | 4 | 0 |
| 2001 | | 0 | 0 | <36* | <36* | <36* | | 25 | 0 | | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | <36* | <36* | | 5 | 47 | 0 | 1 | 0 | 1 | 0 |
| Data Capture (if <75%) (%) | | | | | | | | | | | | | |
| 1997 | | | | | | | | | | | 43 | | |
| 1998 | | | | | | | | | | | | | |
| 1999 | | 57 | | | | | | | | | | | |
| 2000 | 53 | | | | | | | | 66 | | | | |
| 2001 | | | | 43 | | 46 | | | | | | | |
| 2002 | 46 | 32 | | | | | 35 | | | 63 | | | |

* Estimates based on annual percentile data.

Table 4.10 PM₁₀ Statistics from the KMAQMN Automatic Monitoring Stations

Exceedences of the Objectives are shown in bold

| Site | Roadside | | | Background | | | | | | Ind |
|-------------------|--|-----------|-----------|------------|-----|-----------|-----------|-----------|-----------|-----------|
| | ZA2 | ZD2 | ZM2 | ZF1 | ZL1 | ZM3 | ZS1 | ZV1 | ZY1 | RO |
| | Annual Mean $\mu\text{g}/\text{m}^3$ (gravimetric equivalent) Current Objective = 40 $\mu\text{g}/\text{m}^3$ in 2004; Provisional Objective = 20 $\mu\text{g}/\text{m}^3$ in 2010 | | | | | | | | | |
| 1997 | | | | 26 | 23 | | 25 | | | |
| 1998 | | | | 26 | 18 | | 22 | 24 | | |
| 1999 | | | 31 | 27 | 18 | 20 | 23 | 23 | 17 | |
| 2000 | | | 30 | 23 | 20 | 19 | 23 | 23 | | |
| 2001 | | 36 | 31 | 22 | 21 | 20 | 21 | 22 | 23 | 21 |
| 2002 | 29 | 36 | 29 | 24 | 21 | 22 | 23 | 22 | 24 | 23 |
| 2004* | 28 | 35 | 28 | 23 | 20 | 21 | 22 | 21 | 23 | 22 |
| 2010* | 26 | 31 | 26 | 21 | 19 | 20 | 21 | 20 | 21 | 21 |
| | Exceedences of 50 $\mu\text{g}/\text{m}^3$ as a 24-Hour Mean Current Objective = < 36 exceedences in 2004; Provisional Objective = < 8 exceedences in 2010 | | | | | | | | | |
| 1997 | | | | 3 | 16 | | 19 | | | |
| 1998 | | | | 9 | 2 | | 3 | 10 | | |
| 1999 | | | 14 | 15 | 1 | 1 | 6 | 2 | 0 | |
| 2000 | | | 26 | 5 | 3 | 4 | 1 | 2 | | |
| 2001 | | 43 | 24 | 5 | 5 | 3 | 6 | 4 | 7 | |
| 2002 | 18 | 45 | 18 | 6 | 2 | 10 | 6 | 5 | 9 | |
| 2004 ^s | 20 | 48 | 20 | 8 | 4 | 5 | 7 | 5 | 8 | 7 |
| 2010 ^s | 14 | 33 | 14 | 5 | 2 | 3 | 4 | 3 | 5 | 4 |
| | Data Capture (if <75%) (%) | | | | | | | | | |
| 1997 | | | | 31 | | | | | | |
| 1998 | | | | 74 | | | | | | |
| 1999 | | | 54 | | | 56 | | | 24 | |
| 2000 | | 2 | | | 57 | | | | 3 | |
| 2001 | | | | | 60 | | | | | |
| 2002 | | | | | | | 60 | | | |

* Future projections based on factors in Review and Assessment Technical Guidance LAQM.TG(03), Defra 2003

^s The number of 24-hour exceedences in future years has been predicted by applying an observed mathematical relationship between the annual mean concentration and the number of 24-hour exceedences, published in Review and Assessment Technical Guidance LAQM.TG(03), Defra 2003, to the annual mean projections described above.

Table 4.11 Ozone Statistics from the Automatic Monitoring Stations*

Exceedences of the Objective are shown in bold

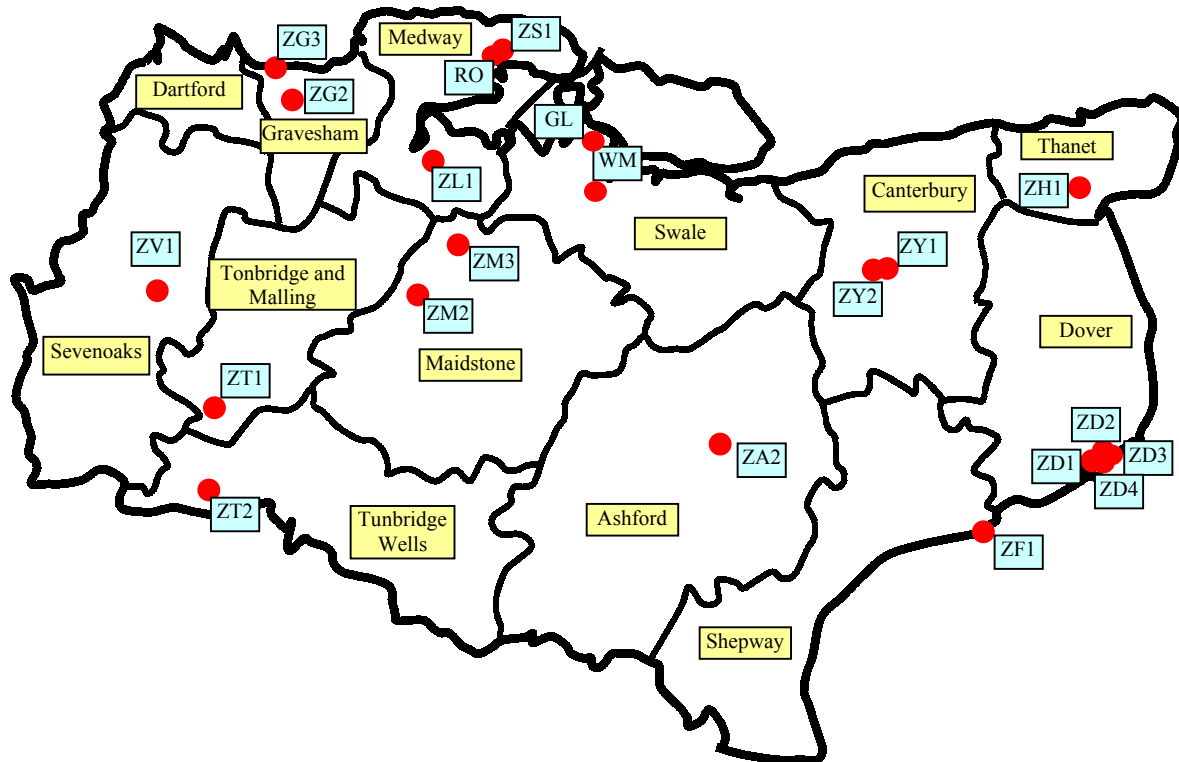
| | ZF1 | ZL1 | ZM3 | ZS1 | ZH1 | ZV1 |
|------|--|-----------|-----------|-----------|-----------|-----------|
| | Number of Exceedences of 100 µg/m³ as an 8-Hour Mean Objective = < 11 exceedences in 2005 | | | | | |
| 1997 | 17 | 23 | | 43 | | |
| 1998 | 10 | 13 | | 24 | | 11 |
| 1999 | 43 | 37 | 32 | 38 | 6 | 26 |
| 2000 | 14 | 9 | 18 | 17 | 11 | 18 |
| 2001 | 22 | 22 | 59 | 30 | 9 | 23 |
| 2002 | 20 | 18 | 26 | 29 | 6 | 28 |
| | Data Capture (if <75%) (%) | | | | | |
| 1997 | 44 | | | | | |
| 1998 | | | | | | |
| 1999 | | | 55 | | | |
| 2000 | | 68 | | | 69 | |
| 2001 | | | | | 71 | |
| 2002 | | | | | | |

* Ozone is a regional pollutant and is not part of the R and A process; it has been included for completeness.

Appendix 5

Air Quality Monitoring Locations

Figure 5.1 Continuous Air Quality Monitoring Locations in Kent and Medway



Site Key

| Site | Location | Pollutants Measured |
|--------|----------------------------------|--|
| ZA2 | Ashford Roadside | Nitrogen dioxide, PM ₁₀ |
| ZY1 | Canterbury Background | PM ₁₀ |
| ZY2 | Canterbury Roadside | Carbon monoxide, PM ₁₀ |
| ZD1 | Dover Roadside – Ladywell | Nitrogen dioxide |
| ZD2 | Dover Roadside - Townwall | Nitrogen dioxide, PM ₁₀ |
| ZD3 | Dover Background | Sulphur dioxide |
| ZD4 | Dover Background | Sulphur dioxide |
| ZF1 | Folkestone Suburban | Nitrogen dioxide, sulphur dioxide, PM ₁₀ , ozone |
| ZG2 | Gravesham Roadside – A2 | Nitrogen dioxide, PM ₁₀ (BAM), sulphur dioxide |
| ZG3 | Gravesham Industrial Background | Nitrogen dioxide, PM ₁₀ , sulphur dioxide |
| ZL1 | Luton Background | Carbon monoxide, nitrogen dioxide, PM ₁₀ , sulphur dioxide |
| ZM2 | Maidstone Roadside | Carbon monoxide, nitrogen dioxide, PM ₁₀ , sulphur dioxide |
| ZM3 | Maidstone Rural - Detling | Nitrogen dioxide, ozone, PM ₁₀ , sulphur dioxide |
| ZS1 | Stoke Rural | Nitrogen dioxide, ozone, PM ₁₀ , sulphur dioxide |
| ZH1 | Thanet Rural | Ozone |
| ZT1 | Tonbridge Roadside | Nitrogen dioxide |
| ZT2 | Tunbridge Wells Background | Nitrogen dioxide |
| ZV1 | Sevenoaks | Carbon monoxide, nitrogen dioxide, sulphur dioxide, PM ₁₀ , ozone |
| RO, WM | Gillingham & Wormdale - Powergen | Nitrogen dioxide, sulphur dioxide, PM ₁₀ |

Figure 5.2 Benzene Monitoring Locations in Kent and Medway

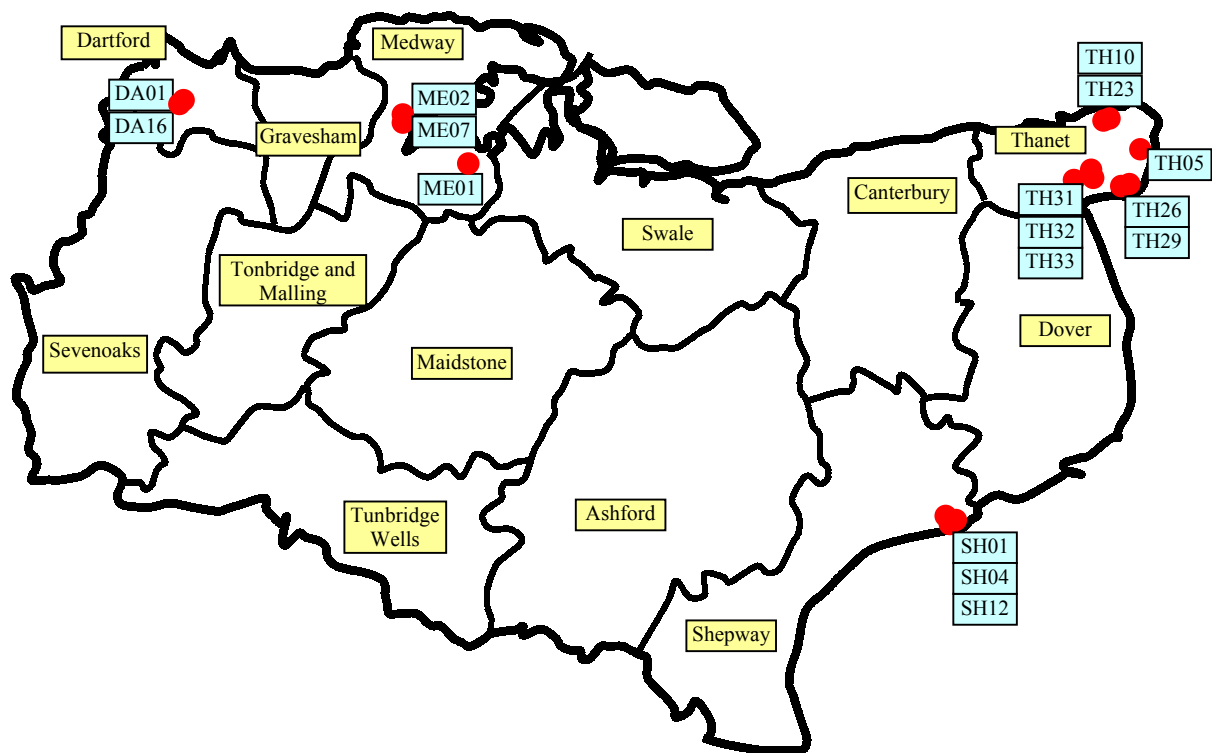


Figure 5.3 Nitrogen Dioxide Diffusion Tube Monitoring Locations in Thanet

- Diffusion Tube Monitoring Locations

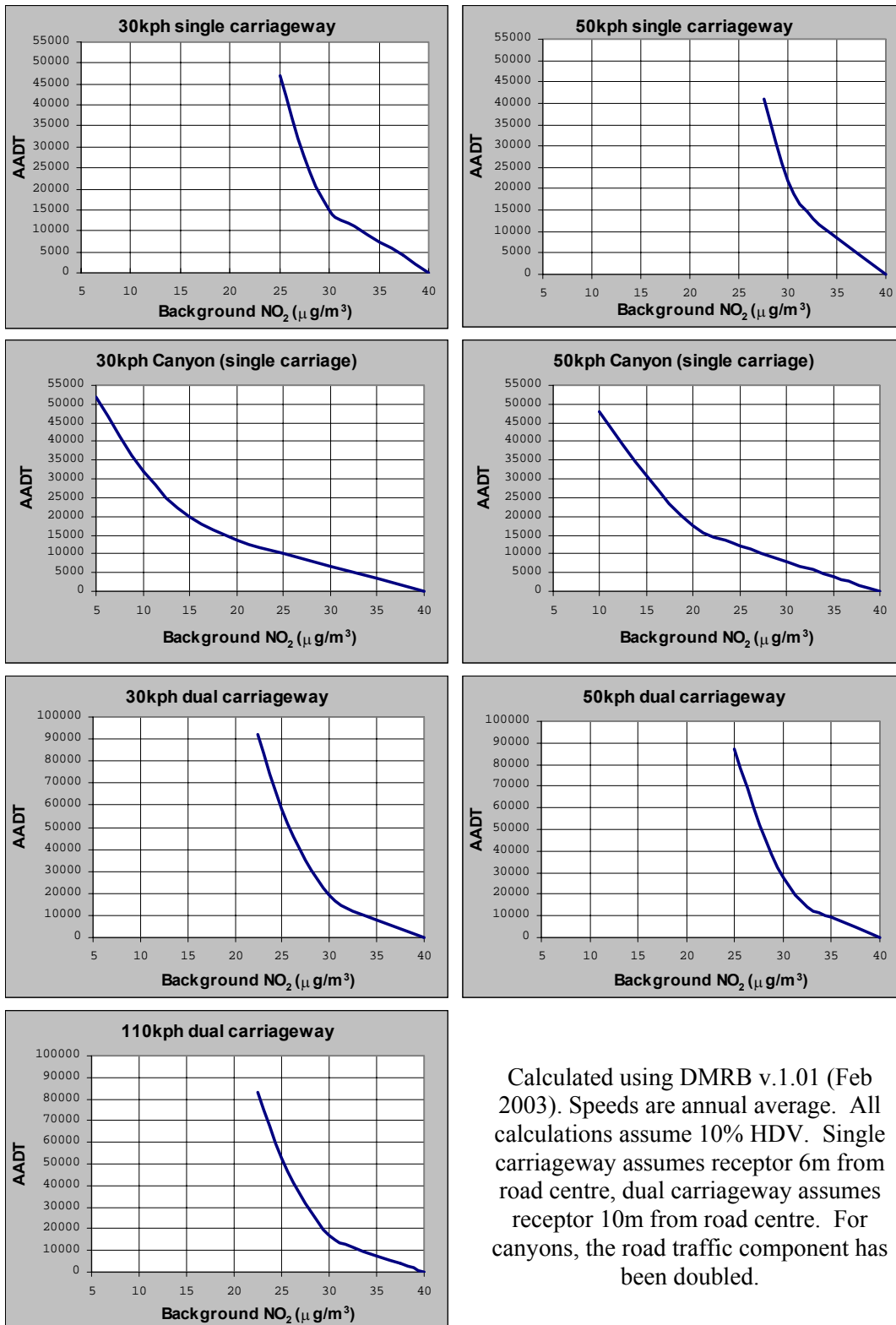


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Appendix 6

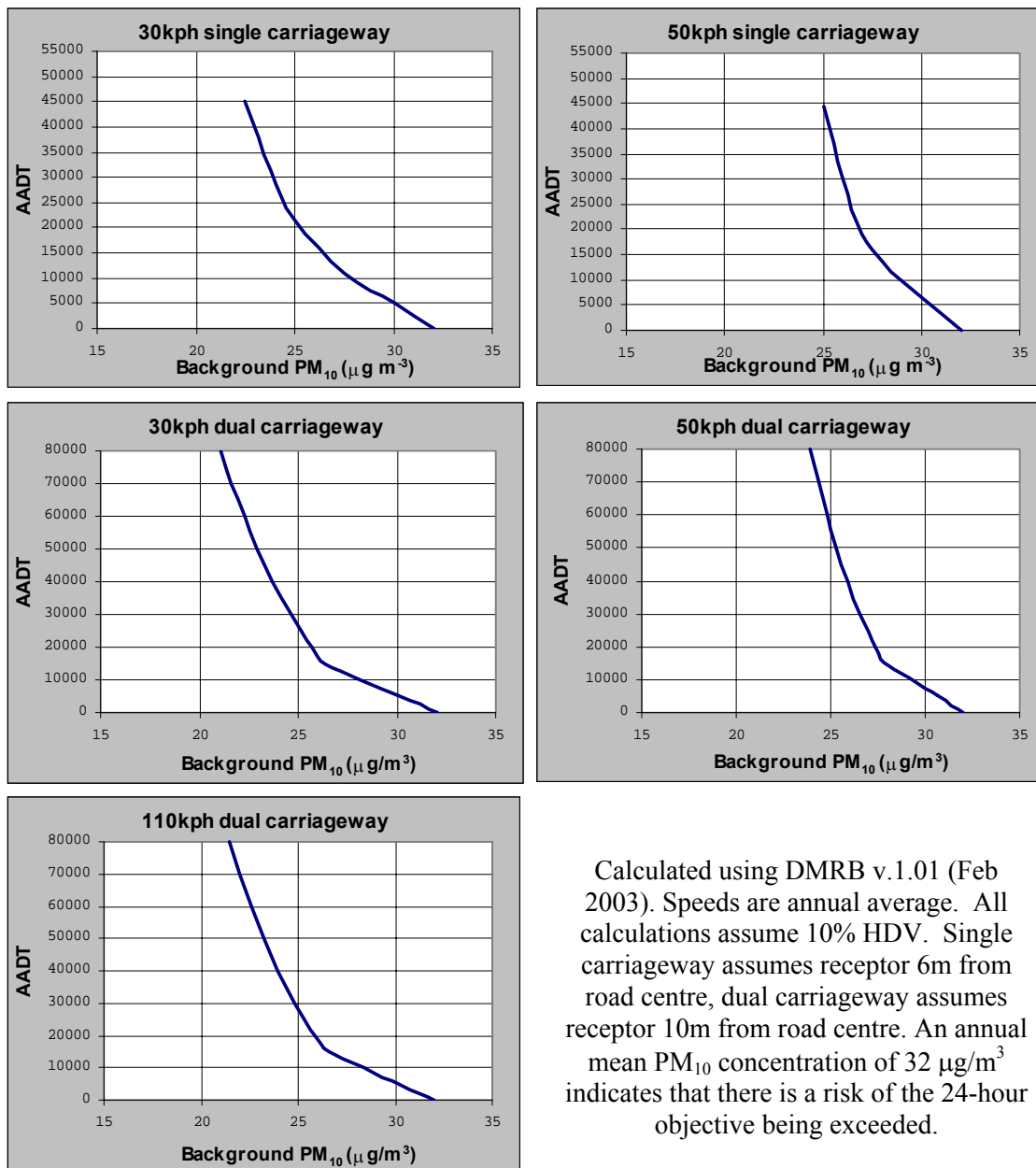
Screening Nomograms Calculated From the DMRB

AA DT (combined veh/day) vs background NO₂ concentration (annual mean) necessary to total 40 µg NO₂/m³ (annual mean) in 2005 for different traffic speeds and road types.



Calculated using DMRB v.1.01 (Feb 2003). Speeds are annual average. All calculations assume 10% HDV. Single carriageway assumes receptor 6m from road centre, dual carriageway assumes receptor 10m from road centre. For canyons, the road traffic component has been doubled.

AADT (combined veh/day) vs background PM₁₀ concentration (annual mean) necessary to total 32 µg PM₁₀/m³ (annual mean) in 2004 for different traffic speeds and road types



Calculated using DMRB v.1.01 (Feb 2003). Speeds are annual average. All calculations assume 10% HDV. Single carriageway assumes receptor 6m from road centre, dual carriageway assumes receptor 10m from road centre. An annual mean PM₁₀ concentration of 32 µg/m³ indicates that there is a risk of the 24-hour objective being exceeded.

Appendix 7

QA/QC of Monitoring Data

Continuous Monitoring QA/QC

The majority of continuous monitoring in Kent is carried out as part of the Kent & Medway Air Quality Monitoring Network, which is operated by the Kings College London, Environmental Research Group (ERG). The QA/QC procedures for the network are equivalent to the Government's UK Automatic Urban and Rural Network (site operators manual available at www.airquality.co.uk), with the following exceptions:

- Independent intercalibrations are carried out every 12 months
- No chart recorders are used.
- No NO₂ span gas is used at routine site visits.
- 12 hourly polling and 24 hourly manual data checks.

Data measured by the analysers are retained by the data loggers as 15 minute raw averages. These values are collected remotely every 12 hours by telemetry automatically by the central computer, where calibration factors are applied to calculate scaled 15 minute average pollutant concentrations. At each polling, algorithms are used to apply automatic validity checks and flag any suspect measurements for possible future editing, rescaling or rejection. In addition to the automatic systems, trained staff inspect the results each morning (365 days per year) and investigate any suspicious data. The resulting provisional data sets are then released as data or statistics to the network internet pages and distributed to interested parties via daily or weekly emails.

In addition to this initial screening process, data are further scrutinised in monthly blocks, then again at the end of each calendar year, in order to provide a final ratified dataset. These definitive results are suitable for publication and use by local authorities for LAQM analysis. This data ratification process requires the detailed examination of a variety of site and analyser outputs. These include site records, calibration records, network intercalibration results, site servicing and equipment records supplied by the site operators and equipment engineers.

Passive Monitoring QA/QC

Details of the passive diffusion tube sampling methods used for nitrogen dioxide and benzene are provided in the following tables. The validation of the nitrogen dioxide diffusion tubes is described in Appendix 8.

Nitrogen Dioxide Diffusion Tube Monitoring QA/QC

| | |
|---|--|
| Supply | Harwell Scientifics |
| Analysis | Kent Scientific Services |
| Preparation method | 50% TEA in acetone |
| Type of tube | Palmer tube |
| Type of absorbent | Doped triethanolamine mesh |
| Membership of inter-laboratory comparison scheme | WASP and Netcen intercomparison carried out on behalf of Defra |
| Method accreditation | UKAS |

Benzene Diffusion Tube Monitoring QA/QC

| | |
|---|---|
| Supply | Dräger |
| Analysis | Kent Scientific Services |
| Type of tube | ORSA 5 |
| Type of absorbent | Charcoal (activated) |
| Membership of inter-laboratory comparison scheme | WASP |
| Method accreditation | UKAS |
| Intake rate | Absorption capacity max. 10mg Uptake rate 0.859 cm ³ /sec |

Appendix 8

Calculation of Diffusion Tube Bias

Various studies have indicated that there are systemic differences in the performance of different laboratories and preparation methods for nitrogen dioxide diffusion tubes. The diffusion tubes used in this Council are supplied by Harwell Scientifics and analysed by Kent Scientific Services. To account for any bias of these diffusion tubes, compared to continuous monitoring results, a comparison has been made between the results of diffusion tube monitoring and continuous monitoring at 4 locations where the two types of monitoring equipment have been collocated. At each of the sites there were at least 11 months of data available. This approach follows that recommend in the Technical Guidance.

The results presented in the table below indicate that, on average, the diffusion tubes prepared and analysed using the method described above, tend to over-estimate nitrogen dioxide concentrations by an average of 22%. An adjustment factor has been derived for each data set (continuous monitoring result divided by the diffusion tube monitoring result). The average of these adjustment factors is 0.836. This average adjustment factor has been applied to all the nitrogen dioxide diffusion tube results included in this report, as it is considered to be the most reliable estimate of the adjustment to be applied to all sites.

There is an element of uncertainty in this adjustment factor and therefore all diffusion tube results should be treated with an element of caution. It should be borne in mind that the actual results could be in the region of at least ± 1 standard deviation. For example, if the annual mean concentration measured by diffusion tube is $48 \mu\text{g}/\text{m}^3$, then, when the adjustment factor of 0.836 is applied, the best estimate of the actual concentration becomes $40 \mu\text{g}/\text{m}^3$. However, the actual concentration could be between 36 to $44 \mu\text{g}/\text{m}^3$ (± 1 standard deviation). Therefore if the adjusted concentration reported is above $36 \mu\text{g}/\text{m}^3$ it should be considered that there is a **risk** the objective may be exceeded.

Data used to calculate bias and an adjustment factor for nitrogen dioxide diffusion tubes

| Local Authority | Annual mean NO ₂ ($\mu\text{g}/\text{m}^3$) measured by continuous monitor | Annual mean NO ₂ ($\mu\text{g}/\text{m}^3$) measured by diffusion tube | Bias (%) | Adjustment factor |
|---------------------|---|---|-----------|-------------------|
| Dover | 41.0 | 59.3 | 45 | 0.690 |
| Canterbury | 29.3 | 41.8 | 43 | 0.701 |
| Eastleigh | 35.0 | 39.0 | 11 | 0.905 |
| Tonbridge & Malling | 42.1 | 38.3 | -9 | 1.05 |
| Average | | | 22 | 0.836 |