



**AIR QUALITY**

**PROGRESS REPORT 2007**

**(PRODUCED MAY 2007)**



## **EXECUTIVE SUMMARY**

**This is the Progress Report 2006 for New Forest District Council.**

**The Progress Report updates the Local Authority's monitoring results, compares the results against the air quality objectives and lists developments and planning applications that may have an impact on air quality.**

**The pollutants monitored within the district during 2006 are nitrogen dioxide, sulphur dioxide and particulate matter. The results show exceedances of the annual mean objective for nitrogen dioxide at 3 locations in Lyndhurst and at 1 location in Totton. In addition 2 locations in Lyndhurst and 3 locations in Totton are close to the nitrogen dioxide annual mean objective.**

**New Forest District Council declared Air Quality Management Areas in 2005 in respect of the annual mean objective for nitrogen dioxide for both Lyndhurst and Totton. Currently the associated Action Plans for Lyndhurst and Totton are out for consultation.**

**The locations which have monitored exceedances or close to exceeding the annual mean objective for nitrogen dioxide are all within the declared Air Quality Management Areas with the exception of 2 locations in Totton; Ringwood Road and Commercial Road. Therefore the Authority will be proceeding to a Detailed Assessment at these locations which will be completed by April 2008.**

**Monitoring over 2006 for sulphur dioxide and particulates has not shown a likely exceedence of the objectives set for these pollutants.**

**There are no new developments listed which may have an impact on air quality. It is noted that the construction of Marchwood Power, a permitted power generation plant will start construction within 2007.**

**The Local Transport Plan has been produced and acknowledges the Air Quality Management Areas within the district. In addition a number of measures within the Air Quality Action Plans have been listed as actions within the Local Transport Plan.**

# **CONTENTS**

<b>1.0</b>	<b>Introduction</b>	<b>5</b>
1.1	Background	5
1.2	Progress Report	7
<b>2.0</b>	<b>Monitoring Results</b>	<b>8</b>
2.1	Nitrogen dioxide	8
2.1.1	<i>Diffusion Tubes</i>	8
2.1.2	<i>Real Time Analysers</i>	18
2.2	Sulphur dioxide	22
2.3	Particulates	28
2.4	Monitoring Conclusions	34
<b>3.0</b>	<b>New Local Developments</b>	<b>35</b>
3.1	New industrial processes	35
3.2	New developments	36
3.3	New landfill sites / quarries	36
<b>4.0</b>	<b>Additional Information</b>	<b>37</b>
4.1	Update on Air Quality Management Area's	37
4.2	Implementation of Local Transport Plans	43
4.3	Planning and policies	45
4.4	Quality Assurance and Control	46
	<b>References</b>	<b>46</b>
	<b>Appendices</b>	<b>47</b>

# **1.0 INTRODUCTION**

## **1.1 Background**

Local Authorities have a statutory duty under the Environment Act 1995, to review and assess the air quality in their district and to conclude their findings in reports produced on a yearly basis. The purpose of the reports is to ensure the air quality is continually assessed and if necessary further action is taken to improve air quality.

Air quality is assessed against objectives set by Government for 7 airborne pollutants. These pollutants and objectives are shown in Table 1. The assessment of air quality is undertaken by following Government guidance and by utilising monitoring and modelling techniques.

If through this continuous assessment it is found that it is unlikely an air quality objective will be met, Local Authorities have a statutory duty to declare an Air Quality Management Area. The purpose of declaring an Air Quality Management Area is to produce an Action Plan, the aim of which is to improve the air quality within the designated area.

**Table 1****Table showing the UK air quality objectives**

<b>Pollutant</b>	<b>Air Quality Objective</b>
<b>Benzene</b>	16.25 $\mu\text{g}/\text{m}^3$ or less, when expressed as a running annual mean to be achieved by December 31 <sup>st</sup> 2003
	5.0 $\mu\text{g}/\text{m}^3$ or less, when expressed as a running annual mean to be achieved by December 31 <sup>st</sup> 2010
<b>1,3 Butadiene</b>	2.25 $\mu\text{g}/\text{m}^3$ or less, when expressed as a running annual mean to be achieved by December 31 <sup>st</sup> 2003
<b>Carbon Monoxide</b>	10.0 $\text{mg}/\text{m}^3$ or less, when expressed as a running 8 hour mean to be achieved by December 31 <sup>st</sup> 2003
<b>Lead</b>	0.5 $\mu\text{g}/\text{m}^3$ annual mean to be achieved by December 31 <sup>st</sup> 2004
	0.25 $\mu\text{g}/\text{m}^3$ annual mean to be achieved by December 31 <sup>st</sup> 2008
<b>Nitrogen Dioxide</b>	200 $\mu\text{g}/\text{m}^3$ when expressed as an hourly mean not to be exceeded more than 18 times a year to be achieved by 31st December 2005.
	40 $\mu\text{g}/\text{m}^3$ when expressed as an annual mean to be achieved by 31st December 2005.
<b>PM<sub>10</sub></b>	50 $\mu\text{g}/\text{m}^3$ or less when expressed as a 24hr mean not to be exceeded more than 35 times a year to be achieved by 31st December 2004.
	40 $\mu\text{g}/\text{m}^3$ or less when expressed as an annual mean to be achieved by 31st December 2004.
<b>Sulphur Dioxide</b>	125 $\mu\text{g}/\text{m}^3$ or less, when expressed as a 24 hour mean, not to be exceeded more than 3 times per year, to be achieved by 31 <sup>st</sup> December 2004.
	350 $\mu\text{g}/\text{m}^3$ or less when expressed as an hourly mean, not to be exceeded more than 24 times a year, to be achieved by 31 <sup>st</sup> December 2004.
	266 $\mu\text{g}/\text{m}^3$ or less when expressed as a 15 minute mean not to be exceeded more than 35 times a year, to be achieved by 31 <sup>st</sup> December 2005.

## **1.2 Progress Report**

The aim of the Progress Report is to ensure the review and assessment process is continuous so that air quality is integrated into the routine work of Local Authorities. It should not be a further Updating and Screening Assessment, rather an update of local air quality issues to provide current information for the next round of review and assessment, due to start in 2009.

As such the aims of the Progress Report are to report on ;

- progress on implementing local air quality management
- progress in achieving or maintaining concentrations below the air quality objectives

These aims will be achieved by reporting on;

- monitoring results, including the assessment of monitoring data in relation to likely exceedences of the objectives
- new local developments which may affect local air quality
- progress on the implementation of any action plans, including the integration of air quality into Local Transport Plans
- planning applications that have the potential to impact on local air quality

## **2.0 MONITORING RESULTS**

Following the last round of review and assessment, monitoring has been carried out locally for the following pollutants ;

- Nitrogen dioxide (NO<sub>2</sub>)
- Sulphur dioxide (SO<sub>2</sub>)
- Particulates (PM<sub>10</sub>)

### **2.1 Nitrogen Dioxide**

Monitoring of nitrogen dioxide has been undertaken throughout the district, primarily where traffic is either congested or has a particularly high flow, by both passive sampling using diffusion tubes, and in two locations continuously using real time analysers.

#### **2.1.1 Diffusion Tube Sampling**

##### **Locations**

Throughout 2006, monitoring using diffusion tubes has been undertaken at 45 sites across the Authority covering locations in Totton, Lyndhurst, Ringwood, Stoney Cross, Holbury, Fawley, Beaulieu and Rockbourne. 5 of these are duplicate sites, whilst a further 2 are triplicate sites.

The diffusion tube locations for the respective sites are shown on maps in Appendix 1. The sites are shown either in green for those sites which are likely to meet the annual mean objective, yellow for those sites close to the annual mean objective or red for those sites which are unlikely to meet the annual mean objective based on the results for 2006.

In addition, following concerns regarding heavy goods vehicles entering an industrial site in Totton, known as Eling Wharf, a further diffusion tube monitoring site was identified and monitoring has been undertaken since December 2006. The monitoring site has been located on a residential property in the High Street, Totton opposite the entrance onto Eling Wharf. Heavy goods vehicles have unlimited access onto this site, and whilst the site is not identified as appropriate for monitoring / further investigation as detailed in the Technical Guidance<sup>1</sup>, the close proximity of residential housing to the High Street (<5m) and the apparent high usage of the road by the heavy goods vehicles warranted monitoring of the location.

## Results

The diffusion tube results for 2006 are shown in Table 2.

**Table 2**

**Table showing the diffusion tube results for 2006 compared to the annual mean objective**

### LYNDHURST

Site	NO <sub>2</sub> Annual Mean / $\mu\text{gm}^{-3}$	Bias Corrected * NO <sub>2</sub> Annual Mean / $\mu\text{gm}^{-3}$	Annual Mean Objective / $\mu\text{gm}^{-3}$	Objective Met?
School	27.03	24.60	40	YES
Jewellery shop	55.51	50.51	40	NO
Analyser	47.64	43.35	40	NO
Bakery	46.93	42.71	40	NO
Romsey Rd lights	42.70	38.86	40	YES**
Romsey Rd (a)	26.28	23.91	40	YES
Romsey Rd (b)	26.87	22.57	40	YES
Tea Shop	31.39	28.56	40	YES
High St.	38.20	34.76	40	YES
Lyndhurst Park Hotel	34.66	31.54	40	YES
Gosport Lane	38.51	35.04	40	YES
Goose Green	25.25	22.98	40	YES
Foxlease Terr	40.23	36.61	40	YES
Shrubbs Hill Rd	31.27	28.46	40	YES
Queens House	24.25	22.07	40	YES
A35	29.94	27.24	40	YES

**Notes ;**

\* bias correction factor of 0.91

\*\* indicates result close to the objective

The green shaded results are monitoring sites located within an Air Quality Management Area.

## TOTTON

Site	NO <sub>2</sub> Annual Mean / µgm <sup>-3</sup>	Bias Corrected* NO <sub>2</sub> Annual Mean / µgm <sup>-3</sup>	Annual Mean Objective / µgm <sup>-3</sup>	Objective Met?
Rumbridge St.	34.47	34.12	40	YES
High St.	36.05	35.69	40	YES
Rose Rd	29.75	29.45	40	YES
BATs corner	38.44	38.06	40	YES**
Junction Rd (b)	44.72	44.27	40	NO
Junction Rd (c)	35.20	34.85	40	YES
Junction Rd (d)	31.99	31.67	40	YES
Junction Rd (e)	28.11	27.83	40	YES
Commercial Rd	38.62	38.23	40	YES**
Commercial Rd (Asda)	25.16	24.91	40	YES
Library	22.38	22.16	40	YES
Salisbury Rd	29.39	29.10	40	YES
Water Rd	25.99	25.73	40	YES
Ringwood Rd (Esso)	35.76	35.40	40	YES
Ringwood Rd	40.36	39.96	40	YES**
Maynard Rd (Asda)	37.25	36.78	40	YES
Winsor Rd	30.20	29.90	40	YES
Reynolds Dale	22.27	22.05	40	YES

**Notes ;**

\* bias correction factor of 0.99

\*\* indicates result close to the objective

The green shaded results are monitoring sites located within an Air Quality Management Area.

## OTHER LOCATIONS

Site	NO <sub>2</sub> Annual Mean / µgm <sup>-3</sup>	Bias Corrected* NO <sub>2</sub> Annual Mean / µgm <sup>-3</sup>	Annual Mean Objective / µgm <sup>-3</sup>	Objective Met?
Marchwood Industrial Estate	19.24	19.05	40	YES
Marchwood School	19.10	18.91	40	YES
Holbury School	13.49	13.35	40	YES
Fawley Village Hall	16.85	16.68	40	YES
Beaulieu	9.84	9.74	40	YES
Chaffey Close Ringwood	26.04	25.78	40	YES
The Furlong Ringwood	21.13	20.92	40	YES
Ringwood School	20.70	20.49	40	YES
Stoney Cross A31	33.96	33.62	40	YES
Main Road Hounslow	26.67	26.40	40	YES
Rockbourne	8.45	8.36	40	YES

*Note ; \* bias correction factor of 0.99*

## **Bias Correction**

The results shown have been corrected to allow for the laboratory bias when the diffusion tubes are analysed. The foot notes to the tables show that different correction figures have been determined and applied to the annual mean results for each diffusion tube site.

Real time continuous analysers are located in Lyndhurst and Totton and co-located with a triplicate diffusion tube site. These sites are shown in Appendix 2. The results from the diffusion tubes and continuous analyser are used to determine the bias correction factor by utilising a spreadsheet produced by the AEA group<sup>2</sup>. The results of the co-located triplicate sites and bias correction figures are shown in Appendix 3. The bias correction factor for Lyndhurst was determined in 2006 to be 0.91 whilst in Totton the bias correction factor was determined to be 0.99 in 2006. These factors were applied to the relevant diffusion tubes in these locations.

A further bias correction factor of 0.99 was obtained from Air Quality Consultants nitrogen dioxide diffusion tube comparison study<sup>3</sup> which is dependant on the laboratory and diffusion tube type used. This bias correction factor was applied to the remaining diffusion tube sites which were not in close proximity to a real time analyser.

## **Quality Assurance and Control**

The diffusion tubes used were supplied by Gradko International Ltd, a UKAS accredited laboratory for the procedure of analysing nitrogen dioxide diffusion tubes. The nitrogen dioxide is absorbed as nitrite by triethanolamine and is determined spectrophotometrically. Gradko International also participates in an external Laboratory Measurement Proficiency Scheme.

The diffusion tubes were exposed for periods of 4 weeks and each batch of diffusion tubes contained a blank reference diffusion tube. The diffusion tubes were located at a height of approximately 3m above ground level in relevant exposures for nitrogen dioxide as stated in Box 1.4 of the Technical Guidance<sup>1</sup>.

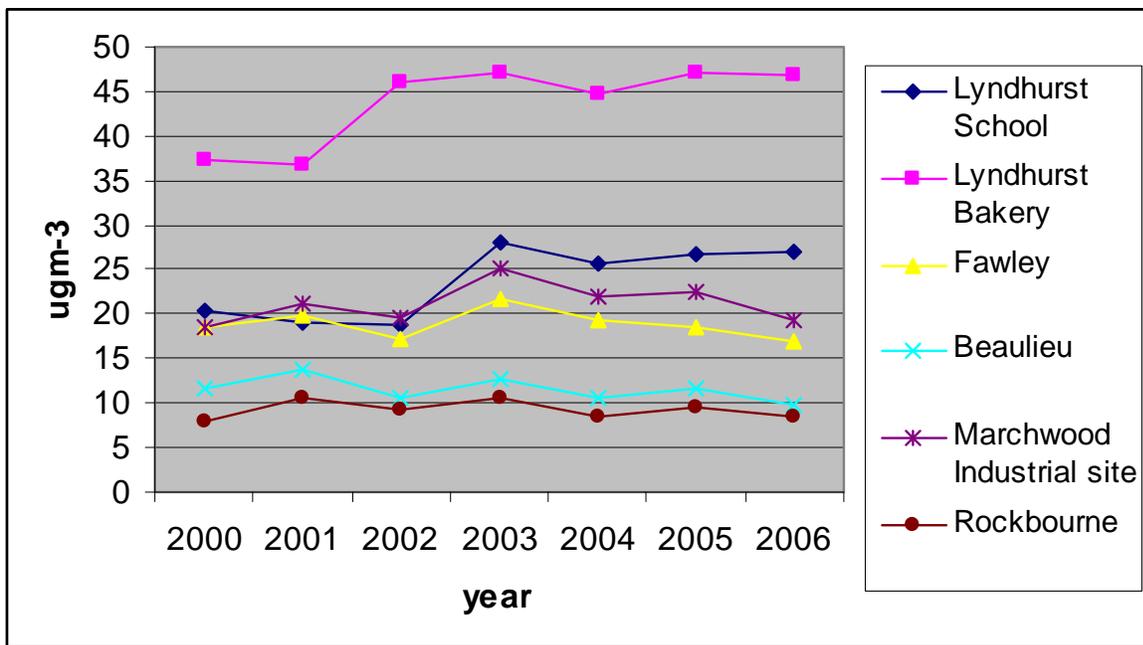
A number of diffusion tube sites were either duplicate or triplicate sites. The diffusion tubes are only numbered when they are sent to the laboratory, therefore the duplicate and triplicate sites allows the Authority to keep a check on the consistency of the laboratory results. The triplicate sites are co-located with the real time analysers in order to determine a localised bias correction factor, in addition such sites also enables the Authority to include our results in National co-location diffusion tube studies.

**Trends in Results**

Six diffusion tube sites have been in use for at least six years, five of which have been in use for the past eight years. This has produced Graph 1.

**Graph 1**

**Graph showing trend in results from across the district**



The results are the annual mean for each site without any corrections. This is to avoid any confusion over which correction factor to use for the earlier years. Therefore the results should be viewed with caution.

However, a number of observations can be made from the graph ;

- The results from each site have remained, on the whole, consistent throughout the monitoring years.
- Lyndhurst Bakery has shown the highest concentrations throughout the monitoring years which is to be expected due to the traffic congestion at this point as a result of traffic lights and the canyon effect of buildings in the vicinity. This site is within an Air Quality Management Area which was declared in June 2005.
- On the whole all the sites follow the same increases and decreases over the years, with the exception of a decrease 2001 at Lyndhurst School and Lyndhurst Bakery, and with one site increasing in 2002 at Lyndhurst Bakery.
- All sites showed a noted decrease in results between 2005 and 2006 with the exception of the two Lyndhurst sites at which the results either remained constant (bakery) or showed a slight increase (school).

## Discussion

The results from the diffusion tubes exposed in 2006 show 4 sites which are likely to exceed the annual mean objective for nitrogen dioxide. These sites are;

- **Jewellery Shop**, High Street, Lyndhurst
- **Analyser**, High Street, Lyndhurst at the junction with the A337
- **Bakery**, High Street, Lyndhurst at the junction with the A337
- **Junction Road (b)**, Junction Road, Totton by the rail crossing

A further 5 sites were noted as being very close to the nitrogen dioxide annual mean objective (noted with a \*\* in the results tables) and are noted as ;

- **Romsey Road lights**, Romsey Road, Lyndhurst at the junction with the High Street
- **High Street**, Lyndhurst close to the pedestrian crossing
- **BATs corner**, Totton on the junction of Junction Road and Rumbridge Street
- **Commercial Road**, Totton
- **Ringwood Road**, Totton

The 4 sites listed above as exceeding the annual mean objective for nitrogen dioxide are all within the boundaries of Air Quality Management Areas declared for Lyndhurst and Totton. The Air Quality Management Areas are shown on pages 38 and 40 and are discussed further in chapter 4.

In addition 3 of the sites listed as being close to the annual mean objective for nitrogen dioxide, Romsey Road lights, Lyndhurst, High Street, Lyndhurst and BATs corner, Totton are all within the boundaries of the declared Air Quality Management Areas.

The 2 further listed sites, Commercial Road, Totton and Ringwood Road, Totton are not within the current Air Quality Management Area for Totton. As a result the Authority will have to proceed to a Detailed Assessment for these two locations.

The purpose of a Detailed Assessment is to undertake further investigations of nitrogen dioxide concentrations in the two identified locations to determine whether the existing Air Quality Management Area in Totton needs to be amended, further Air Quality Management Areas need to be declared or that there is no requirement to designate or amend the existing Air Quality Management Area in Totton.

The Detailed Assessment may include further monitoring or modelling work and should be completed by the end of April 2008.

## **2.1.2 Real Time Analysers**

### **Location**

The Authority has 2 real time nitrogen dioxide analysers at the following locations;

- Junction Road, Totton
- High Street, Lyndhurst

The locations of these sites are shown on maps in Appendix 2. Both analysers are located within the declared Air Quality Management Areas for Totton and Lyndhurst.

### **Totton**

This site is a roadside location situated approximately 2m from the kerbside. The analyser was moved to this location (in 2004) due to the likely exceedences of the annual mean objective for nitrogen dioxide based on diffusion tube data. This location was chosen as it is close to a rail crossing where vehicles are regularly stationary with their engines idling. The nearest relevant exposure locations are residential properties set 10m from the kerb.

### **Lyndhurst**

This site is a roadside location situated approximately 1.5m from the kerbside in an office space on the 1<sup>st</sup> floor. The analyser was moved to this location (in 2004) due to the likely exceedences of the annual mean objective for nitrogen dioxide based on diffusion tube data. This location was chosen as it is close to a busy road junction, controlled by traffic lights, where vehicles are regularly stationary with their engines idling. The nearest relevant exposure locations are residential properties set 2m from the kerb and people who may be exposed on the kerbside for periods longer than 1 hour.

### **Analyser**

The analysers used are Monitor Laboratory 9841 Oxides of Nitrogen Chemiluminescent Analyser.

## Results

The fully ratified results from the real time analysers are shown in Table 3.

**Table 3**

**Table showing the real time analyser results for 2006 compared to the annual mean and hourly mean objectives**

Site	Objective	Data Capture / %	Result	Objective Achieved?
Lyndhurst	Annual mean not exceeding 40 $\mu\text{g}/\text{m}^{-3}$	97	44	NO
Lyndhurst	Hourly mean. No more than 18 exceedances more than 200 $\mu\text{g}/\text{m}^{-3}$	97	1	YES
Totton	Annual mean not exceeding 40 $\mu\text{g}/\text{m}^{-3}$	95	32	YES
Totton	Hourly mean. No more than 18 exceedances more than 200 $\mu\text{g}/\text{m}^{-3}$	95	0	YES

**Note;** *The green shaded results are monitoring sites located within a declared Air Quality Management Area.*

## Trend in Results

The analysers have only been located at the above sites since the end of 2004, therefore there are only 2 full years of data available, which is not enough data to assess if there are any noticeable trends at the sites. However it is noted that whilst the Totton site has remained consistent with the results from 2005, the Lyndhurst site has shown an increase from 39  $\mu\text{g}/\text{m}^{-3}$  to 44  $\mu\text{g}/\text{m}^{-3}$  from 2005 to 2006.

## **Quality Assurance and Control**

### **Calibration**

Each analyser automatically undertakes a daily internal calibration using permeation tubes and a scrubber. The analysers are also manually calibrated using a reference span gas once a fortnight. This gas is obtained from BOC and each cylinder has a certificate detailing the gas concentration and life span of the gas.

The analysers are serviced and calibrated every 6 months by an engineer from Casella Measurement who hold the service contract for the Authority's analysers. The engineer is also available for call outs if the analyser appears to be malfunctioning.

### **Data Validation and Ratification**

The Authority employs Kings College, London (erg) to validate and ratify the data from the sites which is downloaded daily. In addition the Authority can access the data from the sites either directly or via the Authority's website;

<http://www.hantsair.org.uk/hampshire/asp/home.asp?la=NFDC>

The air quality information on the Authority's website is also maintained and operated by erg.

Kings College validate the data daily. During this process they will flag any potential problems with the analysers and potential exceedences, and report back if necessary to the Authority.

The data from the analysers is ratified every 1 – 3 months when the fortnightly calibrations and servicing are taken into account. Full ratification occurs at the end of each year when all servicing reports, calibrations and breakdown information can be applied to the data. All the data given in the Progress Report has been fully ratified.

### **Quality Assurance and Control**

The Authority has contracted the National Physical Laboratory (NPL) to externally audit the six continuous analysers operated within the district. Currently this audit has occurred annually since 2005, however from the 2007 financial year it is hoped that this auditing will occur biannually. This will depend on the availability of funding.

## **Discussion**

The fully ratified results for the continuous real time analysers have shown a likely exceedance of the nitrogen dioxide annual mean objective in Lyndhurst, whilst the analyser located in Totton does not show a likely exceedance of the nitrogen dioxide annual mean objective.

These analysers are ideally located within the declared Air Quality Management Areas, supplying real time concentrations of nitrogen dioxide (NO<sub>2</sub>), nitrous oxide (NO) and total oxides of nitrogen (NO<sub>x</sub>). With the addition of co-located nitrogen dioxide diffusion tubes, the analysers enable a local diffusion tube bias correction factor to be determined.

Therefore, it is recommended that these analysers remain at their current locations for the foreseeable future in particular during the existence of an Air Quality Management Area.

## **2.2 Sulphur Dioxide**

Monitoring of sulphur dioxide has been undertaken in industrial locations within the district using real time analysers.

### **Locations**

The real time analysers are located at Holbury Manor Infant School, Holbury and Fawley Village Hall, Fawley. These locations are urban industrial sites and are shown on a map in Appendix 4. Both locations are in residential areas identified as appropriate to monitor industrial sources, primarily a refinery, in the vicinity, approximately 1km away.

### **Analysers**

The analysers used are Monitor Laboratory 9850 UV Fluorescence sulphur dioxide analysers.

## Results

The results from the real time analysers are shown in Table 4.

**Table 4**

**Table showing the real time analyser results for 2006 compared to the hourly mean, daily mean and 15 min mean objectives**

Site	Objective	Data Capture / %	Result	Objective Achieved?
Holbury	Hourly mean. No more than 24 exceedances more than $350 \mu\text{gm}^{-3}$	99	0	YES
Holbury	Daily mean. No more than 3 days more than $125 \mu\text{gm}^{-3}$	99	0	YES
Holbury	15 min mean. No more than 35 exceedances $266 \mu\text{gm}^{-3}$	99	0	YES
Fawley	Hourly mean. No more than 24 exceedances more than $350 \mu\text{gm}^{-3}$	98	0	YES
Fawley	Daily mean. No more than 3 days more than $125 \mu\text{gm}^{-3}$	98	0	YES
Fawley	15 min mean. No more than 35 exceedances $266 \mu\text{gm}^{-3}$	98	10	YES

*Note; The green shaded results are monitoring sites located within a declared Air Quality Management Area.*

## Quality Assurance and Control

### **Calibration**

Each analyser automatically undertakes a daily internal calibration using either a zero and span gas at the Holbury site, or internal permeation tubes and scrubbers at the Fawley site. The analysers are also manually calibrated using a reference span gas once a fortnight. This gas is obtained from BOC and each cylinder has a certificate detailing the gas concentration and life span of the gas.

The analysers are serviced and calibrated every 6 months by an engineer from Casella Measurement who hold the service contract for the Authority's analysers. The engineer is also available for call outs if the analyser appears to be malfunctioning.

## **Data Validation and Ratification**

The Authority employs Kings College, London (erg) to validate and ratify the data from the sites which is downloaded daily. In addition the Authority can access the data from the sites either directly or via the Authority's website;

<http://www.hantsair.org.uk/hampshire/asp/home.asp?la=NFDC>

The air quality information on the Authority's website is also maintained and operated by erg.

Kings College validate the data daily. During this process they will flag any potential problems with the analysers and potential exceedances, and report back if necessary to the Authority.

The data from the analysers is ratified every 1 – 3 months when the fortnightly calibrations and servicing are taken into account. Full ratification occurs at the end of each year when all servicing reports, calibrations and breakdown information can be applied to the data. All the data given in the Progress Report has been fully ratified.

## **Quality Assurance and Control**

The Authority has contracted the National Physical Laboratory (NPL) to externally audit the six continuous analysers operated within the district. Currently this audit has occurred annually since 2005, however from the 2007 financial year it is hoped that this auditing will occur biannually. This will depend on the availability of funding.

## Trend in Results

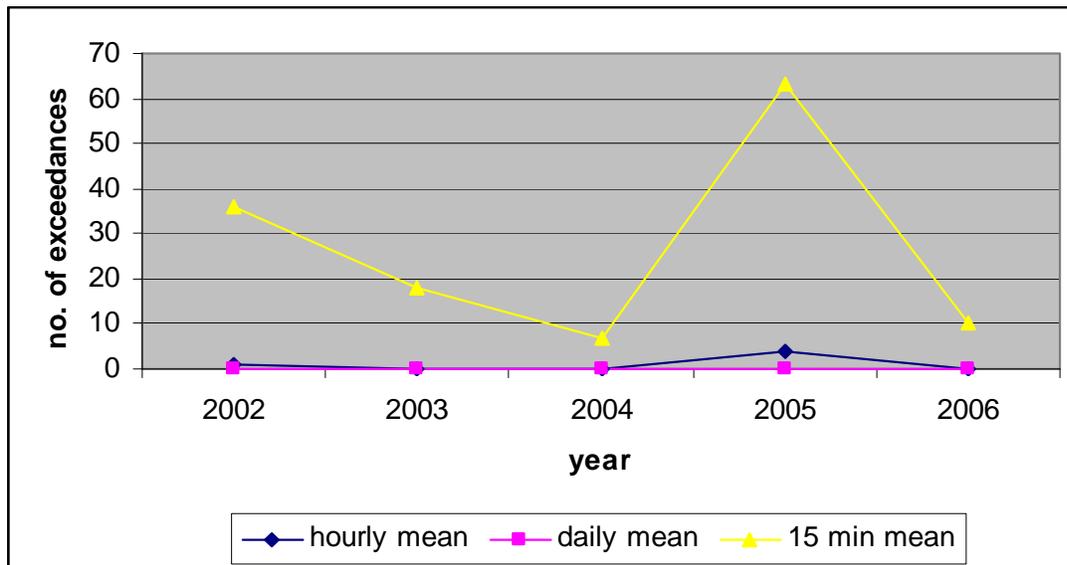
The analyser at Fawley has been located since 2002, therefore the Authority has 5 years of data from the site. The results are shown in Graph 2 which shows the 3 objectives set for sulphur dioxide.

The objectives set for sulphur dioxide are as follows;

POLLUTANT	OBJECTIVE
<b>Sulphur Dioxide</b>	125 µg/m <sup>3</sup> or less, when expressed as a 24 hour mean, not to be exceeded more than 3 times per year, to be achieved by 31 <sup>st</sup> December 2004.
	350 µg/m <sup>3</sup> or less when expressed as an hourly mean, not to be exceeded more than 24 times a year, to be achieved by 31 <sup>st</sup> December 2004.
	266 µg/m <sup>3</sup> or less when expressed as a 15 minute mean not to be exceeded more than 35 times a year, to be achieved by 31 <sup>st</sup> December 2005.

## Graph 2

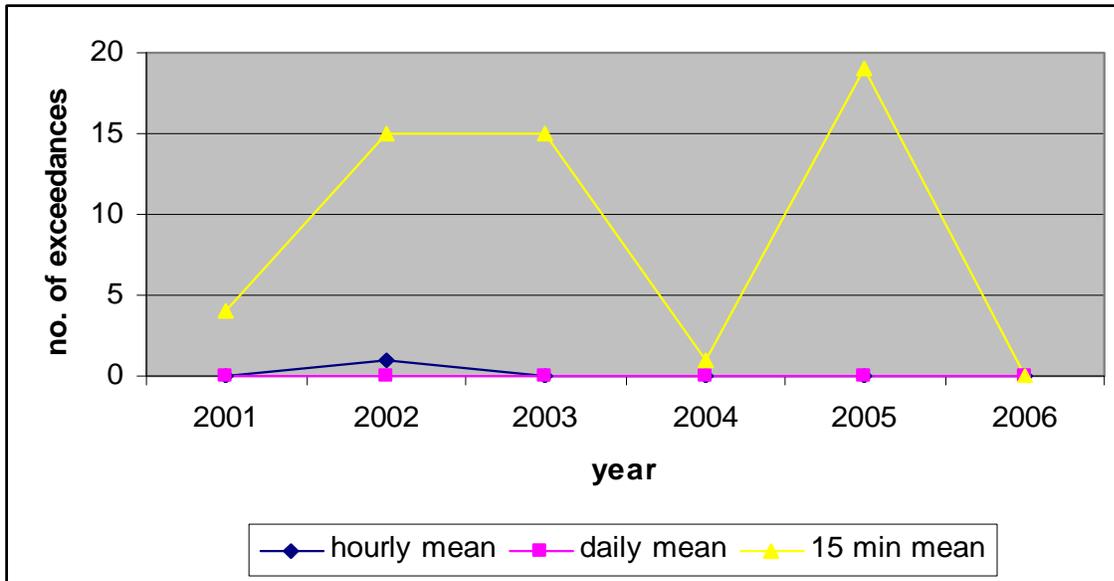
**Graph showing the results from the Fawley sulphur dioxide analyser shown as the objectives set for sulphur dioxide.**



The analyser at Holbury has been located since 2001. Therefore the trend in results for sulphur dioxide are shown in Graph 3.

**Graph 3**

**Graph showing the results from the Holbury sulphur dioxide analyser shown as the objectives set for sulphur dioxide.**



Graphs 2 and 3 show that the highest results were monitored during 2005. In this year the 15 minute mean objective was exceeded at Fawley which resulted in the declaration of the Air Quality Management Area. Whilst the Holbury site did not monitor an exceedance of this objective, the site did monitor the highest number of exceedances of the 15 minute mean in 2005 at 19 exceedances.

The graphs show that since the sites have been operational it is the 15 minute mean objective that has been the objective of interest at these sites.

## **Discussion**

The results for 2006 show that it is unlikely that any of the objectives set for sulphur dioxide will be exceeded at Holbury or Fawley.

Both analysers are ideally situated in locations of relevant exposure within 1km of industrial plants which emit significant quantities of sulphur dioxide. It should be noted that the emissions of sulphur dioxide are within current permitted levels set by the Environment Agency.

It is recommended that these analysers remain at their current locations for the foreseeable future, in particular the analyser located at Fawley which is within the declared Air Quality Management Area for the likely exceedance of the 15 minute mean objective.

## **2.3 Particulates (PM<sub>10</sub>)**

Monitoring of particulates has been undertaken in 2 locations within the district using continuous real time analysers.

### **Locations**

The real time analysers are located at Holbury Manor Infant School, Holbury an urban industrial site and Junction Road, Totton a roadside site. These locations are shown on a map in Appendix 5.

Both locations are residential areas. The Holbury location is within 1km of industry, primarily a refinery. Whilst the Totton location is within 10m of residential properties and 2m of a road which is subjected to queuing traffic with idling engines when a nearby railway crossing has its barriers closed.

### **Analysers**

The analysers used are a Rupprecht and Patashnick TEOM 1400a with a CEN approved PM<sub>10</sub> head.

## Results

The results from the real time analysers are shown in Table 5.

**Table 5**

**Table showing the real time analyser results for 2006 compared to the annual mean and daily mean objectives**

Site	Objective	Data Capture / %	Result	Objective Achieved?
Holbury	Annual mean not exceeding $40\mu\text{g}\text{m}^{-3}$	95	22	YES
Holbury	Daily mean. No more than 35 days more than $50\mu\text{g}\text{m}^{-3}$	95	2	YES
Totton	Annual mean not exceeding $40\mu\text{g}\text{m}^{-3}$	94	29	YES
Totton	Daily mean. No more than 35 days more than $50\mu\text{g}\text{m}^{-3}$	94	18	YES

**Note;** Whilst the location of the Totton analyser is within the declared Air Quality Management Area for nitrogen dioxide, there are no Area Quality Management Areas currently declared for particulate ( $\text{PM}_{10}$ ) matter.

## Quality Assurance and Control

### **Calibration**

The analysers are manually calibrated when the filter loading reaches 80%. Typically this occurs every 6 weeks.

The analysers are serviced and calibrated every 6 months by an engineer from Casella Measurement who hold the service contract for the Authority's analysers. The engineer is also available for call outs if the analyser appears to be malfunctioning.

### **Data Validation and Ratification**

The Authority employs Kings College, London (erg) to validate and ratify the data from the sites which is downloaded daily. In addition the Authority can access the data from the sites either directly or via the Authority's website;

<http://www.hantsair.org.uk/hampshire/asp/home.asp?la=NFDC>

The air quality information on the Authority's website is also maintained and operated by erg.

Kings College validate the data daily. During this process they will flag any potential problems with the analysers and potential exceedances, and report back if necessary to the Authority.

The data from the analysers is ratified every 1 – 3 months when the fortnightly calibrations and servicing are taken into account. Full ratification occurs at the end of each year when all servicing reports, calibrations and breakdown information can be applied to the data. All the data given in the Progress Report has been fully ratified.

### **Quality Assurance and Control**

The Authority has contracted the National Physical Laboratory (NPL) to externally audit the six continuous analysers operated within the district. Currently this audit has occurred annually since 2005, however from the 2007 financial year it is hoped that this auditing will occur biannually. This will depend on the availability of funding.

## Trends in Results

The particulate analyser located in Totton has only been on site since 2005, therefore the analyser has not been located for a long enough period for a comparison of results to be made.

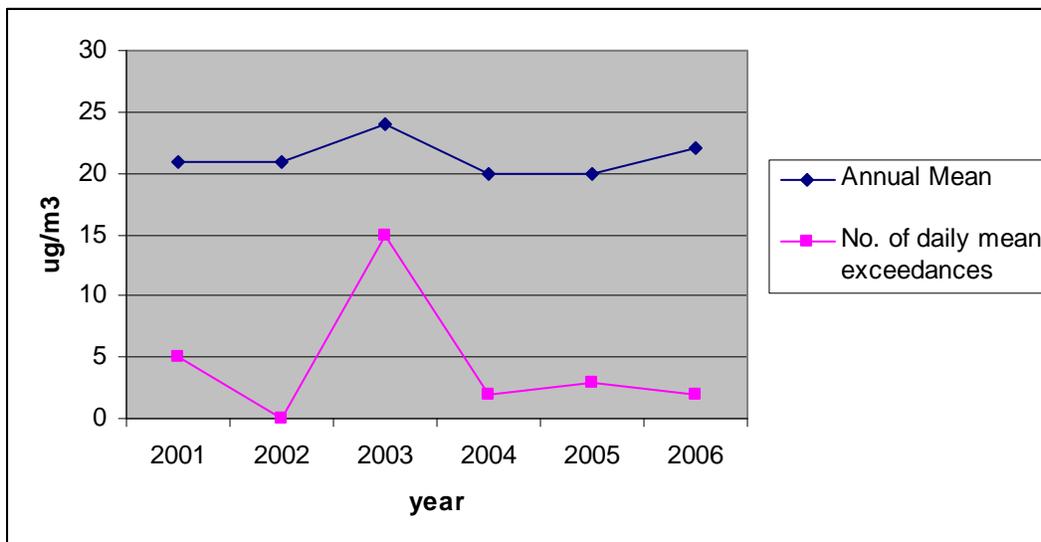
However the particulate analyser in Holbury has been on site since 2001, therefore Graph 4 shows the results from this site.

The set objectives for particulates are as follows;

POLLUTANT	OBJECTIVE
PM <sub>10</sub>	50 µg/m <sup>3</sup> or less when expressed as a 24hr mean not to be exceeded more than 35 times a year to be achieved by 31st December 2004.
	40 µg/m <sup>3</sup> or less when expressed as an annual mean to be achieved by 31st December 2004.

### Graph 4

Graph showing the trend in particulate matter at the Holbury analyser site.



The graph showing the trend in results from the Holbury site shows that the results are well within both objectives set for particulate matter. The results have also been consistent for the previous 6 years, with the exception of 2003. In this year the annual mean showed a slight increase however the number of daily exceedances monitored showed a noticeable increase, although the results were within the set objectives.

## **Discussion**

The particulate results for 2006 show that it is likely that the objectives for particulate matter will be met at the current locations.

The analyser located at Totton will remain at its current location due to its ideal location within an Air Quality Management Area declared for nitrogen dioxide due to congested traffic. Following current air quality helpdesk guidance<sup>4</sup>, which takes into account Defra guidance, it is unlikely that the current TEOM analyser at the Totton site will be changed by the addition of a filter dynamic measurement system (FDMS) or by replacing with a different particulate analyser. This situation will be reviewed if the Defra guidance changes or the current analyser requires replacement.

The analyser at Holbury has shown consistent results for the past 6 years well within the set objectives. There may be an opportunity during 2007 to move this analyser to a new location in a residential area outside Marchwood Industrial Estate which is undergoing development including the construction of Marchwood Power.

If this move occurs it is likely that the analyser would be located at this site for a minimum of 3 years, however the opportunity will remain to move the analyser back to Holbury. This is because the housing for the site will remain in Holbury due to the site also being used for the location of the sulphur dioxide analyser.

If the Authority does relocate this particulate analyser it will have to consider whether there is funding available to install an FDMS system onto the current analyser.

## **2.5 Monitoring Conclusions**

During 2006 the monitored pollutants have shown the likely exceedence of the annual mean objective for nitrogen dioxide in both Lyndhurst and Totton. However the 4 diffusion tube exceeding sites and 1 continuous analyser exceeding site are within the declared Air Quality Management Areas in Lyndhurst and Totton.

A further 3 diffusion tube sites within both declared Air Quality Management Areas are just below the annual mean objective for nitrogen dioxide. However 2 diffusion tube sites in Totton outside the current Air Quality Management Area have shown an annual mean for nitrogen dioxide in 2006 just below the set objective. Therefore the Authority will have to proceed to a Detailed Assessment for these sites in Commercial Road and Ringwood Road in Totton.

The trends in the diffusion tube results whilst quite difficult to compare do show consistency in the results at each site. The trend survey will be more interesting to the Authority once further annual results are obtained over the next few years.

The monitoring during 2006 for sulphur dioxide and particulate matter has not shown a likely exceedence of the objectives set for these pollutants. The Authority will however continue to monitor for these pollutants at the current locations with the possible exception of the particulate matter analyser at Holbury which may be relocated to Marchwood during 2007. It is noted that if such a move were to proceed the particulate matter monitor could be moved back to its current location at Holbury.

The trend results for sulphur dioxide show that 2005 produced the highest results at both locations. The monitored concentrations resulted in the declaration of an Air Quality Management Area with regards to the 15 minute mean objective at Fawley. It should be noted that the 2006 monitored results are within the set objectives at both locations. The trend graphs also showed that it is the 15 minute mean objective which has been of interest for the monitored results.

The trend results for particulate matter were only produced for the Holbury site. The results show that results for both set objectives have been consistent over the past 6 years, with a peak observed in 2003. However it is also noted that the results are all within the current set objectives for particulate matter.

## **3.0 NEW LOCAL DEVELOPMENTS**

This section is to list any new developments or industrial processes in the district, which may have an impact on air quality either directly or through additional traffic generated. The Progress Report will just be a log of such changes, which will be considered further in the next round of the review and assessment of air quality.

### **3.1 New Industrial Processes**

Following consultation with Environmental Health and Environment Agency officers, there are no new industrial processes in the district.

It is noted that Marchwood Power are in the process of starting to construct a power plant. The plant will supply an electricity output of 800 MW to the National Grid via 2 gas turbines, 2 waste heat recovery boilers and a steam turbine. Marchwood Power is a permitted process due to operate from September 2008.

As part of the planning conditions concerning this site, a real time nitrogen dioxide analyser is being installed in a neighbouring residential location. Whilst the site will be owned by Marchwood Power, the Local Authority will operate the site in accordance with the Authority's other real time analyser sites. In addition the Authority will locate further nitrogen dioxide diffusion tubes in relevant residential locations in Marchwood village and close to the main routes that the site vehicles will use.

### **3.2 New Developments**

This list only includes those developments which have been granted planning permission and may have an impact on air quality.

Following consultation with Environmental Health officers, local Planning officers and County Council Transport Planners, there are no new developments in the district.

It is noted that from March 2005, the majority of the New Forest district has been designated National Park status. As a result residential and commercial developments within the National Park will be subjected to changes in the planning rules. In most cases this will result in a tightening of the planning rules within the National Park area.

### **3.3 New Landfill Sites / Quarries**

This list only includes sites which have been granted planning permission and have relevant nearby exposure.

Following consultation with Environmental Health and Planning officers, there are no new landfill sites or quarries within the district which have relevant exposure.

## **4.0 ADDITIONAL INFORMATION**

### **4.1 Update on Air Quality Management Areas**

New Forest District Council has declared three Air Quality Management Areas within its district. The current status of these Air Quality Management Areas is shown in Table 6.

**Table 6**

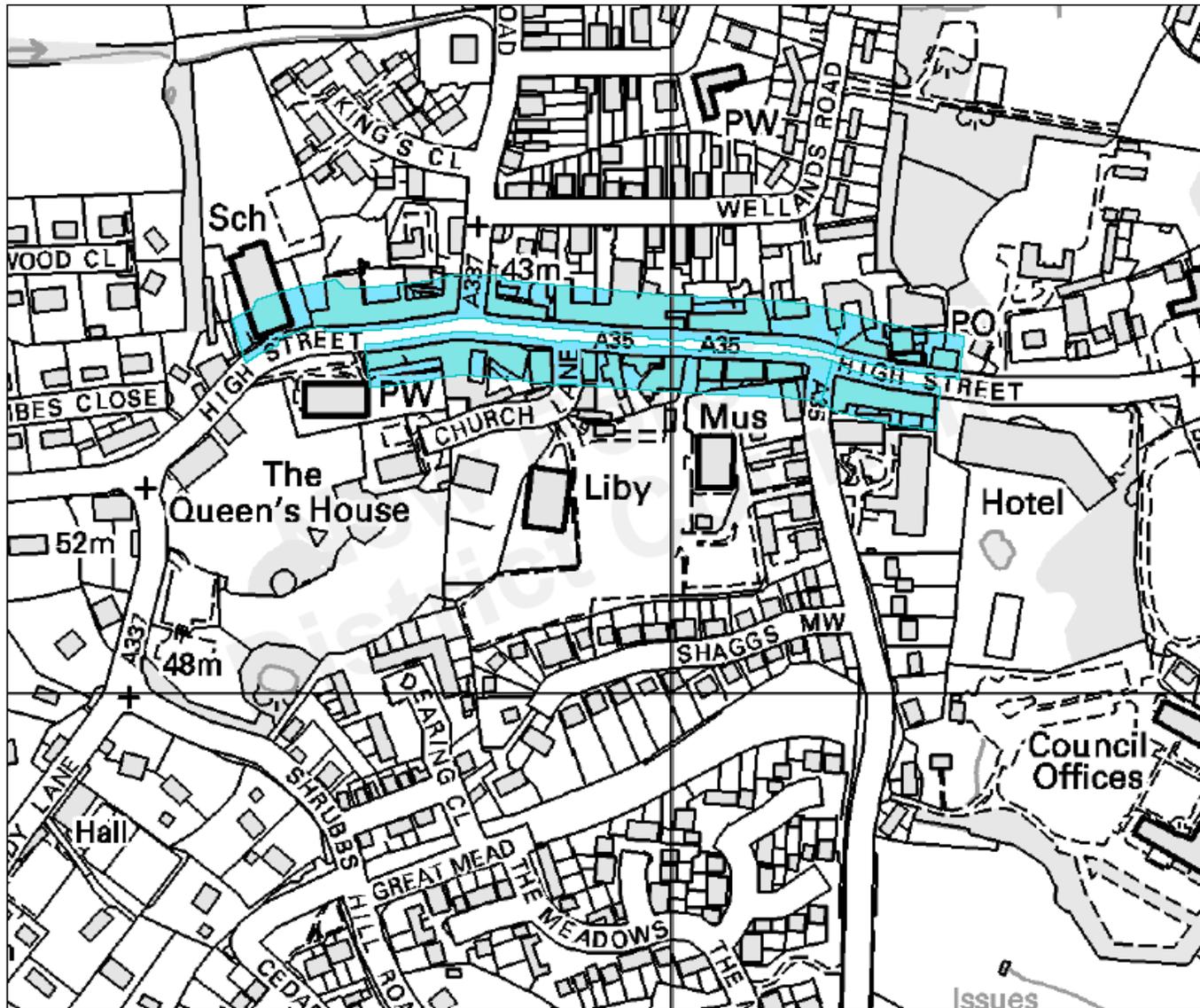
**Table showing the current status of the Air Quality Management Areas in New Forest District Council**

<b>Site</b>	<b>Pollutant of concern</b>	<b>Objective exceeded</b>	<b>AQMA declared</b>	<b>Current status</b>
<b>Lyndhurst</b>	NO <sub>2</sub>	Annual mean	June 2005	Draft Action Plan out to consultation.
<b>Totton</b>	NO <sub>2</sub>	Annual mean	June 2005	Draft Action Plan out to consultation.
<b>Fawley</b>	SO <sub>2</sub>	15 min mean	December 2005	Draft Action Plan due out to consultation summer 2007.

#### **Lyndhurst**

The Air Quality Management Area for Lyndhurst is shown on page 38.

The main source of nitrogen dioxide is from traffic which has resulted in the exceedance of the annual mean objective for nitrogen dioxide. The cause of the problem is from traffic queuing at lights within a street canyon.



DRAWING No.		
REVISIONS		
© Crown copyright. All rights reserved New Forest District Council licence no. 100026220 2007		
 <b>New Forest</b> DISTRICT COUNCIL		
Community Services Directorate Town Hall Avenue Road Lymington Hampshire SO41 5ZZ		
Tel (023) 8028900 Fax (023) 8028943		
SCHEME		
TITLE		
Lymington Air Quality Management Area		
DATE	SCALE	
DESIGNED	DRAWN	CHECKED
DRAWING NO.		

## Totton

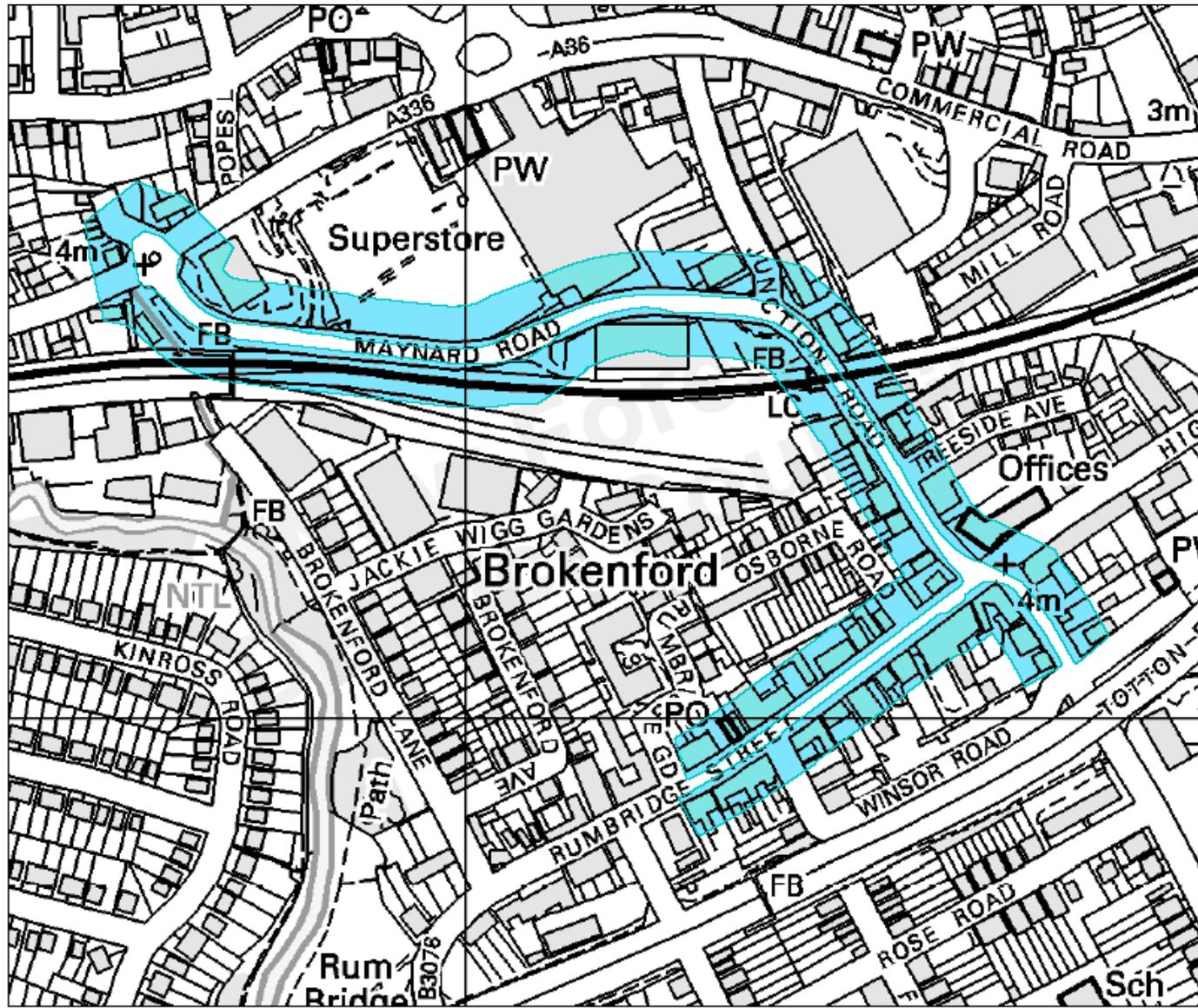
The Air Quality Management Area for Totton is shown on page 40.

The main source of nitrogen dioxide is from traffic which has resulted in the exceedance of the annual mean objective for nitrogen dioxide. The cause of the problem is from traffic queuing at the railway barrier which on average has a down time of 20 minutes in every hour.

The consultation periods for the draft Action Plans for Lyndhurst and Totton are due to finish on the 6<sup>th</sup> August 2007. In addition to the statutory consultees the Authority has also consulted Parish and Town councils, relevant businesses, the police authority and Network Rail. The Authority is also welcoming comments from the public and have distributed consultation leaflets with return section in Lyndhurst and Totton and put the full draft Action Plans on the Authority's website;

<http://www.newforest.gov.uk/index.cfm?articleid=185>

The draft Action Plans were produced with the assistance of district council and county council Transport Planners.



DRAWING No.		
REVISIONS		
© Crown copyright. All rights reserved New Forest District Council licence no. 10026220 2007		
 <b>New Forest</b> DISTRICT COUNCIL		
Community Services Directorate Town Hall Avenue Road Lyntonham Hampshire SO41 8ZG Tel (023) 85285000 Fax (023) 85285943		
SCHEME		
TITLE Totton Air Quality Management Area		
DATE	SCALE	
DESIGNED	DRAWN	CHECKED
DRAWING NO.		

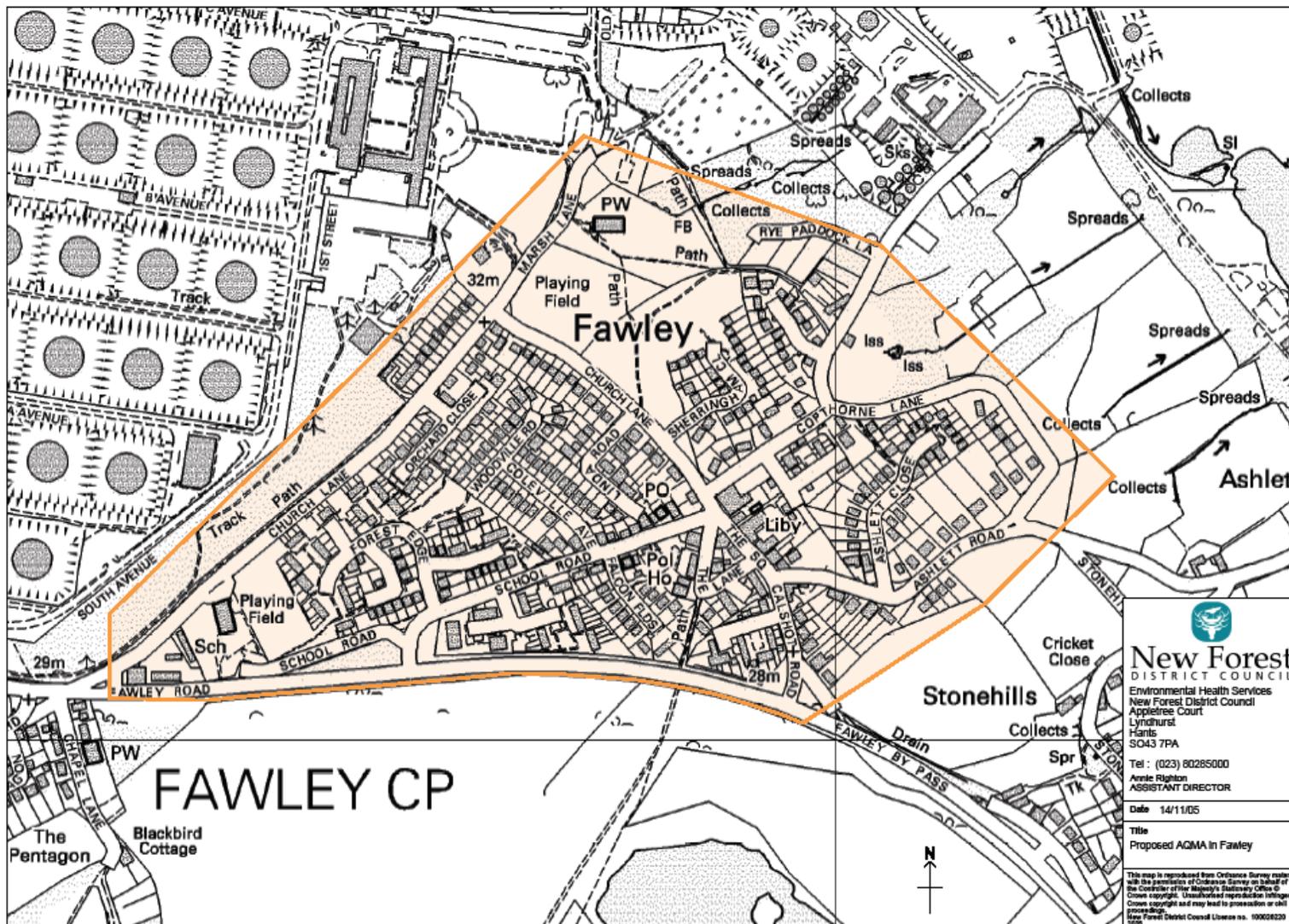
## Fawley

The Air Quality Management Area for Fawley is shown on page 43.

The main source of sulphur dioxide is from industrial emissions and in particular the Exxon Mobil oil refinery situated approximately 1km from Fawley village. It has been established that during specific weather conditions, a north westerly wind over 19 knots, exceedances of the 15 min mean objective are more likely to occur. This is due to the emissions from 4 stacks on the refinery site being lined up and the strength of the wind carrying the emissions onto the village.

It should be noted that procedures have already been put into practice by the refinery to reduce the likely occurrence of the exceedances of the 15 min mean and that not every exceedance of the 15 min mean have occurred during the weather conditions outlined above. However it has been determined that exceedances of the 15 minute mean objective are more likely during such weather conditions.

The draft Action Plan for Fawley is due out for consultation during the summer 2007 and will be produced with the assistance of the Environment Agency and the Exxon Mobil refinery.



  
**New Forest**  
 DISTRICT COUNCIL  
 Environmental Health Services  
 New Forest District Council  
 Appletree Court  
 Lyndhurst  
 Hants  
 SO43 7PA  
 Tel : (023) 80285000  
 Annie Righton  
 ASSISTANT DIRECTOR  
 Date 14/11/05  
 Title  
 Proposed AQMA in Fawley  
This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil penalties.  
 New Forest District Council Licence no. 100026220 2005

© Crown copyright. All rights reserved New Forest District Council licence no. 100026220 2007

## **4.2 Implementation of Local Transport Plans and Strategies**

### **Local Transport Plan**

New Forest District Council forms part of the Hampshire Local Transport Plan. Due in part to the proposed Air Quality Management Areas being related to traffic movements and congestion, the local and county transport planners have integrated air quality into the Local Transport Plan<sup>5</sup>. The Local Transport Plan was published in March 2006 and covers the period 2006 – 2011.

The Local Transport Plan focuses in part on the issues surrounding the New Forest, with noted aims including;

- to help deliver the aims and objectives of the New Forest Committee's strategy for the New Forest.
- to reduce adverse impacts of traffic on the environment and local communities especially in the designated National Park.

and objectives including;

- to promote new and improved passenger transport, cycling and walking facilities that are accessible to all and that provide safe, reliable, affordable and attractive alternatives to the car.
- to provide imaginative local solutions . . . . . (to) reduce air pollution . . . . .

To date, meetings between Environmental Health and the local and county Transport Planners have focused on the traffic problems within the proposed Air Quality Management Areas. The Local Transport Plan includes options to improve air quality and traffic congestion, and these options are also included within the Air Quality Action Plans for both Lyndhurst and Totton. Currently a number of the options are being assessed for feasibility by Hampshire County Council's transport department.

## **Local Plan**

The New Forest District Local Plan (first alteration)<sup>6</sup> is a document produced by New Forest District Council. The Local Plan provides detailed planning policies to guide and control the use of land, against which applications for planning permission will be determined. The Local Plan, which was adopted in 2005, must conform generally to the adopted Hampshire County Structure Plan 1996 – 2011.

Objective 11 states that the Local Plan will;

- protect air and water quality and reduce the burden of pollution of air, land and water by controlling potentially polluting development (with reference to PPS23).

## **Future Matters**

Future Matters is a recently released consultation document, which has been jointly produced by New Forest Local Strategic Partnership, New Forest District Council and the New Forest National Park Authority.

Future Matters involves three plans which overlap in some capacity;

- New Forest District Community Strategy
- New Forest National Park Management Plan
- Local Framework Development (which will gradually replace the New Forest Local Plan)

These plans will set out policies for the future and what each organisation will achieve. The Future Matters consultation is the opportunity for the public and organisations to help determine their environment and quality of life in the New Forest now and in the future. Recent results have shown that 58% of 146 organisations and 63% of 429 individuals surveyed, list improving air quality as important.

Within the consultation document there is reference to the duty placed on Local Authorities to review and assess air quality within its district and the work that has, to date, been undertaken.

### **4.3 Planning and Policies**

This list only includes those developments for which a planning application has been received and which may have an impact on air quality either directly or through additional traffic generated.

Following consultation with Environmental Health staff and local Planning officers, there are no new planning applications which may impact on air quality in the district.

However, Totton is currently in the process of general improvements to the town which is as a result of the Urban Design Framework<sup>7</sup> document. This document has been produced jointly by Hampshire County Council, New Forest District Council and Totton and Eling Town Council as supplementary planning for Totton. The document was adopted in 2003.

The document acknowledges the air quality issues in Totton and outlines numerous schemes some of which are also options within the Action Plan for Totton, for example cycle routes and improvements for pedestrians in the town centre. Therefore it is essential that air quality is a material consideration during the progression of the Urban Design Framework for Totton to ensure any schemes or planned developments do not have a negative impact on local air quality.

With regards to planning policy in light of guidance contained in document entitled 'Best Practice Guidance on the Validation of Planning Applications' and PPS23 'Planning and Pollution Control' the Authority's current procedures are such that Environmental Health are consulted on air quality issues if the application directly refers to air quality or, if either Planning or Environmental Health officers deem it necessary for comment to be made on the application.

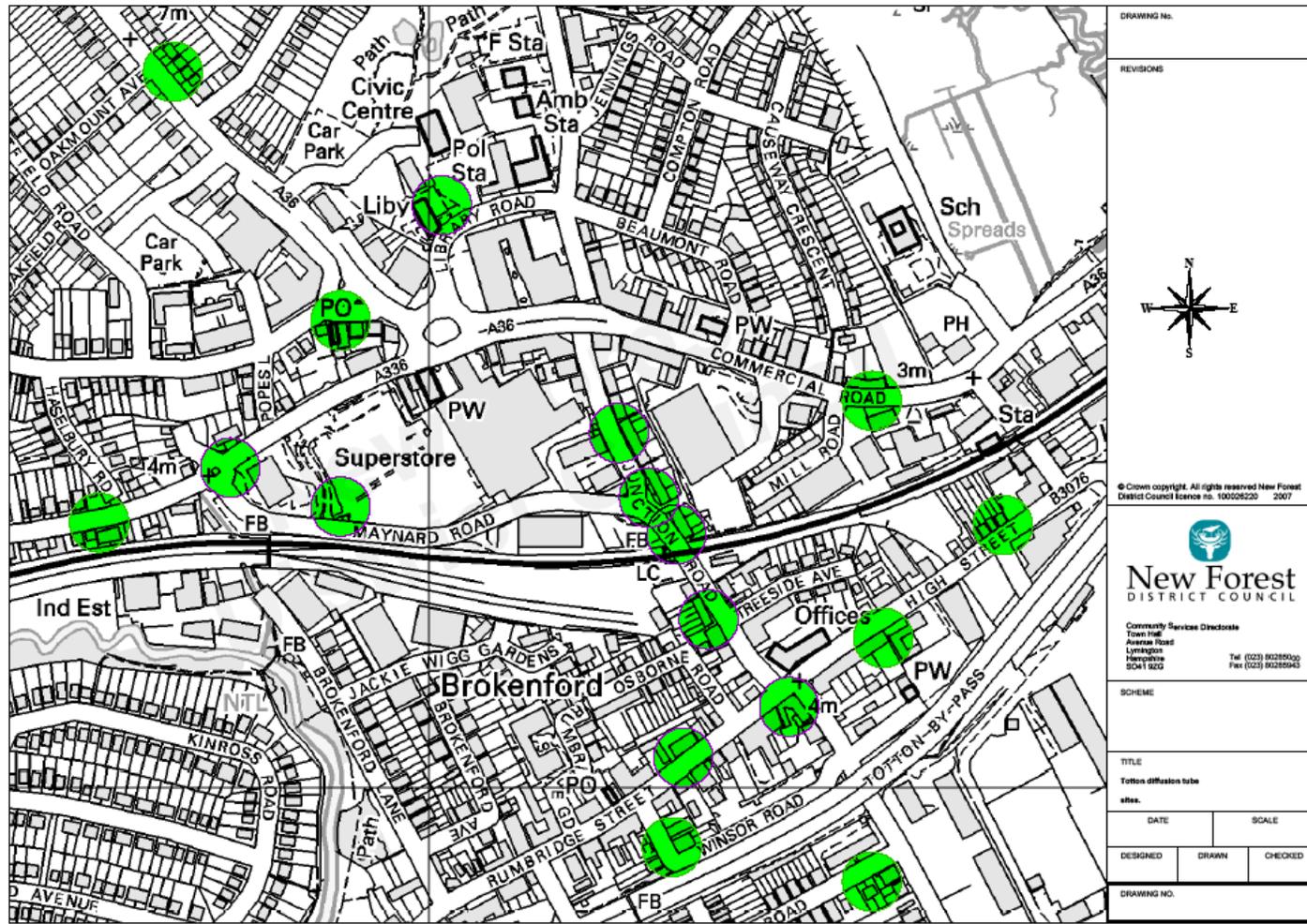
## **REFERENCES**

1. Local Air Quality Management – Technical Guidance LAQM. TG(03) – DEFRA.
2. [http://www.airquality.co.uk/archive/laqm/tools/AEA\\_DifTPAB\\_v03.xls](http://www.airquality.co.uk/archive/laqm/tools/AEA_DifTPAB_v03.xls)
3. Nitrogen dioxide diffusion tube correction spreadsheet published by Air Quality Consultants on behalf of DEFRA. Website address;  
<http://www.uwe.ac.uk/aqm/review/diffusiantube280205.xls>
4. <http://www.laqmsupport.org.uk/faqs.php?action=search>
5. Hampshire County Council Local Transport Plan 2006 – 2011. **Hampshire County Council.**
6. Adopted Local Plan, First Alteration. **August 2005. New Forest District Council.**
7. Totton Town Centre – Urban Design Framework. New Forest District Local Plan. Supplementary Planning Guidance. **New Forest District Council. 2003.**

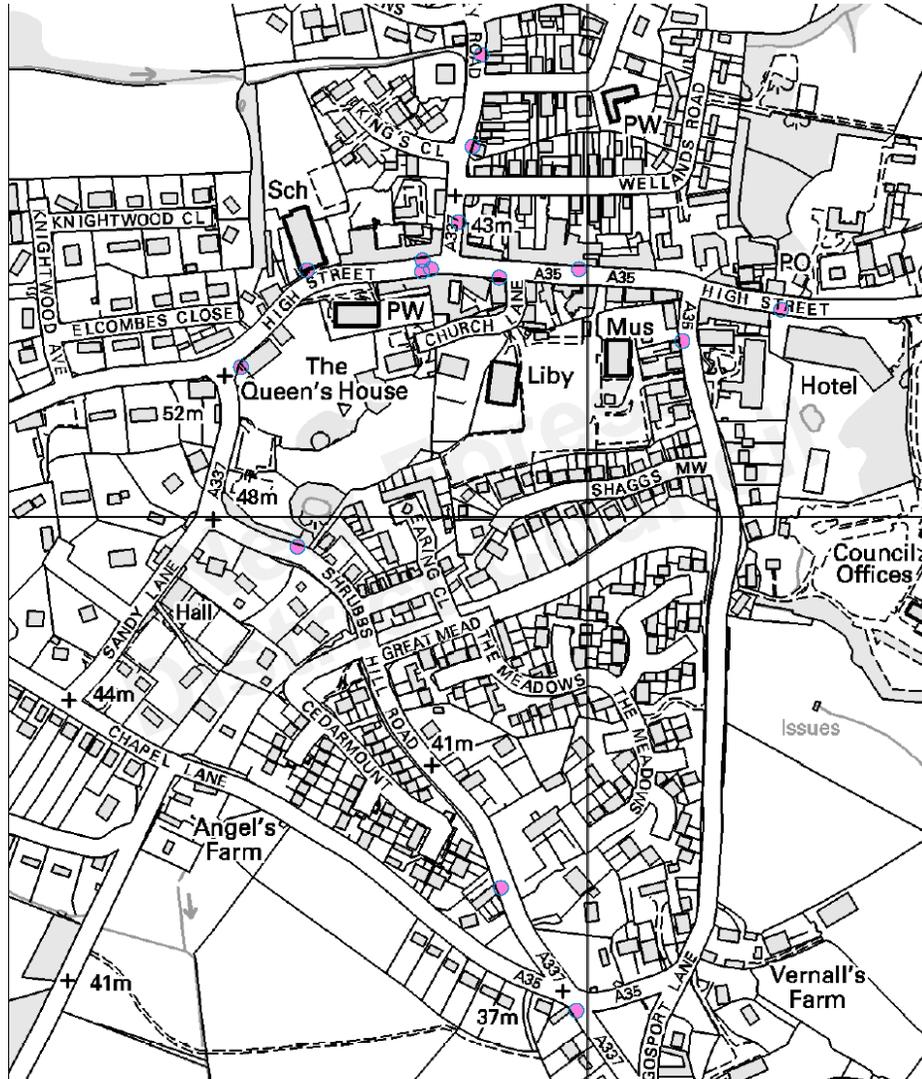
## **APPENDICES**

# APPENDIX 1

## TOTTON DIFFUSION TUBE SITES



**LYNDHURST DIFFUSION TUBE SITES**



 <b>New Forest</b> DISTRICT COUNCIL  Community Services Directorate Town Hall Avenue Road Lymington Hampshire SO41 9ZG Tel (023) 80285000 Fax (023) 80285943	REVISIONS  	SCHEME  TITLE <b>Appendix 1</b>					
	© Crown copyright. All rights reserved New Forest District Council licence no. 100026220 2007	<table border="1"> <tr> <td>DATE</td> <td>SCALE</td> <td rowspan="2">DRAWING NO.</td> </tr> <tr> <td>DESIGNED</td> <td>DRAWN</td> <td>CHECKED</td> </tr> </table>	DATE	SCALE	DRAWING NO.	DESIGNED	DRAWN
DATE	SCALE	DRAWING NO.					
DESIGNED	DRAWN		CHECKED				

# APPENDIX 1

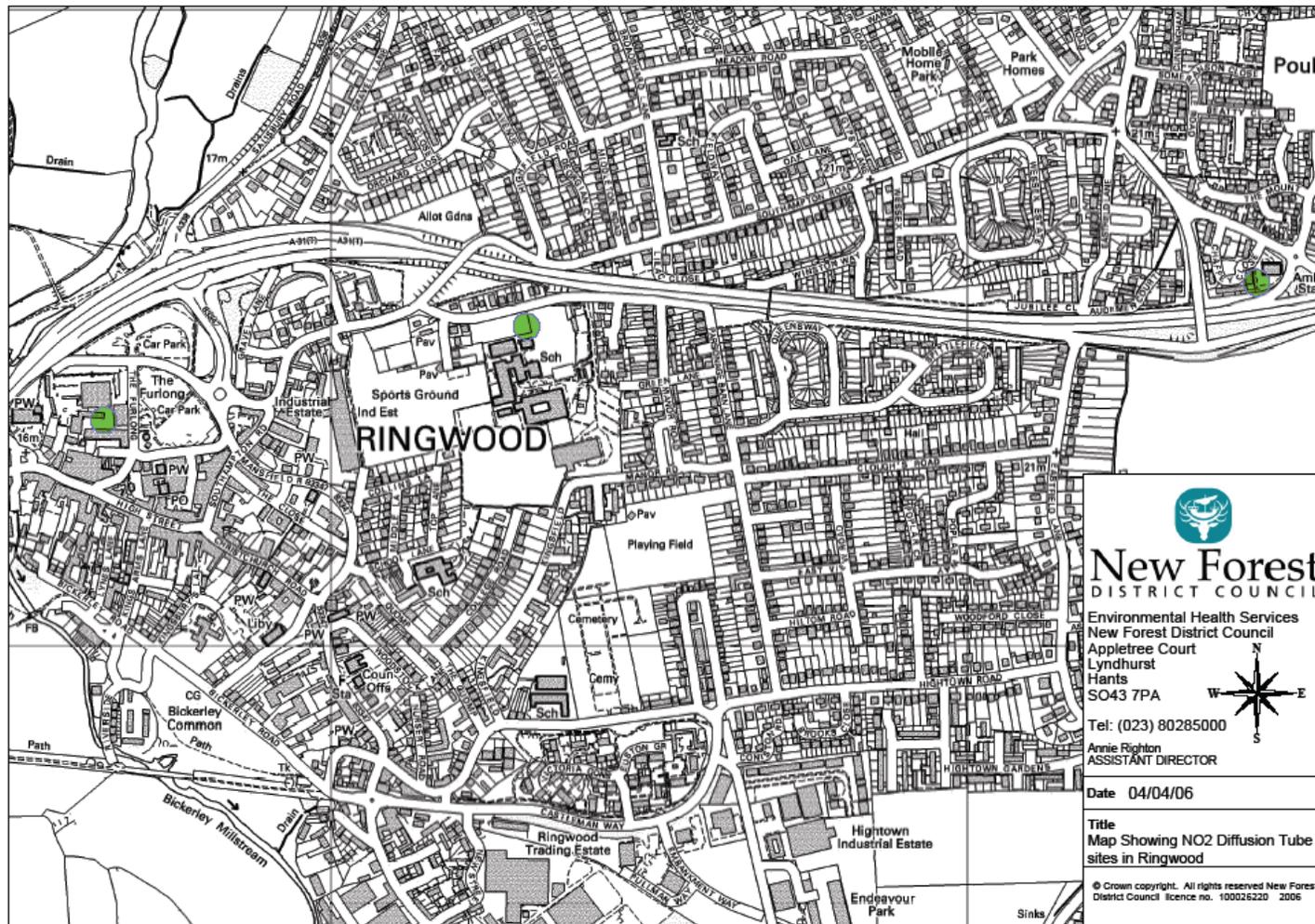
## HOLBURY AND FAWLEY DIFFUSION TUBE SITES



© Crown copyright. All rights reserved New Forest District Council licence no. 100026220 2007

# APPENDIX 1

## RINGWOOD DIFFUSION TUBE STES



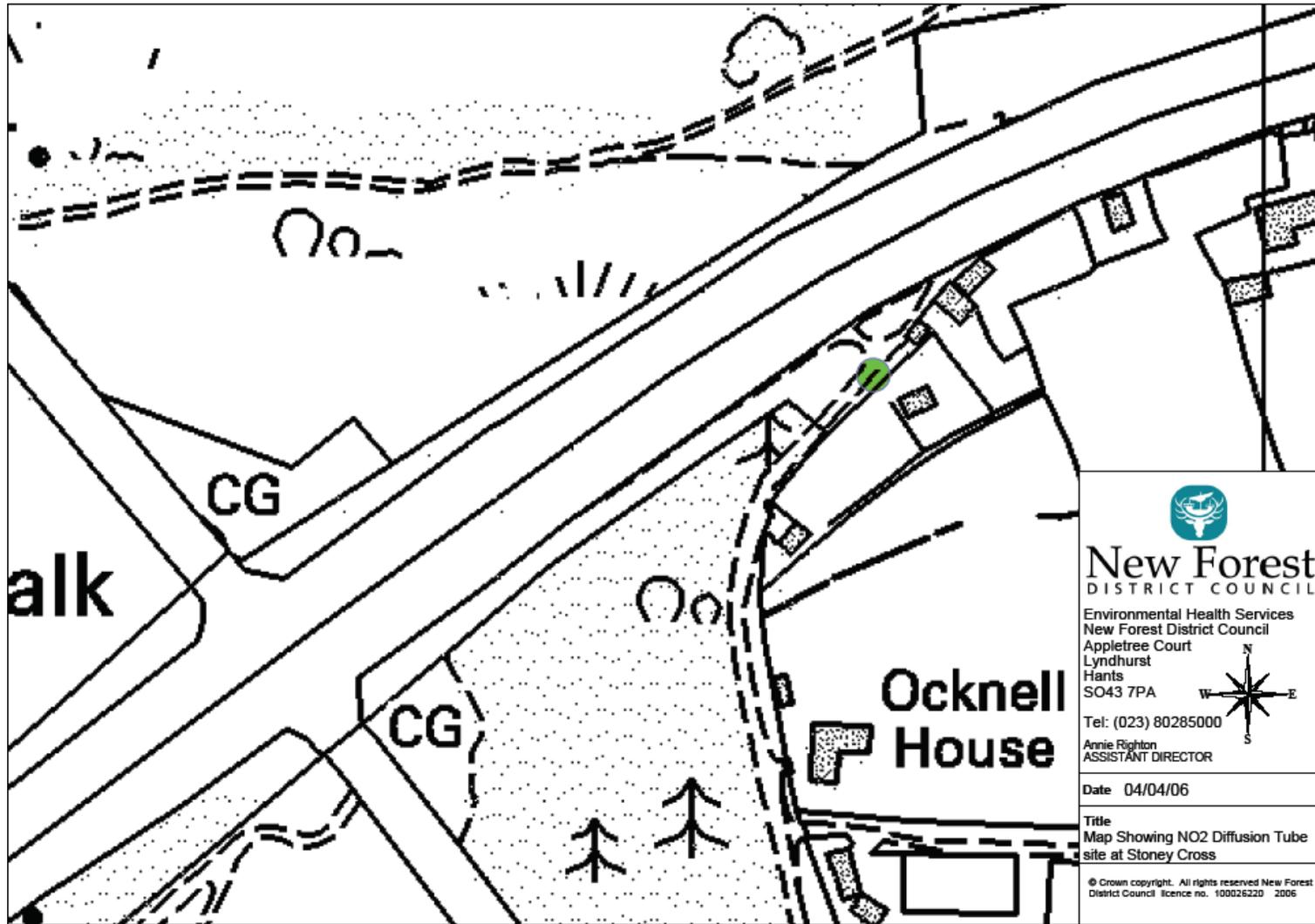
# APPENDIX 1

## MARCHWOOD DIFFUSION TUBE SITES



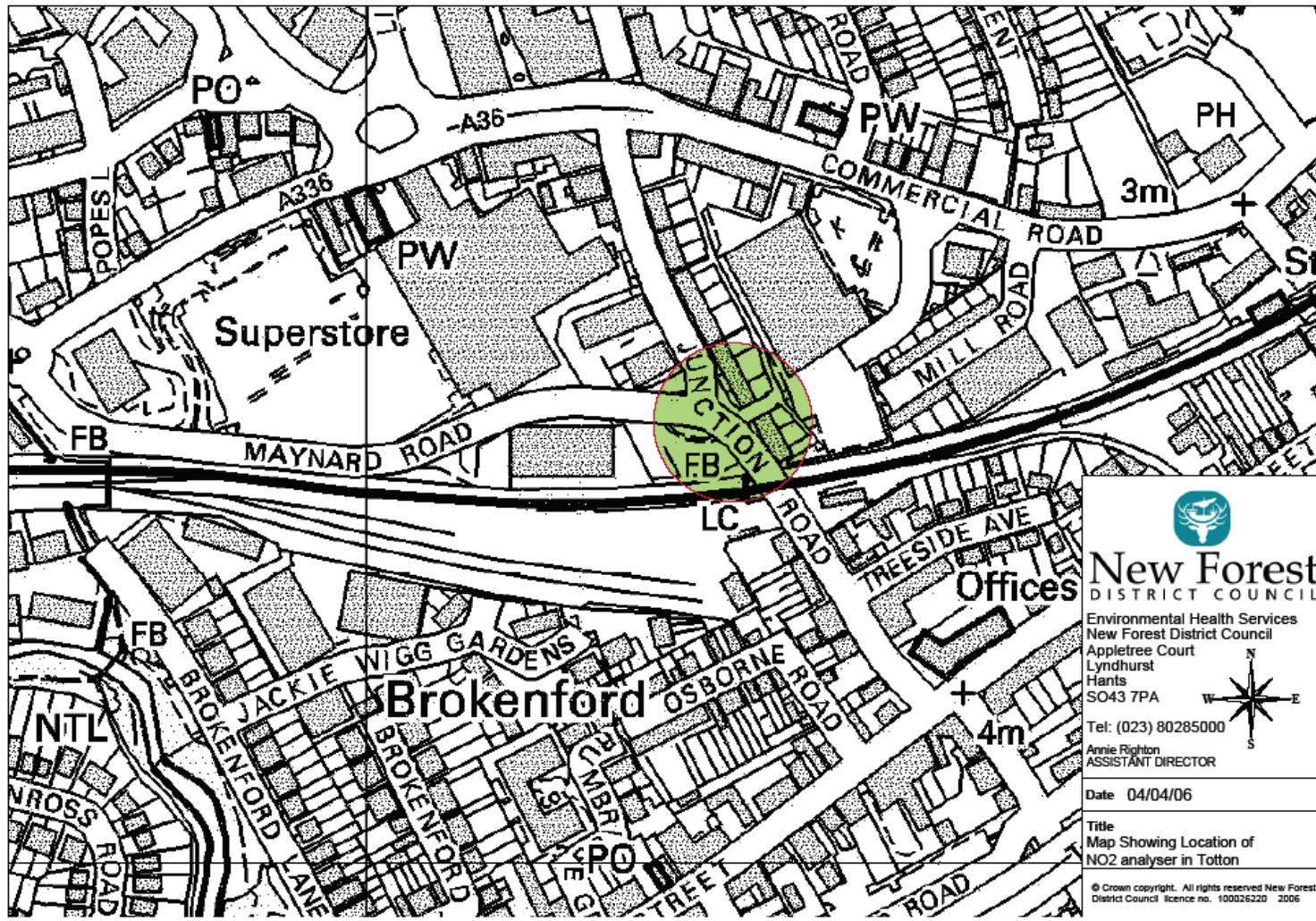
**APPENDIX 1**

**STONEY CROSS DIFFUSION TUBE SITE**



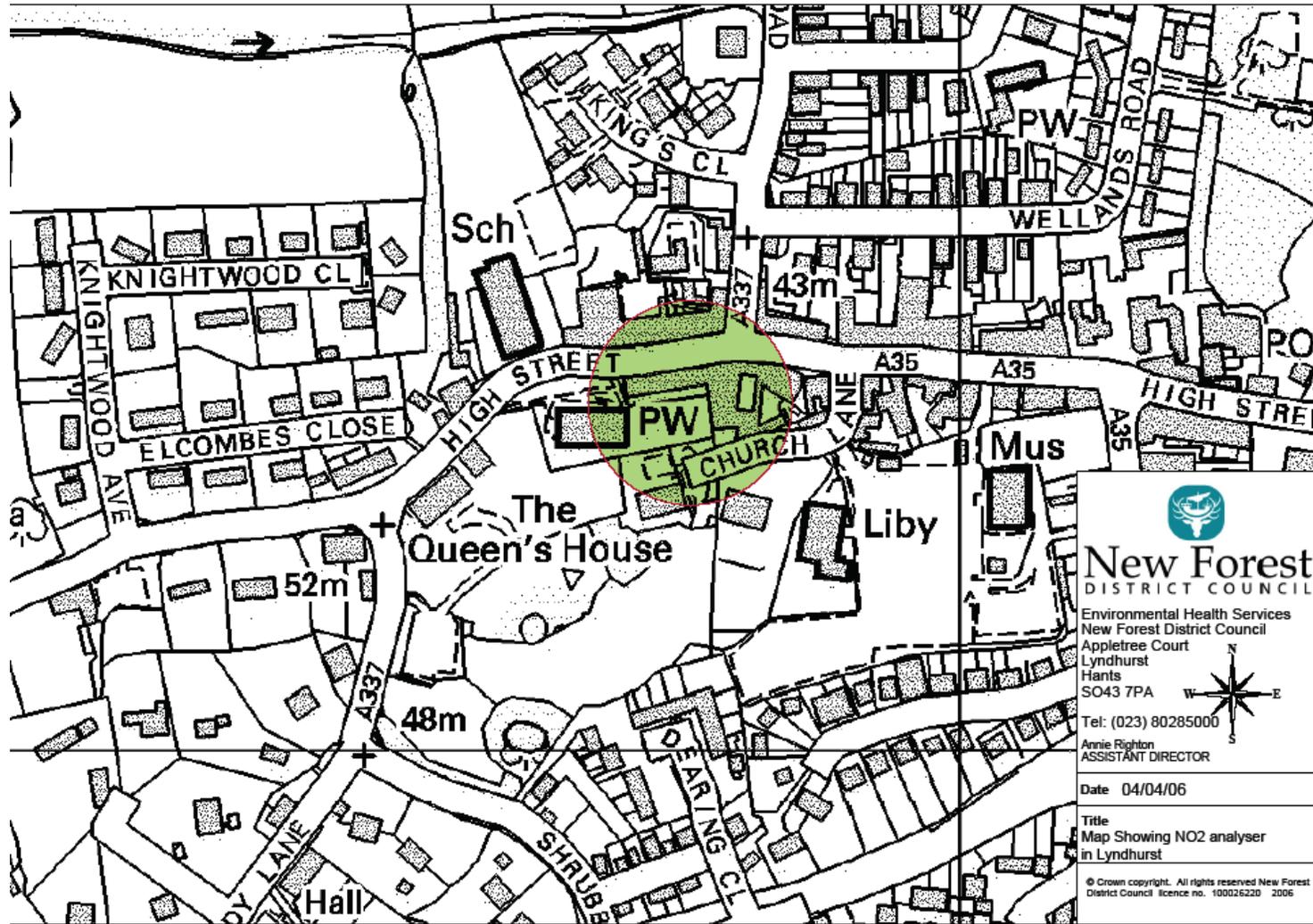
## APPENDIX 2

### NO<sub>2</sub> REAL TIME ANALYSER SITE -TOTTON



## APPENDIX 2

### NO<sub>2</sub> REAL TIME ANALYSER SITE – LYNDHURST



### Checking Precision and Accuracy of Triplicate Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	12/01/2006	10/02/2006	41.05	40.89	41.52	41	0.3	1	0.8
2	10/02/2006	15/03/2006	35.29	30.15	33.15	33	2.6	8	6.4
3	15/03/2006	05/04/2006	32.17	29.71	27.02	30	2.6	9	6.4
4	05/04/2006	03/05/2006	30.23	24.81	27.8	28	2.7	10	6.7
5	03/05/2006	31/05/2006	30.5	30.1	29.12	30	0.7	2	1.8
6	31/05/2006	29/06/2006	29.02	28.73	26.88	28	1.2	4	2.9
7	29/06/2006	26/07/2006	37.23	44.56	38.42	40	3.9	10	9.8
8	26/07/2006	23/08/2006	24.17	24.98	26.75	25	1.3	5	3.3
9	23/08/2006	19/09/2006	29.27	30.42	29.27	30	0.7	2	1.6
10	19/09/2006	16/10/2006	39.19	35.13	40.17	38	2.7	7	6.6
11	16/10/2006	15/11/2006							
12	15/11/2006	12/12/2006	24.90	34.98	36.92	32	6.5	20	16.0
13	12/12/2006	10/01/2007	26.88	30.87	29.30	29	2.0	7	5.0

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
42.80	100	Good	Good
35.50	100	Good	Good
27.20	100	Good	Good
30.60	96	Good	Good
27.60	100	Good	Good
32.70	99	Good	Good
36.30	66	Good	for Data Capture
19.30	72	Good	for Data Capture
26.00	100	Good	Good
31.40	100	Good	Good
36.30	100	Good	Good
27.40	100	Poor Precision	Good
30.40	100	Good	Good
Overall survey →		Good precision	Good Overall DC

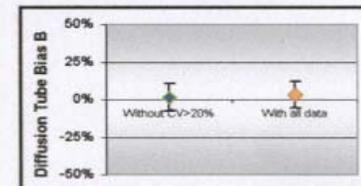
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: **Totton**

Accuracy (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 9 periods of data	
Bias factor A	0.99 (0.91 - 1.09)
Bias B	1% (-8% - 10%)
Diffusion Tubes Mean:	32 $\mu\text{gm}^{-3}$
Mean CV (Precision)	6
Automatic Mean:	32 $\mu\text{gm}^{-3}$
Data Capture for periods used:	99%
Adjusted Tubes Mean:	31 (29 - 35) $\mu\text{gm}^{-3}$

Precision 11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 10 periods of data	
Bias factor A	0.98 (0.9 - 1.07)
Bias B	2% (-7% - 11%)
Diffusion Tubes Mean:	32 $\mu\text{gm}^{-3}$
Mean CV (Precision):	7
Automatic Mean:	31 $\mu\text{gm}^{-3}$
Data Capture for periods used:	100%
Adjusted Tubes Mean:	31 (29 - 34) $\mu\text{gm}^{-3}$



Jaume Targa  
jaume.targa@aeat.co.uk  
Version 03 - November 2006

**Checking Precision and Accuracy of Triplicate Tubes**

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	12/01/2006	10/02/2006	48.11	47.71	48.00	48	0.2	0	0.5
2	10/02/2006	15/03/2006	41.26	43.80	46.53	44	2.6	6	6.5
3	15/03/2006	05/04/2006	40.01	44.37	40.56	42	2.4	6	5.9
4	05/04/2006	03/05/2006	43.96	44.3	44.3	44	0.2	0	0.5
5	03/05/2006	31/05/2006	43.89	47.88	47.62	46	2.2	5	5.4
6	31/05/2006	29/06/2006	51.68	53.3	51.51	52	1.0	2	2.5
7	29/06/2006	26/07/2006	66.54	61.42	62.61	64	2.7	4	6.7
8	26/07/2006	23/08/2006	48.29	50.18	49.78	49	1.0	2	2.5
9	23/08/2006	19/09/2006	57.57	42.91	48.18	50	7.4	15	18.4
10	19/09/2006	16/10/2006	49.59	45.83	47.00	47	1.9	4	4.8
11	16/10/2006	15/11/2006	48.07	51.38	56.19	52	4.1	8	10.1
12	15/11/2006	12/12/2006	40.08	44.07	43.07	42	2.1	5	5.2
13	12/12/2006	10/01/2007	43.28	37.72	35.78	39	3.9	10	9.7

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
40.70	93	Good	Good
38.50	97	Good	Good
38.10	100	Good	Good
41.00	98	Good	Good
42.40	99	Good	Good
51.60	100	Good	Good
61.40	100	Good	Good
44.10	96	Good	Good
44.50	100	Good	Good
45.50	99	Good	Good
46.50	99	Good	Good
34.60	90	Good	Good
34.80	97	Good	Good
<b>Overall survey →</b>		<b>Good precision</b>	<b>Good Overall DC</b>

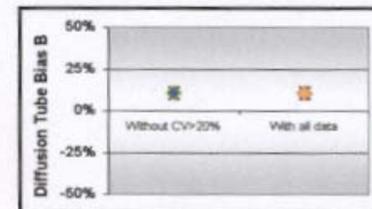
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: **Lyndhurst**

Precision 13 out of 13 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 13 periods of data	
Bias factor A	0.91 (0.88 - 0.94)
Bias B	10% (5% - 14%)
Diffusion Tubes Mean:	48 $\mu\text{gm}^{-3}$
Mean CV (Precision)	5
Automatic Mean:	43 $\mu\text{gm}^{-3}$
Data Capture for periods used:	98%
Adjusted Tubes Mean:	43 (42 - 45) $\mu\text{gm}^{-3}$

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 13 periods of data	
Bias factor A	0.91 (0.88 - 0.94)
Bias B	10% (6% - 14%)
Diffusion Tubes Mean:	48 $\mu\text{gm}^{-3}$
Mean CV (Precision)	5
Automatic Mean:	43 $\mu\text{gm}^{-3}$
Data Capture for periods used:	98%
Adjusted Tubes Mean:	43 (42 - 45) $\mu\text{gm}^{-3}$



Jaume Targa  
jaume.targa@aeat.co.uk  
Version 03 - November 2006

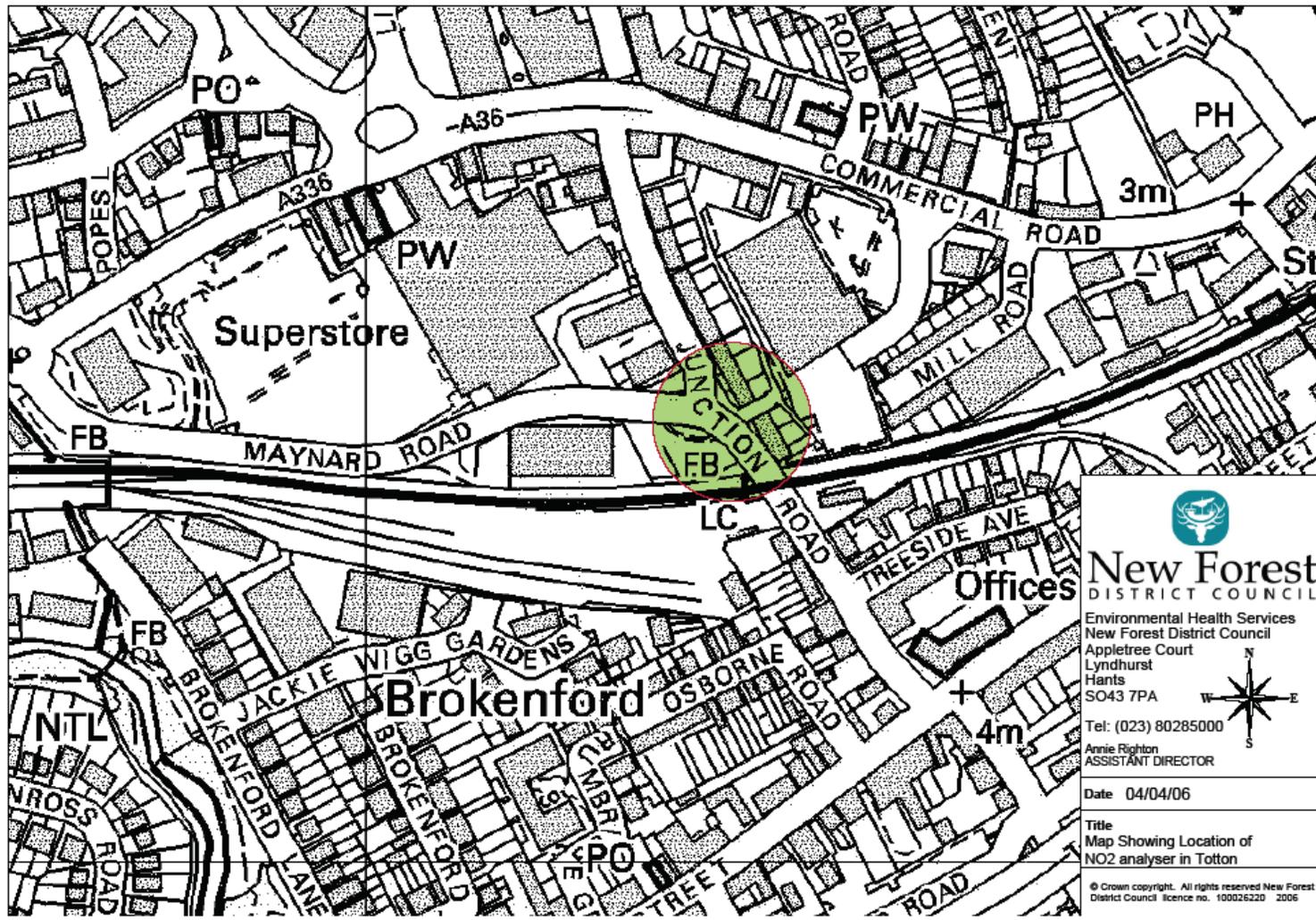
**SO<sub>2</sub> REAL TIME ANALYSER SITES – HOLBURY AND FAWLEY**



© Crown copyright. All rights reserved New Forest District Council licence no. 100026220 2007

**APPENDIX 5**

**PARTICULATE REAL TIME ANALYSER SITE -TOTTON**



# APPENDIX 5

## PARTICULATE REAL TIME ANALYSER - HOLBURY

