

Salisbury District Council Air Quality Review and Assessment

Progress Report on Air Quality April 2005.



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1. Executive summary

All local authorities are under a duty conferred by the Environment Act 1995 to investigate air quality within their administrative areas, and determine whether it will achieve the objectives contained in the national air quality strategy.

This is the latest publication in our ongoing Review and Assessment of air quality within the district. We have determined that the only parameter of concern is the annual mean objective for nitrogen dioxide of 40ug/m³ (micrograms per cubic metre) which is to be met by the 31st December 2005. This has led to the declaration of 5 Air Quality Management Areas (AQMAs) in the City Centre and a further AQMA on the A36 at Wilton. Further work undertaken in 2004 recommended the revocation of the AQMA at Wilton.

The primary source of nitrogen dioxide (NO₂) is vehicle exhaust fumes.

An Air Quality Action Plan based on the Salisbury Transport Plan (STP) was adopted as the means to achieve the nitrogen dioxide annual mean objective.

This report focuses on the latest monitoring data for nitrogen dioxide we have obtained for the city centre and on progress with implementing the city Centre AQAP.

The report concludes that the STP is required to achieve the objective. The suspension of funding in 2003 has delayed benefits to air quality and the objective is not likely to be achieved in Minster Street, Brown Street, and Exeter Street AQMAs until after 2005 but before 2010.

2. Summary of Air Quality Action Plan

Four air quality management areas (AQMAs) were declared in 2003 in Salisbury City Centre on the basis of data that indicated the annual mean objective for nitrogen dioxide would not be met by 31st December 2005.

These were:

- Fisherton Street,
- Milford Street
- Minster Street
- Brown Street

The primary cause of this failure was identified as road traffic. An Air Quality Action Plan (AQAP) for the city centre was adopted, following consultation, based upon the measures put forward in the Salisbury Transportation Plan (STP).

The Government Office developed the STP from a study for the South West (GOSW) of transports needs in the Salisbury area. The overall aim of the study was to:

“Help the Secretary of State decide upon a transport strategy and propose integrated multi-modal measures for a solution of the traffic problems in the Salisbury area”

The STP area faced a 20% increase in traffic if no measures were taken. The plan sought to limit this increase to 10% on trunk and non-trunk routes. This was to be achieved by:

- Allowing the effective flow of through traffic around the outskirts of the city.
- Reducing local congestion.
- Delivering back the highway to pedestrian in the city centre.
- Creating bus priority at traffic signal.

2.1 Mechanisms for achieving the STP aims.

The STP comprises a package of complimentary measures directed at reducing traffic and promoting non-car means of transport. Its principal key elements with respect to the city centre are:

- Measures to support initiatives to reduce traffic and car dependency.
- Provision of park and ride.
- Improvements to public transport.
- Traffic restraint measures.
- Improvements to facilities for cyclists and pedestrians
- City centre traffic management measures.
- An Intelligent transport system.
- Measures to address the most serious local traffic problems
- A solution to the problem of access to Churchfield's industrial Estate

Specific details include, provision of five Park and Ride sites (P&R) on the approaches to the city together with real-time passenger information, a balanced parking strategy incorporating changes to on street parking, residential parking and the overall quality of available city centre parking, restrictions on waiting and loading to enhance free follow of traffic remaining in the centre, bus priority measures and an Urban transport system on the major link roads around the city centre.

2.2 Other initiatives supporting the STP

These include:

- Planning policy. The objective of Salisbury Local Plan is to

“implement a sustainable transportation and land use strategy for the district in partnership with the county council, which minimises the need to travel, reduces reliance on private vehicle and encourages the use of environmentally friendly modes of transport such as public transport, walking and cycling whilst providing good accessibility and promoting economic viability within the district”

- The Brunel Link

An alternative vehicular access to Churchfield's Industrial Estate, which is currently via a mixture of narrow, poorly aligned roads and low bridges. It has been known for large vehicles, such as car transporters to become trapped in the narrow streets, particularly on the corner of Brown Street and Winchester Street.

- Cycling strategy

50% of workers live within 5 miles of their place of work.

- Community transport

Social inclusion is an important consideration in transport policy. There are nine LINK schemes offering a good neighbour service to the elderly, disabled and those on low incomes.

- Motivate Scheme

Salisbury District Council joined the Motivate scheme in 2002. The objective is to reduce carbon dioxide emissions from council vehicles by 12%.

3. Summary of detailed assessment

This document was published subsequent to the action plan and is an element of the second round of review and assessment building on previous work. The objective of the assessment was to further examine areas where there had been significant changes in air quality since the first round of review and assessment, which might lead to a risk of an air quality objective being exceeded.

The principal conclusions of the report were that:

- The four AQMAs in Salisbury City Centre should remain
- That a further AQMA should be declared in Exeter Street
- The Brown Street AQMA be extended slightly to incorporate Winchester Street
- London Road and Wilton Road be kept under review.

A new Air Quality Management Area was declared in Exeter Street in January 2005. This took in both part of Ivy Street and St Johns Street, which are concurrent with Exeter Street and the one-way system. The AQMA for Brown Street was modified at the same time by separate order. The areas covered by the orders are illustrated in appendix 1.

4. New air quality monitoring

Air quality monitoring has continued using diffusion tubes and two real time monitors for particulate matter and oxides of nitrogen.

4.1 Diffusion tube monitoring.

There are twenty-two locations monitored using diffusion tubes throughout the city centre.

Quality assurance of the analysis of diffusion tubes includes activities such as the use of analytical and field blanks and co-locating diffusion tubes with the real time analysers. The analytical laboratory used is Bristol Scientific Services who are accredited to recognised standards. They participate in the Workplace Analysis Scheme for Proficiency (WASP) for both nitrogen dioxide and benzene tubes. A WASP report for the Nitrogen dioxide tubes is enclosed at appendix 8

In the case of nitrogen dioxide analysis BSS also analyse a solution supplied by AEA technology as part of the QA/QC scheme that they run. The results are returned to them on a monthly basis. They also participate in occasional comparison exercises again run by AEA Technology.

Reference materials and equipment are obtained from suppliers all of whom are approved to BS EN ISO9001. All reference materials are of at least analytical grade or equivalent

4.1.1 Diffusion tube results - non AQMAs

Table 1:

Site	Annual Mean Concentration / $\mu\text{g}/\text{m}^3$								
	1998	1999	2000	2001	2002	2003	2004	Predicted 2005	Predicted 2010
44 High Street	32.3	29.5	27.3	27.2	20.1	26.18	24.5	23.9	19.7
15 St Martin's Church Street	35.1	31.5	27.9	29.0	21.5	24.6	26.2	25.6	21.0
3 St Francis Road	26.3	25.0	22.5	23.1	16.8	19.2	19.1	18.6	15.3
4 Canadian Avenue	27.6	29.1	25.7	24.7	19.3	22.1	23.1	22.5	18.5
Blue Boar Row	37.4	35.5	34.4	28.2	26.2	33.2	31.3	30.5	25.1
Fish Row/Queen Street	35.2	33.9	28.7	26.4	24.0	28.0	26.4	25.7	21.2
Boots Chemist, New Canal	36.5	35.0	34.0	36.9	27.4	33.2	36.5	35.6	29.3
94 Crane Street	31.7	30.1	27.2	27.5	23.4	26.7	30.2	29.5	24.3
Lloyds Bank, Castle Street	46.1	45.8	40.3	35.3	33.1	37.5	35.3	34.4	28.3
33 Castle Road*	-	-	33.3	31.4	27.3	31.2	31.4	30.6	25.2
85 Estcourt Road*	-	-	26.0	28.3	25.1	30.9	29.1	28.4	23.3
12 Devizes Road*	-	-	-	32.6	24.0	36.4	31.9	31.1	25.6
267 Castle Road*	-	-	30.5	24.2	19.8	24.2	23.2	22.6	18.6
1 High Street*	-	-	-	28.5	28.6	38.1	35.2	34.3	28.2

It can be seen from this table that these results are currently significantly below the annual mean objective for nitrogen dioxide and are predicted to fall further. The general trend is down. The STP is progressively being implemented so further falls are expected.

4.1.2 Diffusion tube Results- AQMAs

Site	Annual Mean Concentration / $\mu\text{g}/\text{m}^3$								
	1998	1999	2000	2001	2002	2003	2004	Predicted 2005	Predicted 2010
2 Minster Street	55.9	54.9	38.1	44.7	42.0	47.5	48.3	47.1	38.8
100 Brown Street	48.6	48.6	40.3	37.1	31.2	41.2	42.7	41.7	34.3
16 Winchester Street	49.9	52.1	50.4	38.7	33.6	44.0	43.9	42.8	35.2
42 Fisherton Street*	-	-	44.2	41.5	30.0	37.4	36.8	35.9	29.6
26 Milford Street***	-	-	40.0	36.6	30.0	-	-	-	-
32 Milford Street***	-	-	-	-	29.9	36.1	35.3	34.4	28.3
75 Exeter Street*	-	-	43.4	43.2	39.0	51.2	48.3	47.1	38.8

*** Tube relocated from 26 to 32 Milford Street owing to redevelopment work in the area

The results for the AQMAs are variable. Milford Street and Fisherton Street are well below the objective. Minster Street, Brown Street and Winchester Street are disappointing. The STP and hence AQAP is one year behind in implementation following the Department for Transport (DfT) decision to review the finance to the project in 2003 and the impact of the major elements such as P&R, bus priority and reduction in city centre parking will only begin to show in this years monitoring data.

The figures for 2005 and 2010 are simple projections using Box 6.6 in Technical Guidance document LAQM. TG(03) and therefore do not incorporate the STP measures that have recently or are about to come on line. Extensive and detailed Modelling work carried out in partnership with the county council for the stage 3 report, which indicated the objective would be achieved by the implementation of the STP and this should become apparent in monitoring data over the next few months. The work plan for the STP is reproduced in appendix 2.

Specific measures that will be completed by the end of 2005 are:

AQMA	Measure to be implemented	Target date.
Exeter Street	Britford Park & ride	May 2005
Brown Street/ Winchester Street	Britford P&R	May 2005
Minster Street Fisherton Street	Britford P&R	May 2005
	Wilton P&R	Opened March 2005
	Variable message signing	Commenced March 2005
	Increase in daily parking charge to £5 per day	May 2005

Technical guidance for progress reports specifies that local authorities must estimate when an objective will be met if it will be exceeded in 2005. It is difficult to give accurate predictions given the AQAP is in the midst of being implemented. However taking a worst case scenario and assuming no further AQAP measures were implemented the following projected dates for compliance are gained using the same formula to predict levels for 2005 and 2010:

AQMA	Objective achieved
Minster Street	2009
Brown Street	2006
Winchester Street	2006/7
Exeter Street	2009

4.1.3 Diffusion tube Results- Areas identified by detailed assessment

Site	Annual Mean Concentration / $\mu\text{g}/\text{m}^3$					
	2001	2002	2003	2004	Predicted 2005	Predicted 2010
68 London Road*	44.7	39.7	47.3	40.5	39.5	32.5

The exceptional hot summer of 2003 bucked the downward trend in nitrogen dioxide levels, however levels fell significantly in 2004. As part of the implementation of the STP a park & ride site is to be constructed on London Road, close to St Thomas' Bridge and this will serve to ease traffic on this link.

Site	Annual Mean Concentration / $\mu\text{g}/\text{m}^3$					
	2001	2002	2003	2004	Predicted 2005	Predicted 2010
6 Wilton Road*	42.0	35.5	40.9	37	36.1	29.7

The diffusion tube at 6 Wilton Road is located on a signpost on the edge of the highway, so representing a worst-case scenario for Nitrogen dioxide levels. However the pavement is relatively narrow and the flats front directly onto the road, so relocation to the property façade is unlikely to have a major impact on results. Skew Bridge was operating on traffic signals owing to major work to rebuild the bridge for much of 2004. This had a resultant impact on traffic levels. Using 2003 data as a basis for predicting levels for 2005 and 2010 the following results are gained:

6 Wilton Road		
2003	Predicted 2005	Predicted 2010
40.9	38.8	31.9

The exceptional hot summer of 2003 had a significant impact on nitrogen dioxide levels across the district and the rest of the Country. Nitrogen dioxide levels have dropped back toward 2002 levels

4.2 Realtime analyser - Exeter Street

There are two real time analysers managed by Environmental Services, one in the city centre at Exeter Street and another has been located on the A36 in the small town of Wilton to the west of Salisbury. The stage 4 Review and assessment report for Wilton recommended revocation of the Air Quality management area at this location. Highway works have also been undertaken

to install a new pedestrian crossing, which warranted the removal of the analyser. It was moved in March to a new location in Bridge Street in Salisbury City Centre. This short street forms a T junction with the High street, part of the one way system and feeds traffic directly into Fisherton Street to the north and Minster street to the south.

It benefits from access power to a supply and wider pavement, both of which are absent from Minster Street itself.

4.2.1 QA/QC

Data management and reporting is carried out automatically from a PC situated in the East team office via a GSM modem. The poll occurs three times daily at 00:00 Hours, 08:00 Hours and 13:00 Hours. The main PC remains switched on constantly.

Features include;

- Automatic calibration every 73 hours
- Automatic redial on busy line or after communication failure
- Detailed logs of data requests and transmission problems
- Remote control of stations for zero test, test gas, measuring range and calibrations
- Calculation of scaling factors and application to the nearest results following each automatic calibration
- Marking of abnormal readings, negative readings or readings taken during instrument failure or calibration
- Deletion of abnormal readings

Manual scaling is therefore not required. The auto-scaling feature means that the figures are more frequently scaled than the accepted manual scaling operation on a two weekly basis. Data is checked manually at least weekly, more normally daily to ensure the software is making the correct adjustments. There should, therefore, be no requirement to manually back correct. Abnormal readings are marked. During the calibration checks a manual note is taken of span and zero and NO₂ gas readings, any abnormal conditions or error readings and any actions taken. Manual calibrations are compared with auto-calibration.

At six monthly intervals the data will be compared with the nearest AURN site. Any abnormal data will be discarded unless it can be traced to a local event. The correction factors are recorded in the calibration report.

Data capture for the Salisbury site is high, with only a small percentage being lost due to calibration, filter changes and head cleaning.

Fifteen minute means of NO_x and NO are recorded; from this hourly means are produced by the software. Hourly nitrogen dioxide is calculated by subtracting nitrogen oxide from NO_x on a spreadsheet. Anomalous or negative readings are removed. The data is then used to calculate daily NO₂ levels.

4.2.2 Realtime analyser results - Exeter Street

2004	Predicted 2005	Predicted 2010
38.9 ug/m ³	37.7 ug/m ³	31.2 ug/m ³

5. Conclusions- Wilton Road and London Road

5.1 Wilton Road

Wilton Park & Ride opened on the 7th March 2005 providing 421 parking spaces in the first phase and access/ egress from The Avenue. Phase two will increase capacity to 692 spaces.

Bus priority measures are proposed along Wilton Road (A36) between The Avenue junction at the convergence of the A36 and A30 and St Paul's roundabout, on the edge of the city centre and the start point of the dual carriageway ring road.

Bus priority will be introduced in both directions of Wilton road. On the undeveloped western portion, as far as Skew Bridge priority will be by way of bus lanes with merge points controlled by bus gate traffic signals

Specifically an inbound bus lane will be provided for approximately 400metres on the approach to Skew Bridge and an outbound bus lane for a similar distance on the approach to Park Wall junction, as substantial queuing occurs at both these locations and such provision would allow buses to pass this traffic.

On the developed portion of Wilton Road, which is lined by a mix of housing and businesses bus lanes are not feasible. In order to facilitate bus flow along this stretch of Wilton Road it is intended by linking traffic signal and use of the urban traffic control system. On street parking will also be reviewed.

The installation of variable message signing at the A36/ Kingsway junction is being installed as this report is written.

It is too early to see the effects of P&R on monitoring results at 6 Wilton Road, however the view is taken that with Park and Ride coming on stream with other STP measures, that the actual value for 2005 will be between these two predictions, and below the 40ug/m³ limit. It is not proposed to declare an AQMA for this location, however monitoring will continue.

5.2 London Road

Nitrogen dioxide levels are close to the objective. Planning consent has been granted for a park and ride close to St Thomas' Bridge. The design consultants are in the process of producing a detailed design and tender document with a view to awarding the contract in the summer. The site will accommodate approximately 380 cars and incorporate a terminal building, CCTV and real time Passenger information (RTPI). Construction is expected to in late July 2005. It is not proposed to declare an AQMA for this location, however monitoring will continue.

6. New AQMAs Winchester Street and Exeter Street

A new AQMA was declared in Exeter Street in January 2005.

The AQMA takes in St Johns Street, which is contiguous with Exeter Street, Ivy Street and St Ann's Street, linking it with the Brown Street AQMA and is illustrated in appendix 1.



Exeter Street. Real time monitor is on the right by the lamp post, the diffusion tube is on a property façade.

This street is two way receiving traffic entering the city from the south and traffic exiting the city via Brown Street which is one way. One side of the street is bordered by the wall of the Cathedral Close and the other by Town houses which open directly onto the street, as can be seen in the photograph below. Britford Park & Ride will serve the southern sector of the city.



The Junction of Winchester Street with Brown Street and Rollestone Street has been incorporated into the Brown Street AQMA. There are flats on two sides of the junction.

An Amended AQMA was declared for Brown Street, incorporating the junction with Winchester Street at the same time. Winchester Street is one way and feeds traffic exiting the city south via Brown Street.

The electoral register indicates the following numbers of residents present in these AQMA areas:

Exeter Street AQMA		Amended Brown St AQMA	
Exeter Street	81	Winchester St	4
New Street	15	Rollestone Street	11
St John Street	6	Previous AQMA	84
Ivy Street	19		
Total	121	Total	99

This obvious does not include anyone under the age of 18 therefore numbers are likely to be slightly higher. There are also two schools on Exeter Street: St Osmund's Primary School and the Cathedral School.

7. Implementation of city centre action plan.

7.1 Beehive Park & Ride Facility.

This facility opened in 2003 and carried 21700 passengers, removing an average of 395 car trips per day from the city centre.

Overall the volume of people travelling toward Salisbury has increased 20% on 1999 levels during peak hours of 8am – 9am, however the total volume of traffic remained constant. The modal share of trips by public transport increased from 32% to 42%. Car journey times remained similar to that of 1999. Users of this park and ride have an improved journey time of up to 5 minutes ^(ref 3.).

7.2 Britford park and ride

This is due to open in May 2005, providing parking for 486 cars in autumn and winter and 436 in spring and summer. During spring and summer space will be given over to coach parking.

7.3 Urban traffic control (UTC)

System Activated Plan Slection (SAPS) plans have been installed have been installed on two of the ring road roundabouts (St Mark's & Castle Road) and modifications are being made to take into account differences between the models used in the design work and reality to ensure maximum efficiency. The system will be introduced to St Paul's roundabout shortly.

7.4 Realtime passenger information (RTPI)

The system was subject of demonstrations to Salisbury joint Transportation team and Wilts & Dorset Bus Company. Formal acceptance of the system took place in early February. Information on the forthcoming park & ride sites is being added to the system. Voice communication system is with fleet management, allowing response to be made as situations occur

Work is on going to introduce an SMS message facility to the system, so providing text messages to passengers at stops where real time information is operative on a service, regardless of whether real time information displays are present at individual bus stops.

Salisbury District Council and Wiltshire County Council are to host the national real time information group in April 2005 at the request of the Department of transport to showcase the system, as it is one of the largest in England.

7.5 Car park guidance

Approval for the non-prescribed signs on both county and trunk roads was issued by the Department of Transport in January 2005. Installation of the Variable message signs has commenced.

7.6 Residents' parking schemes.

A new residents' parking scheme is proposed for the St Paul's area of the city, which will further reduce the availability of non-resident parking to commuters.

7.7 Cycle routes.

Statutory cycle route signage has been installed on 8 cycle routes.

8. New Local Development.

There are no new industrial processes within the district, however one part 'B' permitted process is to move to Environment Agency control under Part 'A' control. This is an incinerator operated by the HPA, in a remote location. There are no implications for air quality as this facility was included in our considerations in the first round of review and assessment.

There are no developments proposed that would significantly change traffic flows that have not been considered at earlier stages of review and assessment and there are no new landfill site proposed.

9. Local air quality strategies

Salisbury District Council has not adopted a separate air quality strategy. Local initiatives do exist to encourage walking, cycling to work and car sharing, some of which are detailed above and further information is available in the AQAP which is available on our website at www.salisbury.gov.uk

9. Planning Applications.

There are no new major developments predicted to have a significant impact on air quality, within the district. The Stonehenge Visitor Centre planning application will not influence air quality within the existing AQMAs'. The proposed changes to the A303 in the vicinity of Stonehenge have been scrutinised and the results of the Public Inquiry are awaited from the Office of the Deputy prime Minister.

The Planning Department liaise closely with Environmental Services on any proposals for major development larger scale development. These are accompanied by Environmental Impact Assessments and an assessment of the impact of the development on air quality is expected as part of that document. There has been, over the last 10-15 years, a lot of additional housing built on the outskirts of the city and in Amesbury to the north. This area is expected to become increasingly important and we propose closer ties with the Planning Department on this subject.

10. Air Quality & Planning policies.

Salisbury District council's adopted local plan, incorporate policies that embrace the STP. Policies have been adopted for new development to encourage designs that minimise the need for travel, as well as encouraging use of public transport, walking and cycling.

Full access to these policies can be gained through our website at www.salisbury.gov.uk

11. Conclusions.

Salisbury District council is dependant on the measures contained in the STP to achieve the nitrogen dioxide annual mean objective in the near future. The objective will be achieved before 2010.

References.

1. Salisbury District Council Air Quality Review & Assessment of Air Quality: Stage 3
2. Salisbury District Council Review & Assessment of Air Quality: Detailed Assessment
3. Wiltshire County Council LTP Progress Report 2004
4. Salisbury District Council/ Wiltshire County Council Joint Transportation Committee 14th February 2005 Agenda item 8 "Salisbury Transport Plan Programme review"
5. Local Air Quality Management: Progress Report Guidance LAQM. PRG(03)
6. Local Air Quality Management Policy Guidance: Addendum LAQM. PG(05)

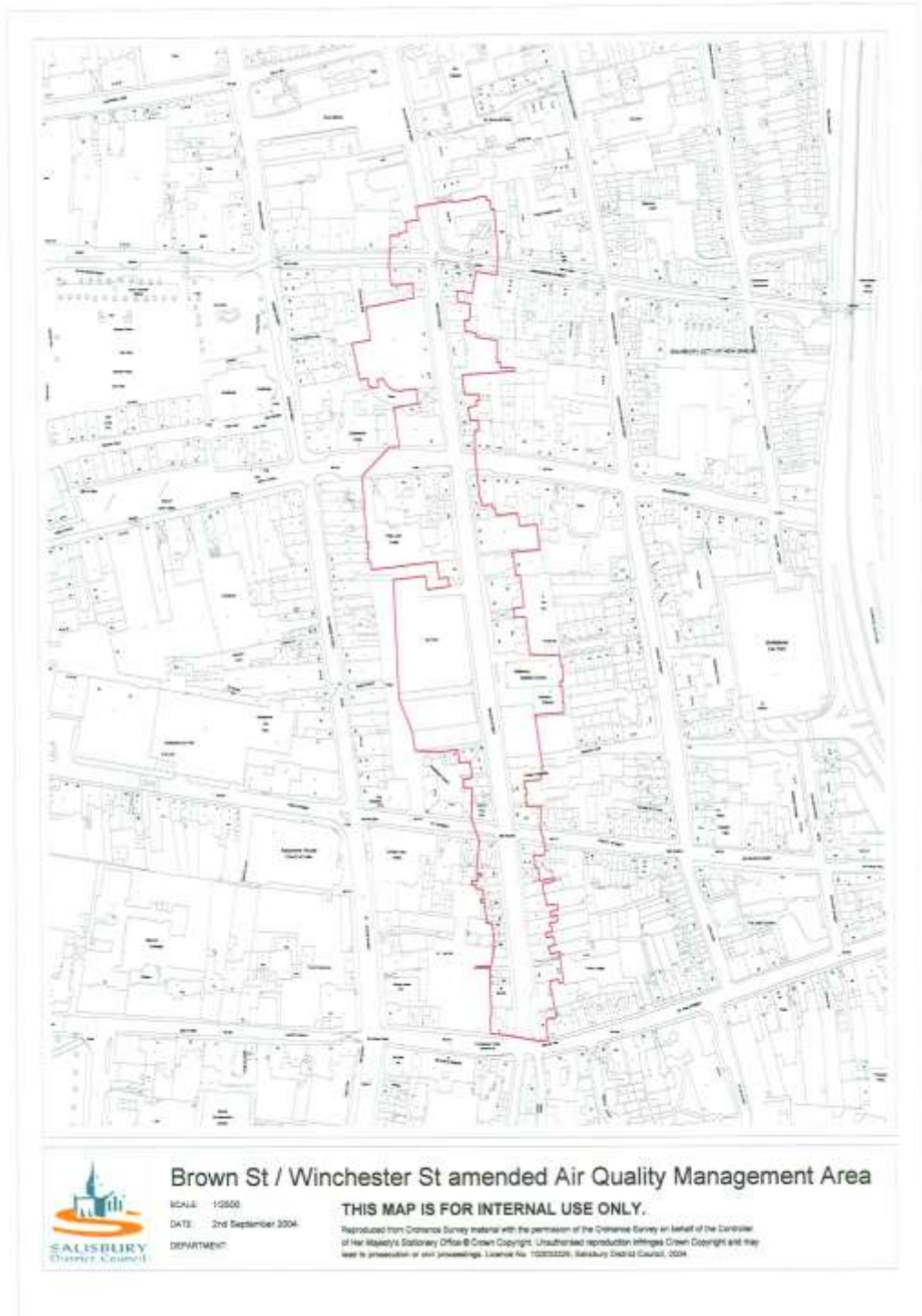
Contributors.

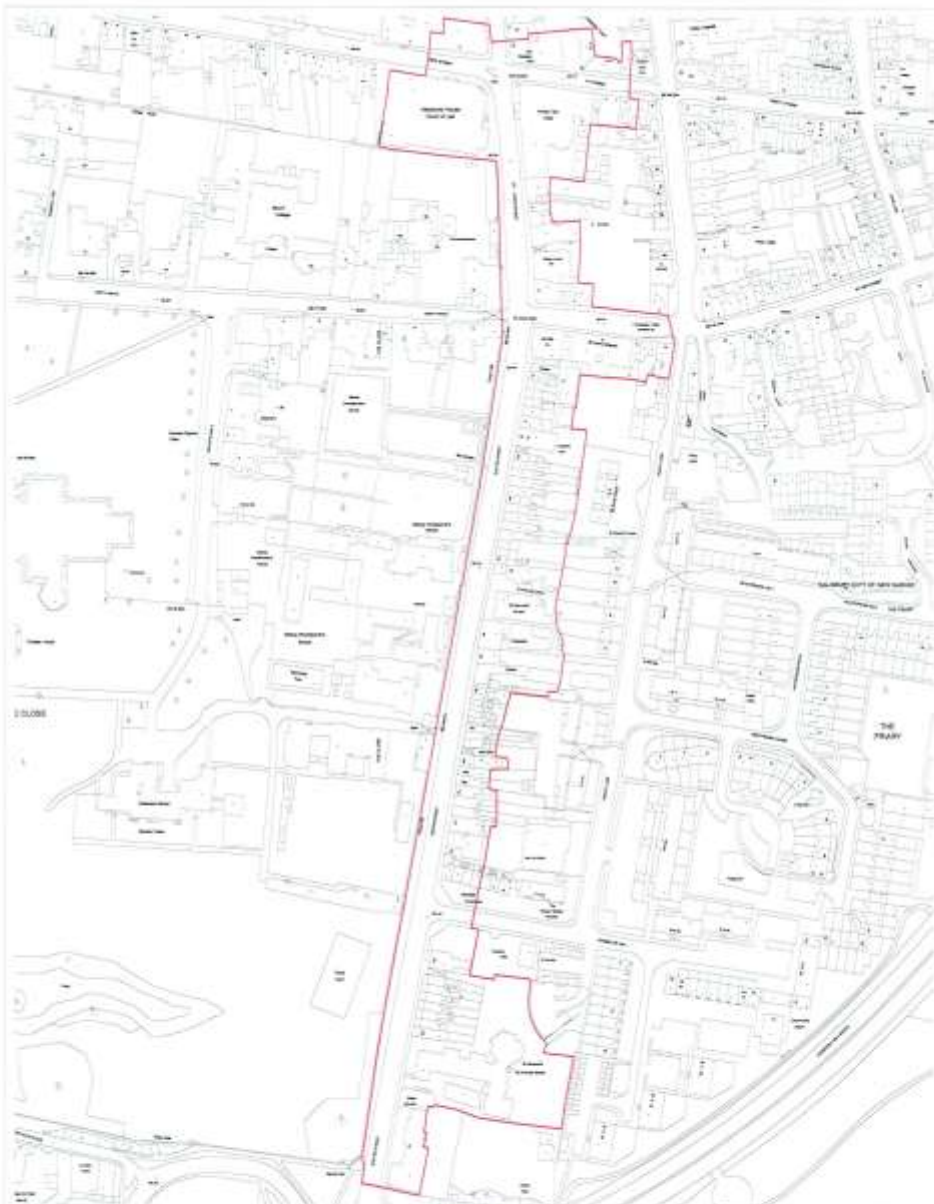
David Philips, Wiltshire County Council Highways Department

Paul Shaddock, SDC/ WCC Joint Transportation Team

Report prepared by G Tomsett Senior EHO. May 2005

Appendix 1: New & amended AQMAs





EXETER STREET Air Quality Management Area

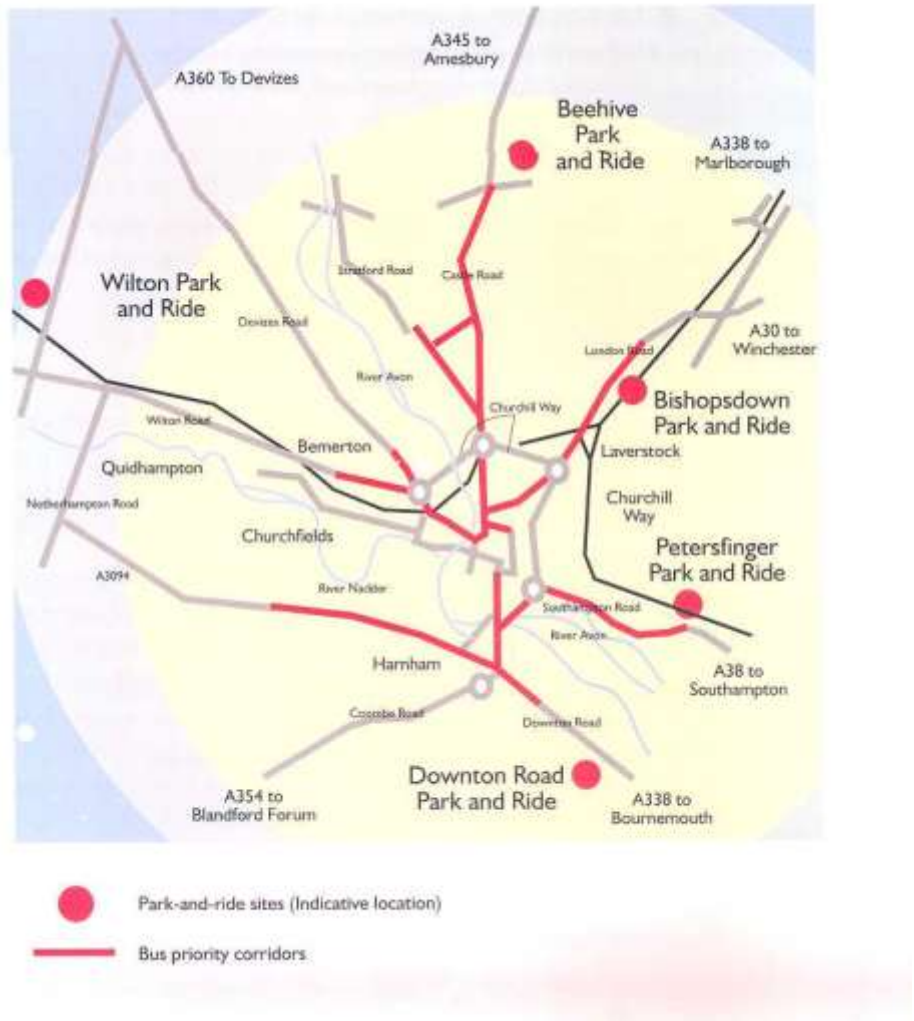
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DATE: 2nd September 2004
DEPARTMENT:

THIS MAP IS FOR INTERNAL USE ONLY.

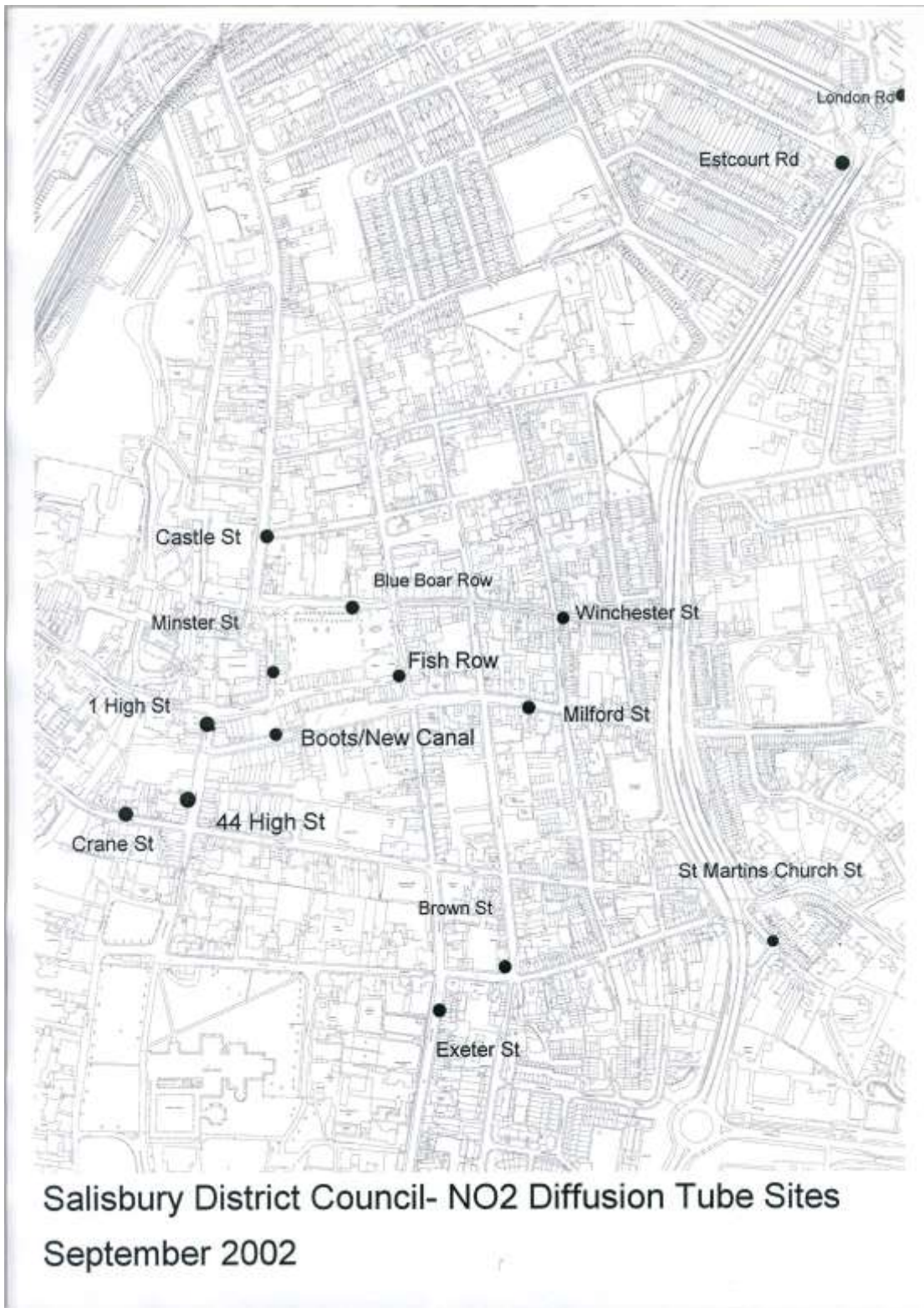
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Appendix 2: Work Plan 2005/06

Appendix 3: Park & Ride Location.

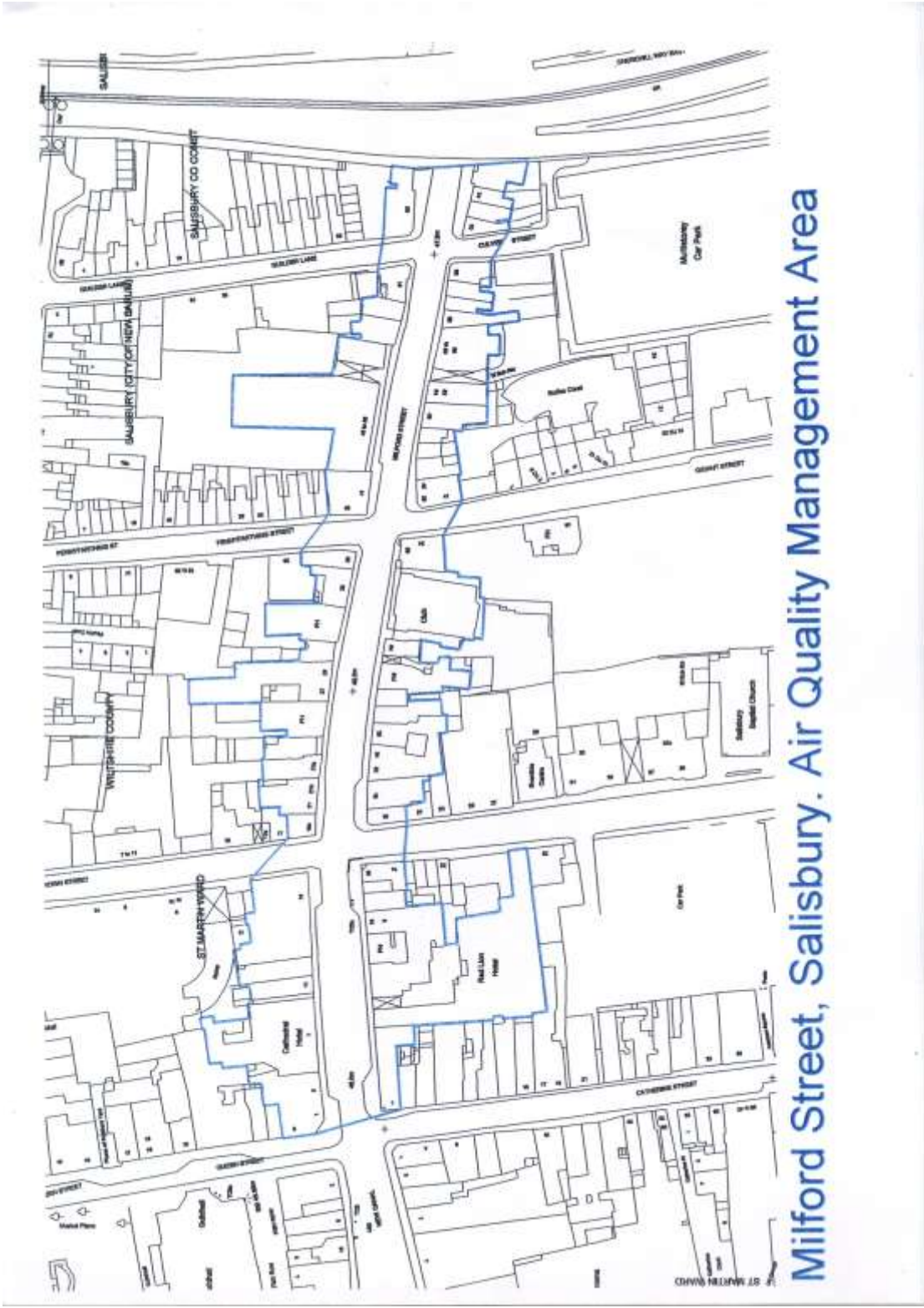


Appendix 4: Location of Diffusion tubes.

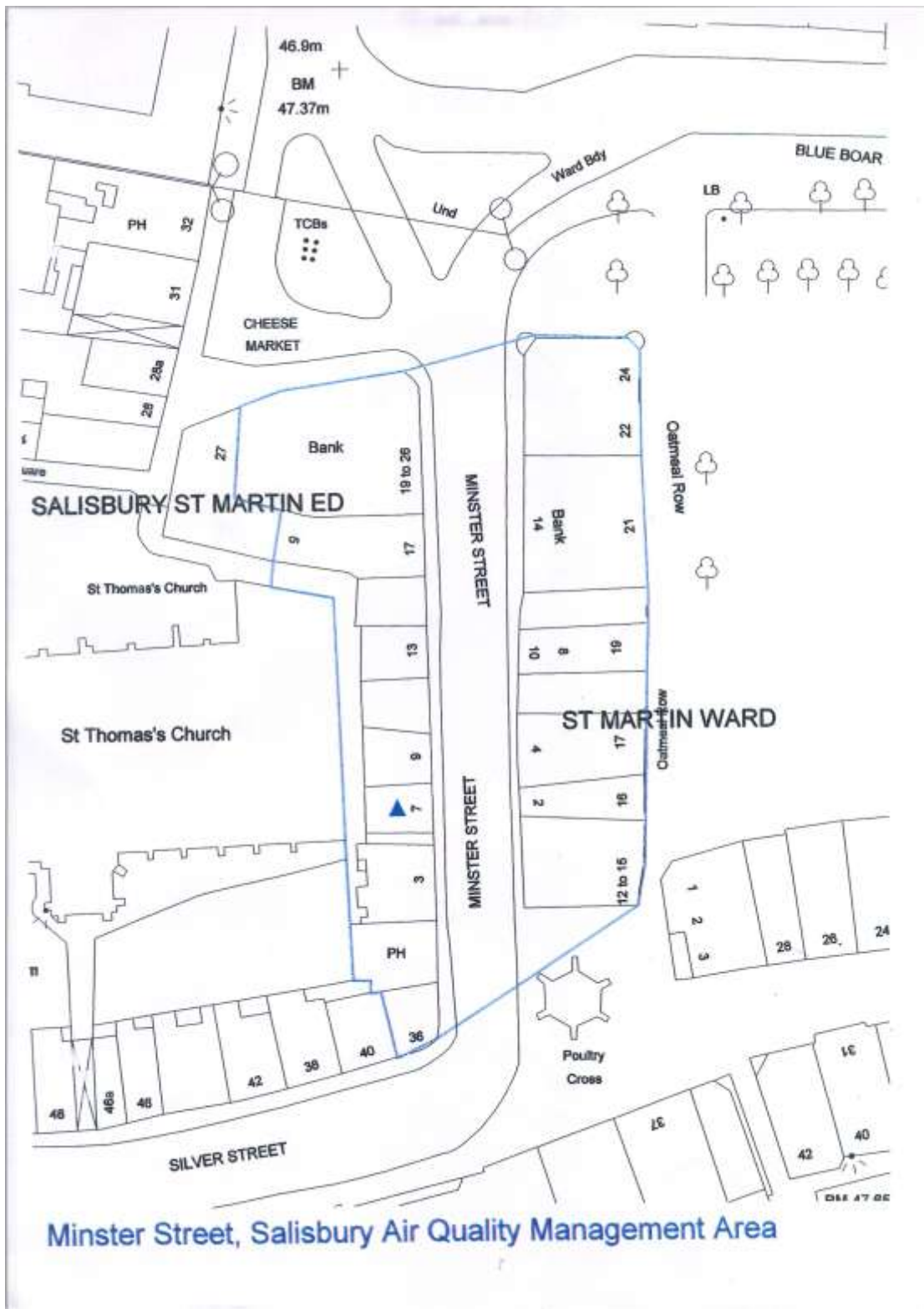


Appendix 5: Original City Centre Air Quality Management Areas.



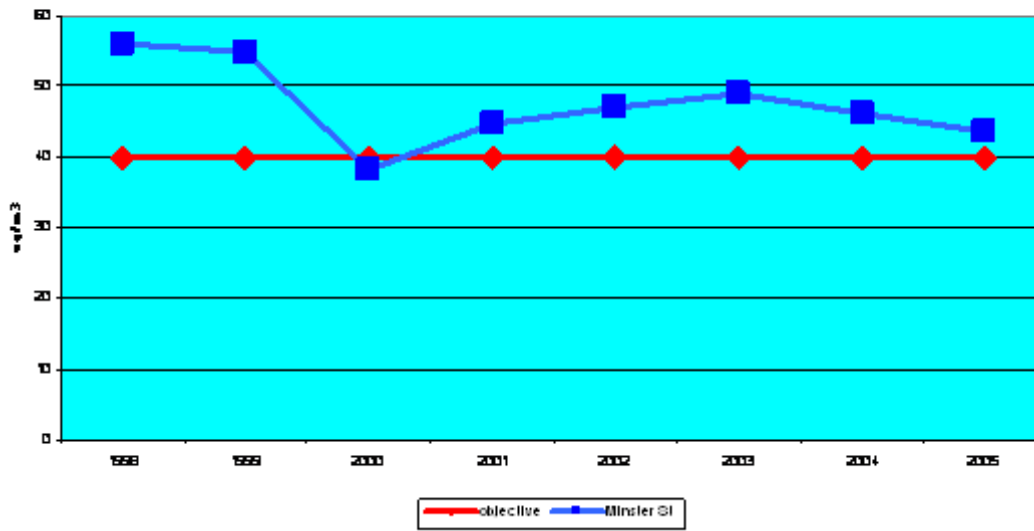


Milford Street, Salisbury. Air Quality Management Area

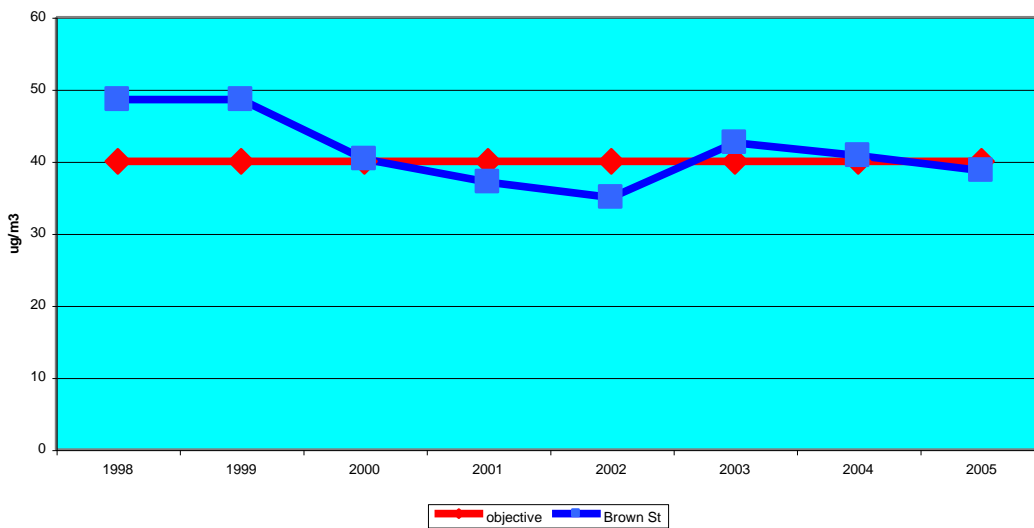


Appendix 6: Nitrogen Dioxide Trends.

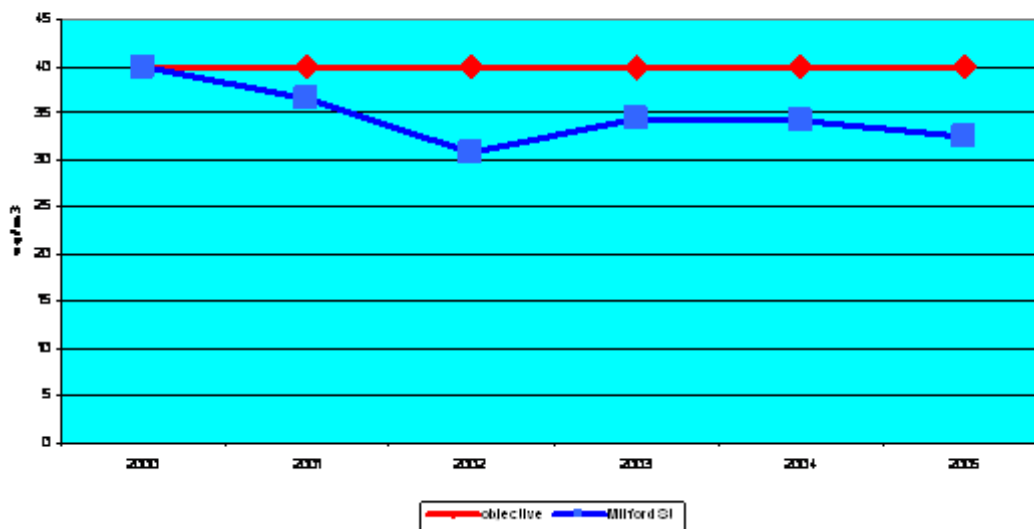
Nitrogen Dioxide trends in Minster St



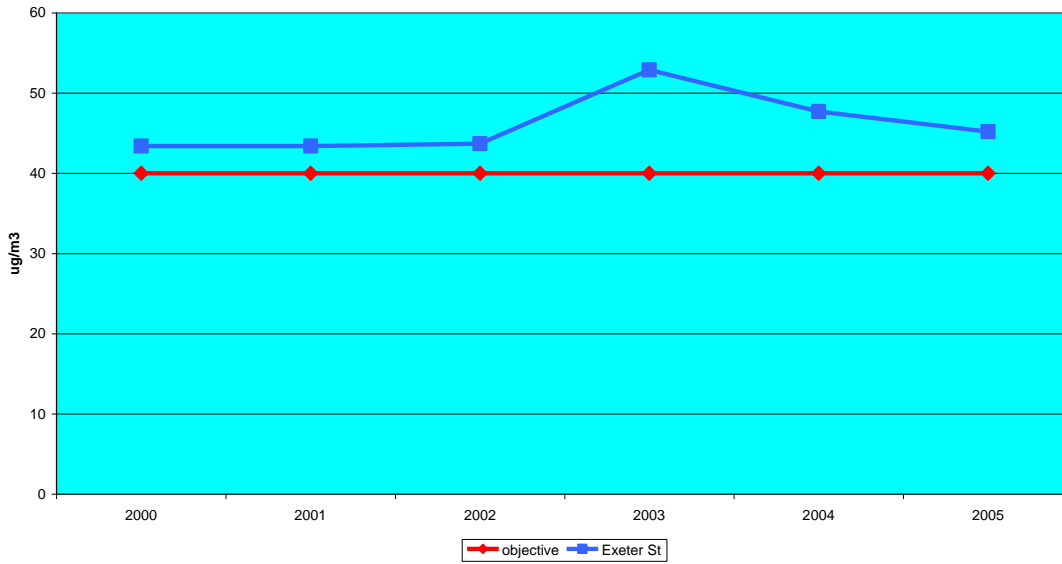
Nitrogen dioxide trend in Brown St



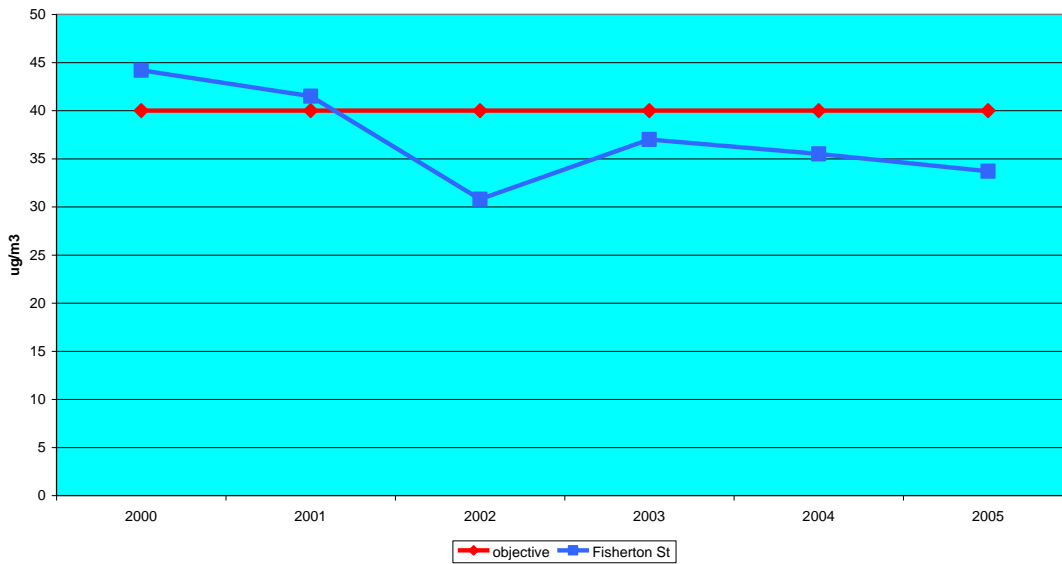
Nitrogen dioxide trend in Milford St



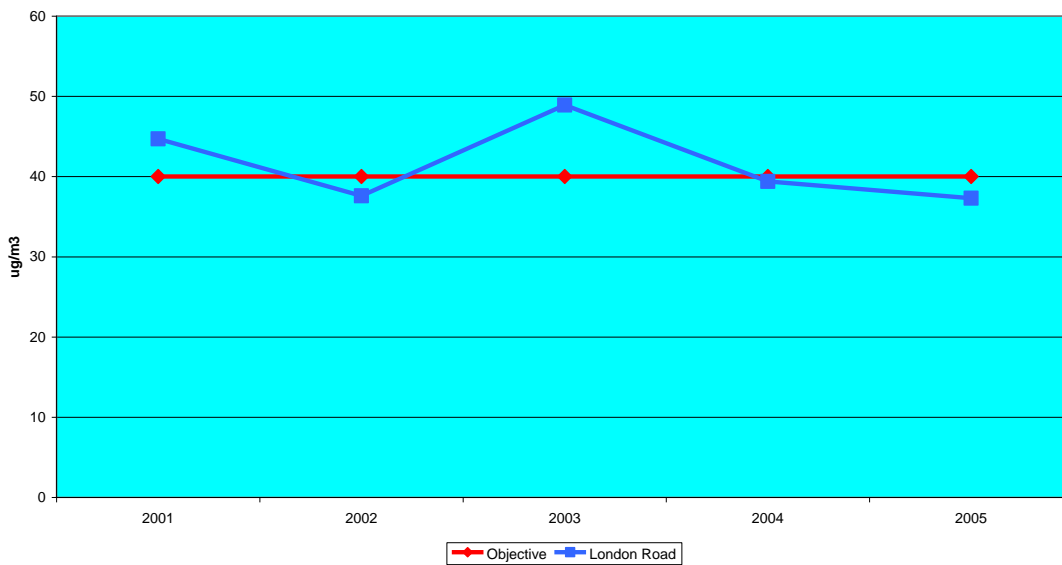
Nitrogen dioxide trend in Exeter St



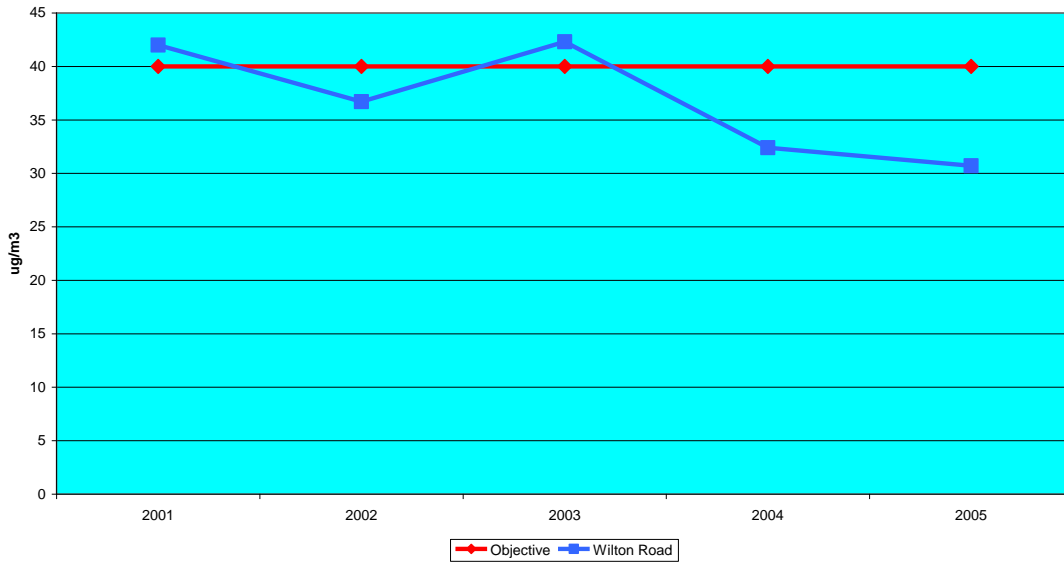
Diffusion tube trend in Fisherton St



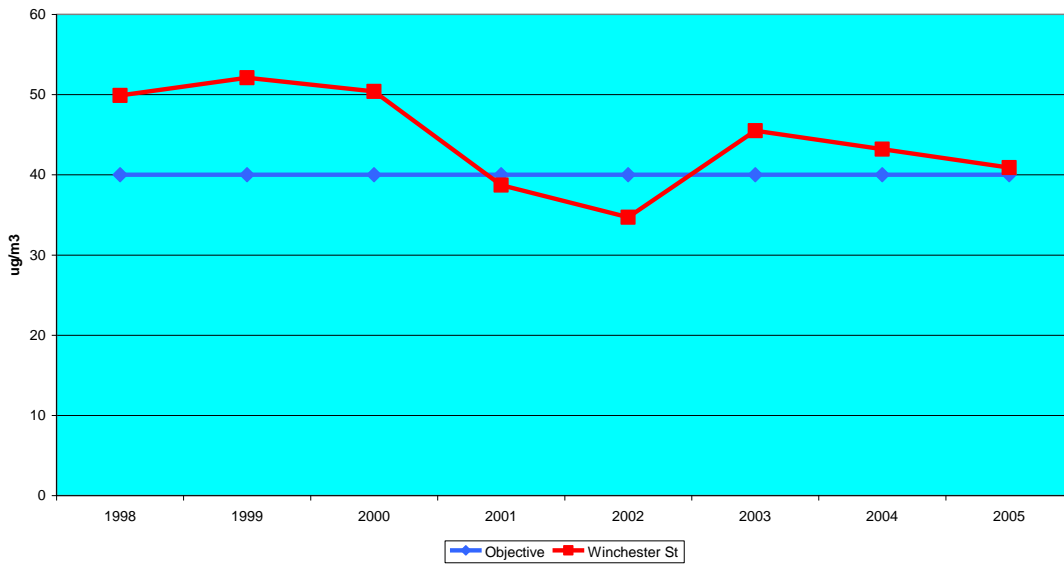
Nitrogen Dioxide trend for London Road Salisbury



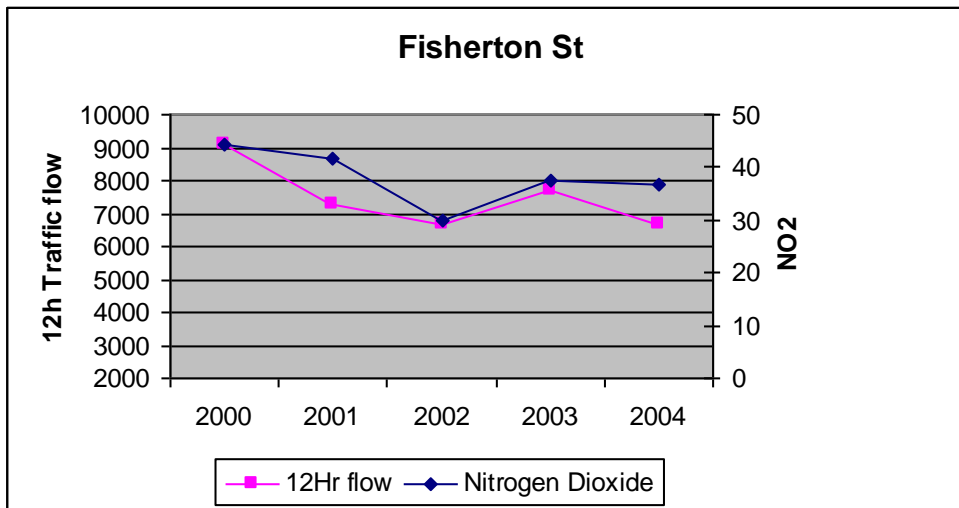
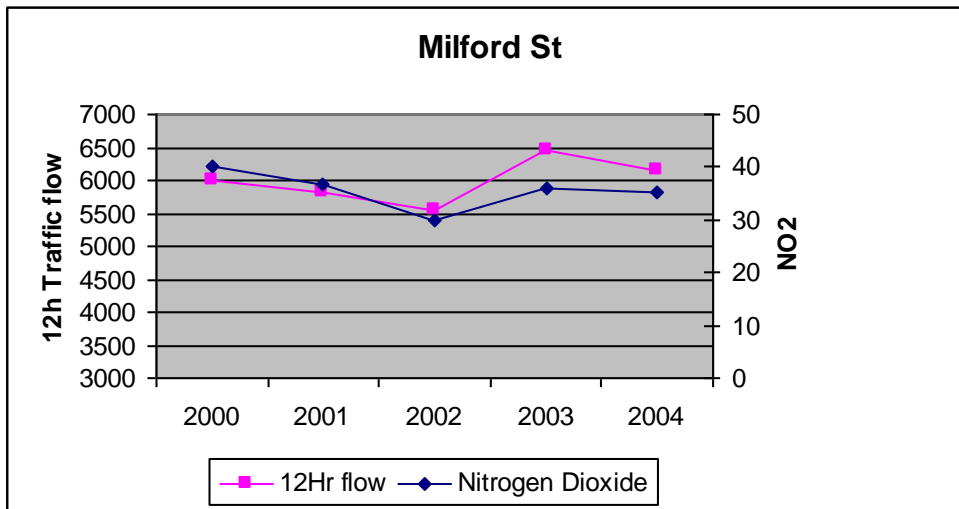
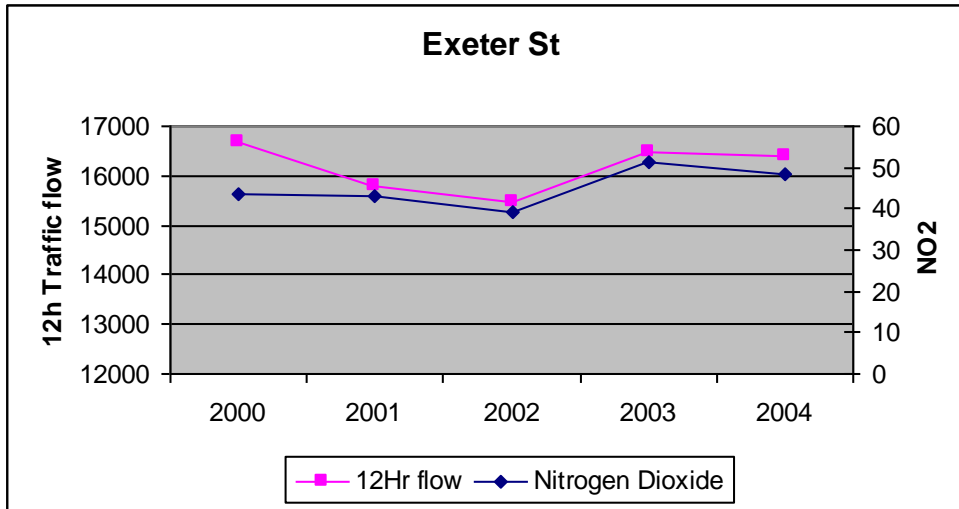
Nitrogen Dioxide trend for Wilton Road Salisbury



Nitrogen Dioxide trend for Winchester Street Salisbury



Appendix 7. Comparison of Nitrogen Dioxide Levels and Traffic flows for Exeter St, Milford Street and Fisherton Street.



Appendix 8: Bristol Scientific Services QA/QC data.



Scientific Services

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*Serving the communities
of Bristol, Bath and
North East Somerset,
North Somerset and
South Gloucestershire*

Diffusion tubes – analytical quality control

Many authorities have been requesting information on our analytical quality control (AQC) in the analysis of diffusion tubes. Below I have attempted to address the points raised so far.

1. This laboratory is accredited by UKAS for a variety of tests in areas such as food, consumer safety, microbiology and asbestos. We do not have UKAS accreditation for the analysis of diffusion tubes. Our current policy is to seek accreditation only when it is necessary. This is due not only to the expense of accreditation but also the lack of flexibility we have often found in the other areas.
2. We participate in the Workplace Analysis Scheme for Proficiency (WASP) for both nitrogen dioxide and benzene tubes. We also participate in other aspects of the WASP scheme including solvents on carbon tubes and metals on filters.

I am including the latest WASP reports for nitrogen dioxide and benzene for your information.

3. In the case of the nitrogen dioxide analysis we also analyse a solution supplied by Netcen as part of the QA/QC scheme that they run. I am also including the last annual report on this scheme.
4. We also participate in a field inter-comparison scheme that started in November 2002. In this scheme, controlled by Netcen and organized by the Health and Safety Laboratory, three tubes are co-located with a continuous analyzer which provides a reference value. Three sets of results have been returned to date and these show an average positive bias for the tubes of 11%, 16% and 34%. I am including the results for December 2002 as this includes results from the most laboratories (laboratories must participate at least quarterly). We are identified at laboratory 2.

Results of previous field trials are available on-line at www.

5. Reference materials and equipment are obtained from our normal suppliers all of whom are approved to BS EN ISO 9001. All reference materials are of at least analytical grade or equivalent. Standards are prepared using equipment that is all within our normal quality system.
6. Each nitrogen dioxide tube is prepared by pipetting 30µl of a solution of 20% triethanolamine in water onto the metal grids in the end cap, then assembling the tube components. A fresh batch of tubes is prepared each month ready to dispatch in time for the required exposure date.

Laboratory blanks are retained so that at least one is run alongside each batch of samples. Travel blanks are supplied three-monthly as required by the U.K. Survey procedure.

7. As well as participating in the field trials we are also carrying out some tests to compare tube preparation techniques. Those authorities that expose triplicate tubes alongside their continuous monitors in order to measure tube bias will have observed that the results sometimes are not as close to each other as would be expected, and in some cases markedly so. We are therefore carrying out trials to establish whether we can improve the precision of the technique which we think may be due to variances in the tube preparation.
8. Benzene tubes are the Perkin Elmer type (length 89mm x 6.4mm o.d.) packed with Tenax TA. The uptake rate for benzene is taken to be 0.76 ng/ppm/minute.

I hope that this information is sufficient for your needs, but please contact me if you require clarification or additional data.



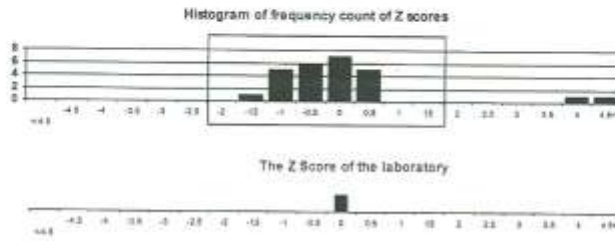
S. D. Pearce

Principal Scientist
Bristol City Council Scientific Services
17th March 2003

NO₂ Results

Round: 46 Laboratory: 2

Date: 06 Mar 2003



Summary of your results and their ratio to the mean

Your result	Assigned value	Standardised result
0.52	0.80	1.020
	% Bias: 2	Performance Score: 4
	Z Score: 0.134	Performance Index: 27.82

Z Score	Performance Classification
0 - 2	Good
2 - 3	Warning
> 3	Action

Your Laboratory's Performance Classification is: Good

Standard Uncertainty: 5.532442

Results for All Participants:			
Mean Performance Score:	300.47	Median Performance Score:	20
Mean Z Score:	0.01	Median Z Score:	0

Your laboratory is ranked 8 out of 26 labs. Standard Uncertainty: 5.53%



A participant should investigate any analytical measurement returning an 'ACTION' performance category in a single round or a second successive 'WARNING' performance category

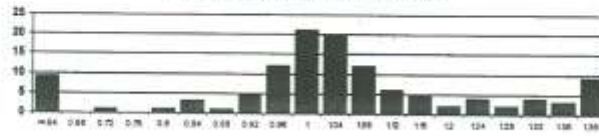
WASP Results

Round: 55

Laboratory: 152

Benzene on Tenax Tubes - Environmental

Frequency Count of Results for this Analyte



Results for this Laboratory



Summary of your results and their ratio to the mean

sample number	your result	'true' result	standardised results
1	22.22	50.10	1.945
1	151.64	151.48	1.001
3	26.18	26.27	1.000
4	41.98	38.42	1.069

RPI	performance category
< 73	1
73 to 310	2
> 310	3
RPI Reference Value: 197	

Reference Value Used: No mean: 1.05

Results for Your Laboratory:

Number of outliers: 0
 Performance Index (PI): 28
 Running Performance Index (RPI): 48
 Performance Category: 1

Results for All Participants:

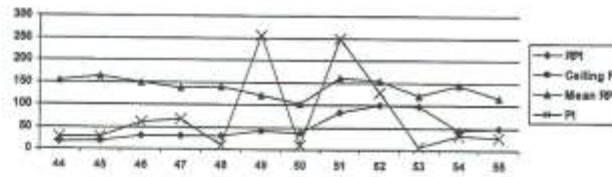
Mean PI: 77.64 Median PI: 45
 Mean RPI: 117.33 Median RPI: 103

Your laboratory is ranked 8 out of 21 labs.

additional statistical data (see the statistical protocol paragraphs 12 to 18)

analysis of variance: Delta: 0.045245 SSW: 0.003075 Standard Uncertainty: 7.19%

RPI Plot for your Laboratory



**UK Nitrogen Dioxide Network Laboratory Performance
Testing Scheme
January 2002 - December 2002**

This document lists the results obtained by a laboratory in the Quality Control Solution Programme for the Department of Environment, Food and Rural Affairs' UK Nitrogen Dioxide Network.

Laboratory: **Bristol City Council Scientific Services**

Month	Analyte	Reported Concentration	Performance
January	QC Solution		No Data
February	QC Solution	1925.00	Good (0)
March	QC Solution	1925.00	Good (0)
April	QC Solution	1935.00	Good (0)
May	QC Solution	1937.00	Good (0)
June	QC Solution	1931.00	Good (0)
July	QC Solution	1932.00	Good (0)
August	QC Solution	1920.00	Good (0)
September	QC Solution	1917.00	Good (0)
October	QC Solution	1933.00	Good (0)
November	QC Solution	1934.00	Good (0)
December	QC Solution	1928.00	Good (0)

Concentration units: QC Solution(mg/l)

Conditions of Performance

The Quality Control (QC) solution is sent out to laboratories participating in the NO₂ Diffusion Tube Network. It is provided to provide an independent means of checking their instrument calibration curve. Analysts can prepare dilutions within the calibration curve of the instrument, and use these to check the calibration of their apparatus. However, it is not intended as a substitute for the laboratory's own independent quality control procedures.

Performance scores are assigned to the reported concentrations, on the basis from the known concentration of the solution and the expected standard deviations. Performance is classified as follows:
 'Good' - within +/- 3 standard deviations of the true analyte concentration
 'Warning' - 2 to 3 standard deviations of the true analyte concentration
 'Action' - greater than 3 standard deviations from the true analyte concentration

If any of your results are listed as 'Warning' or 'Action', please check that the analyses were carried out and reported correctly. However, unlike the Doped Tube Quality Assurance Programme operated independently by the Health and Safety Laboratories (HSL), the QC Solution Programme is not used as a basis to reject data.

05C 02

Lab Code	Exposure Time hrs	Tube 1			Tube 2			Tube 3			Reference Conc. mg/m ³	Prep. Method	Bias Tube 1 %	Bias Tube 2 %	Bias Tube 3 %	Mean Bias
		1 ppb	2 ppb	3 ppb	1 ppb	2 ppb	3 ppb	1 ppb	2 ppb	3 ppb						
6	866.00	1.66	2.10	2.10	31.40	33.10	32.63	W20%	34.40			-8.22%	-3.76%	-3.76%	-0.05	
9	866.16	2.68	2.70	3.07	41.68	46.14	43.25	W20%	34.40			21.17%	21.85%	34.13%	0.26	
10	866.00	2.48	2.40	2.62	35.70	37.30	36.80	ACETONE	34.40			12.60%	8.43%	11.31%	0.13	
12a	866.00	2.44	2.59	2.62	18.70	20.65	22.82	W20%	34.40			-48.39%	-38.10%	-33.66%	-0.38	
12b	866.00	2.27	2.44	2.69	18.38	19.76	20.95	W20%	34.40			-48.54%	-42.47%	-39.10%	-0.43	
12c	866.00	2.47	2.63	2.47	38.44	33.34	38.44	W50%	34.40			11.74%	-3.08%	11.74%	0.07	
13	866.00	1.23	1.93	2.03	19.90	30.00	32.00	W10%	34.40			44.77%	-12.70%	-6.98%	-0.22	
16	866.00	3.13	3.12	3.13	50.80	50.80	51.00	ACETONE	34.40			67.97%	47.67%	48.26%	0.40	
18	866.16	2.80	2.50	2.92	45.00	38.00	45.00	ACETONE	34.40			30.81%	10.47%	30.81%	0.24	
17	866.00	2.18	2.37	3.07	34.00	37.00	36.50	ACETONE	34.40			-1.96%	7.56%	0.93		
22	866.00	2.00	1.21	3.07	45.00	48.00	37.33	Acetone	34.40			30.81%	-44.77%	30.53%	0.09	
26	866.00	2.66	2.82	2.83	45.00	44.00	44.50	W20%	34.40			30.81%	27.91%	27.91%	0.29	
28	866.00	2.59	2.74	2.89	39.10	41.40	41.40	ACETONE	34.40			13.66%	20.35%	27.03%	0.20	
32	866.00	2.10	2.30	2.10	34.00	36.00	34.33	ACETONE	34.40			-1.16%	4.66%	-4.07%	0.00	
34	866.16	2.99	2.80	3.00	24.00	28.00	25.00	Acetone	34.40			-27.33%	-30.23%	-24.42%	-0.27	
35	866.00	2.42	2.66	2.18	30.70	40.30	35.00	W20%	34.40			5.69%	17.15%	-4.07%	0.07	
40	866.18	2.01	1.88	1.98	31.30	26.10	29.43	W50%	34.40			-9.01%	-34.15%	-10.17%	-0.14	
47	866.00	2.75	2.78	2.63	42.78	43.22	44.02	W20%	34.40			25.03%	27.66%	27.66%	0.27	
48	866.00	2.31	2.21	2.40	34.60	34.20	36.50	W20%	34.40			-0.65%	6.10%	6.10%	0.04	
49	866.00	2.08	2.46	2.54	41.56	39.84	41.08	ACETONE	34.40			20.30%	15.81%	15.42%	0.19	
50	866.00	1.61	0.87	2.47	25.00	14.00	35.00	W20%	34.40			-27.33%	-59.30%	13.37%	-0.24	

See below

* Tube 3 very low, therefore removed data.