

WREXHAM COUNTY BOROUGH
COUNCIL

AIR QUALITY REVIEW AND
ASSESSMENT

UPDATING AND SCREENING
ASSESSMENT
FOR 2005

Executive Summary

This report has been prepared as part of Wrexham County Borough Councils (WCBC) Air Quality Management Strategy as required under the Environment Act 1995. The overall aims of this report are to:

- Report progress on the implementation of the Local Air Quality Management (LAQM) plan
- Report progress in maintaining the pollution concentrations below the Air Quality objectives (see Appendix 1)

The Progress Report for 2003 & 2004 concluded that:

- *The findings of the Updating and Screening Assessment (2002) continue to remain valid.*
- *That there has not been any change in local circumstances to indicate a possible exceedence of the air quality standards and objectives.*
- *That potential changes in local circumstances will most likely relate to increases in traffic (e.g. as a result on increased housing development) at sensitive locations.*

The Progress Report also stated that:

- WCBC will continue its monitoring program to confirm the findings of the report.

This Updating and Screening Assessment (USA)

Has considered the seven health based air quality objectives as laid down in regulations and whether these levels will be breached currently or by their target dates. If these levels are exceeded a detailed assessment will be required.

Having considered each pollutant and presented evidence to support the assessment of each, it has been concluded that all the air quality objectives will be met. There is no requirement for Wrexham County Borough Council (WCBC) to undertake a detailed assessment.

WCBC will continue to maintain its monitoring program to confirm the findings of this report, additionally the diffusion tube co-location study at the Victoria Road network air quality station will continue.

Summary Table

Objectives	Detailed Assessment Required
Benzene	No
1,3-butadiene	No
Carbon Monoxide	No
Lead	No
Nitrogen Dioxide	No
PM₁₀	No
Sulphur Dioxide	No

Contents

	Page
1 Introduction	3
2 Summary of previous review and assessment work	4
3 Monitoring results	
i – Carbon Monoxide	6
ii –Benzene	7
iii – 1,3 Butadiene	10
iv – Lead	11
v – Nitrogen Dioxide	12
vi – Sulphur Dioxide	17
vii – Particulate matter (PM ₁₀)	20
viii – Ozone	24
4 New local developments	
New Residential / Retail Developments	25
5 Additional information	26
6 Summary of key points and future actions.	28
Appendices	
1 The National Air Quality objectives	
2 i – Diffusion tubes locations (table)	
ii– Diffusion tubes location (map)	
iii– Particulate matter monitoring locations and AURN station	
3 NO ₂ Diffusion tube lab and Bias Adjustment Factor (BAF)	

Introduction

This report has been prepared by Wrexham County Borough Council as part of its obligations under the Environmental Protection Act, 1995, to assess local air quality.

Part IV of the Environment Act, 1995, places a statutory duty on local authorities to periodically review and assess the air quality within their area. This involves consideration of present and likely future air quality, against air quality standards and objectives. Guidelines for the 'Review and Assessment' of local air quality were published in the 1997 National Air Quality Strategy (NAQS) and associated guidance and technical guidance. In 2000 the Government reviewed the NAQS and set down a revised Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland. This set down a revised framework for air quality standards and objectives for seven pollutants, which were subsequently set in Regulation in 2000 through the Air Quality (Wales) Regulations 2000. These were subsequently amended in 2002. The National Assembly for Wales has responsibility for meeting air quality objectives in Wales by their target dates.

The Updating and Screening Assessment (USA) is designed to:

- Report progress on the implementation of the Local Air Quality Management (LAQM) plan
- Report progress in maintaining the pollution concentrations below the Air Quality objectives (see Appendix 1)

This report has been prepared in accordance with Technical Guidance TG(03) and Process Guidance PG(03).

Summary of Previous Review and Assessment Work

The **first stage** of review and assessment was carried out in 1999 / 2000 and made the following recommendation:

This report has identified two pollutants, particulates (PM_{10}) and Nitrogen dioxide (NO_2), which may not meet the Air Quality standards, adopted by the Government. It is therefore necessary to carry out a stage 2 review and assessment. This will include the collation of data with regard to traffic emissions and further monitoring of particulates (PM_{10}) and Nitrogen dioxide. The current air quality monitoring carried out as part of Wrexham County Borough Council's Air Quality Strategy will continue and will be expanded in those areas where further monitoring is required. The methodology will be described within the scope of the second stage review and assessment.

Based on the recommendations of the first round of review and assessment Wrexham County Borough Council proceeded to the **second stage** of review and assessment, which presented the following conclusion:

The Stage 2 assessment has indicated that background air quality will improve up to 2005 throughout the County Borough. The review and assessment process has demonstrated that the predicted emissions from traffic growth have a limited impact on air quality within Wrexham over the next three years. The predictions were carried out to determine a worst case situation. The exceedence of the PM_{10} and the NO_2 objective from road sources is unlikely at any relevant location. This situation will continue to be reviewed annually as part of the air quality strategy and in the event of any proposed major new development. However, it is recognised that future increased traffic growth may challenge air quality in Wales and the rest of the UK and therefore this situation will need ongoing review. The local sources of pollutants for PM_{10} , and SO_2 which are considered to require a Stage 3 assessment are not expected to give rise to an exceedence of the air quality objective by 2004 / 2005.

The stage two review and assessment commented that there was insufficient monitoring data to be confident that the Air Quality Objectives would not be breached for PM_{10} and Sulphur Dioxide (SO_2). Hence Wrexham County Borough Council proceeded to the **third stage** of Review and assessment, which made the following conclusion:

The Stage 3 Assessment has indicated elevated particulate emissions from local domestic coal burning in the village of Llay. The results of the investigation indicate that the air quality standard and objective for particulate emissions in Llay may be exceeded.

The Public Protection Department of Wrexham County Borough Council will recommend the declaration of an Air Quality Management Area for Llay. This will include the production of a Stage 4 Report and the implementation of an Air Quality Action Plan during 2002.

An Air Quality Action Plan was implemented in 2003, which introduced a gas supply into the village of Llay. This had the effect of lowering the PM_{10} levels in the village and bringing them within the national guideline levels. This removed the need to declare an Air Quality Management Area in Llay.

The **Updating and Screening Assessment** and addendum completed in 2004. concluded:

Results of the screening assessment have shown that no detailed assessment is required with respect to emissions arising from all sources assessed - predictions of air quality in relevant future years indicate that the current air quality objectives will be met at all receptors in Wrexham County Borough.

The USA also stated that:

WCBC will continue with its monitoring programme to confirm the findings of this report. Further work will be undertaken with respect to the performance of diffusion tubes through the use of triplicate tubes at the continuous roadside-monitoring site.

The last Air Quality report prepared by Wrexham County Borough Council was the **Progress Report**. This report was completed in 2005 and concluded:

- The findings of the Updating and Screening Assessment continue to remain valid
- That there has not been any change in local circumstances to indicate a possible exceedance of the air quality standards and objectives.
- That potential changes in local circumstances will most likely relate to increases in traffic (e.g. as a result on increased housing development) at sensitive locations.
- The introduction of a domestic gas supply into the coal-burning region of Llay has had the effect of reducing the PM₁₀ levels, and as a result has improved the Air Quality in the village.
- The future recommendations as outlined in the USA continue to remain valid, namely:
 - a – WCBC will continue its monitoring program.
 - b – The co-location study into the Nitrogen Dioxide diffusion tubes located at the Victoria Road AURN station will continue.

Copies of the above reports can be viewed on the Wrexham County Borough Council web site at http://www.wrexham.gov.uk/english/environment/air_quality/index.htm

The above web site also shows the results for the air quality monitoring carried out by Wrexham County Borough Council.

Results

(i) Carbon Monoxide

(A) Monitoring

Wrexham County Borough Council is part of the Automatic Urban and Rural Network (AURN) for Air Quality. With Carbon Monoxide (CO) being one of the pollutants monitored at Wrexham. No other automatic network site monitors for Carbon Monoxide in North Wales (source www.welshairquality.co.uk).

Monitoring has shown that over the monitoring period there were no exceedences of the running 8 hour mean.

Year	% Data Capture	Maximum Daily Running 8 Hour Mean - mg/m ³
2002 ¹	98.1	0.6
2003	98.7	0.6
2004	98.9	0.4
2005 ²	98.7	2.28

1 – Monitoring did not start in 2002 until March 6th. Hence the 2002 data quoted above is for this point on (i.e. almost 10 months)

2 - The last quarter's data for 2005 has not yet been ratified.

(B) Very busy roads or junctions in built up areas

Local Authorities are only required to undertake a screening assessment for road traffic sources, where their daily flow of traffic exceeds certain levels. These levels are shown below and should be particularly applied to 'very busy' roads and junctions in built up areas:

- Single carriageway roads with daily average traffic flows which exceed 80 000 vehicles per day.
- Dual carriageway (2 or 3 lane) roads with daily traffic flows which exceed 120 000 vehicles per day.
- Motorways with daily average traffic flows which exceed 140 000 vehicles per day.

The previous USA considered traffic flows and projected them to 2010 where no roads or junctions exceeded the above threshold values. Current and projected flows have not changed significantly, therefore no further assessment work is required for Carbon Monoxide.

Conclusion

No detailed assessment for Carbon Monoxide is required

(ii) Benzene

(A) Monitoring:

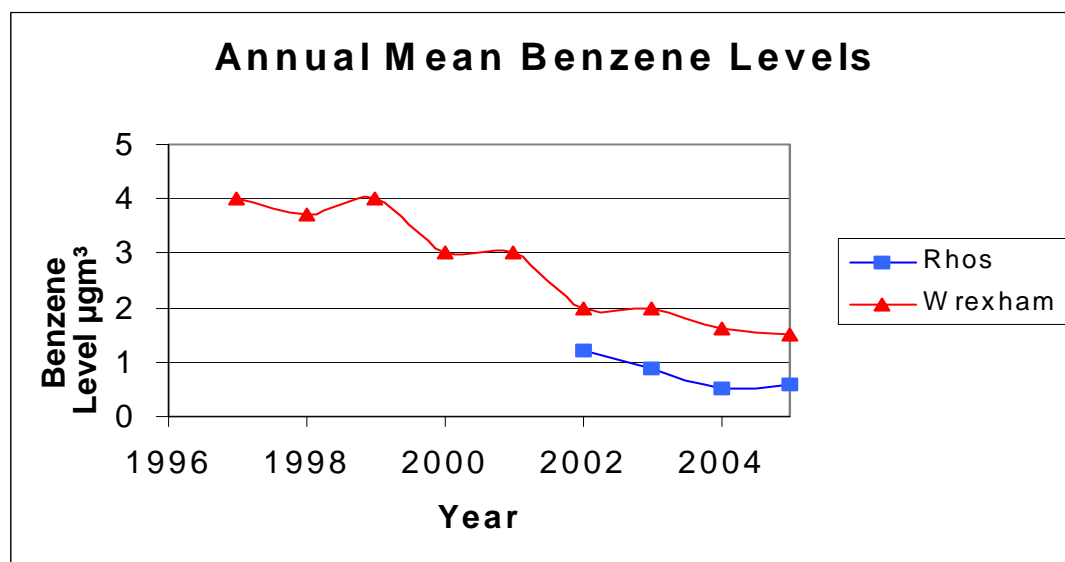
There is currently no national network Benzene monitoring being undertaken in North Wales (source www.welshairquality.co.uk).

Benzene is monitored for using diffusion tubes at two locations in the County Borough:

Llwyneinion Road in Rhosllanerchrugog (Rhos)
Grosvenor Road in Wrexham town

	Benzene Levels μgm^3								
Location	1997	1998	1999	2000	2001	2002	2003	2004	2005
Rhos	-	-	-	-	-	1.2	0.9	0.5	0.6
Wrexham	4.0	3.7	4.0	3.0	3.0	2.0	2.0	1.6	1.5

A plot of the above data gives the following trends:



The Benzene concentrations recorded at Grosvenor Road are showing a downward trend. This trend is mirrored at the monitoring location at Llwyneinion Road though, as less than five years of data exists for this site, definitive trends cannot be stated.

Using the method outlined in LAQM.TG(03) the following projections to the objective year can be made for mean annual Benzene levels at the two monitoring locations:

	Projected annual mean Benzene Concentration μgm^3				
Location	2006	2007	2008	2009	2010
Rhos	0.4	0.3	0.2	0.2	0.1
Wrexham	1.1	0.8	0.6	0.4	0.2

This demonstrates that the recorded levels of Benzene and the projected levels will be within the standards set by the Air Quality (Wales) Regulations 2000 and Amendment (Wales) Regulations 2002.

Benzene data on the Local Air Quality Management website (<http://www.airquality.co.uk/archive/laqm/tools.php>) is only available for 2003. Using the method outlined in LAQM.TG(03) the values projected for 2005 and 2010 show that there are no locations in Wrexham County Borough likely to exceed the Benzene objective..

(B) Monitoring data within an AQMA

There are no AQMA's in Wrexham County Borough Council

(C) Very busy roads or junctions in built up areas

Local Authorities are only required to undertake a screening assessment for road traffic sources, where their daily flow of traffic exceeds certain levels. These levels are shown below and should be particularly applied to 'very busy' roads and junctions in built up areas:

- Single carriageway roads with daily average traffic flows which exceed 80 000 vehicles per day.
- Dual carriageway (2 or 3 lane) roads with daily traffic flows which exceed 120 000 vehicles per day.
- Motorways with daily average traffic flows which exceed 140 000 vehicles per day.

The previous USA considered traffic flows and projected them to 2010 where no roads or junctions exceeded the above threshold values. Current and projected flows have not changed significantly, therefore no further assessment work is required for Benzene.

(D) New industrial sources

There are no new industrial sources within Wrexham County that need to be considered further with regards to Benzene levels.

(E) Industrial sources with substantially increased emissions or new relevant exposure

There are no industrial processes with substantially increased Benzene emissions within Wrexham County Borough or Industrial sources that have been identified in neighbouring authorities that need to be considered further with regards to Benzene levels.

(F) Petrol Stations

The petrol stations within Wrexham County Borough that have a throughput of more than 2000m³ of petrol per annum are shown below. All these petrol stations have a P.P.C. (Pollution Prevention and Control) permit relating to the unloading of petrol and therefore have appropriate vapour recovery systems in place:

Asda Stores Ltd, Asda Petrol Filling Station, Holt Road.
Ruabon Service Area, Ruabon by pass, Ruabon.
Snax 24, Tan y Clawdd Service Station.
Rhostyllen Service Station, Wrexham Road, Rhostyllen.
Beechley Service Station, Kingsmill Road, Hightown.
D, G & P Warner & Sons, 1 Chester Road, Gresford.
Tesco Petrol Filling Station, Crescent Road.
Mold Road Service Station (Shell UK), Mold Road. Gwersyllt
Sainsbury's Supermarkets Ltd, Plas Coch Road.
TGN Jones & Sons, Berwyn Garage, Holyhead Road, Chirk.

(G) Major petrol storage depots

There are no major fuel storage depots in Wrexham County Borough Council or it's neighbouring authorities.

Conclusion

No detailed assessment for Benzene is required

(iii) 1,3-Butadiene

(A) Monitoring data

There is currently no national network for 1,3-Butadiene monitoring in North Wales (source www.welshairquality.co.uk).

Wrexham County Borough Council does not monitor for 1,3-Butadiene as no significant sources exist within the County Borough.

1.3-Butadiene data on the Local Air Quality Management website (<http://www.airquality.co.uk/archive/lqgm/tools.php>) is only available for 2003. This modelled data showed that there were no locations in Wrexham County Borough that exceeded the running annual mean for 1.3-Butadiene.

(B) New industrial sources

There are no new industrial processes within Wrexham County Borough or its neighbouring authorities that need to be considered further with regards to levels of 1.3-Butadiene.

(C) Industrial sources with substantially increased emissions or new relevant exposure

There are no sources with substantially increased emissions or new relevant exposure within Wrexham County Borough or that have been identified in neighbouring authorities that need to be considered further with regards to levels of 1.3-Butadiene.

Conclusion

No detailed assessment for 1.3-Butadiene is required

(iv) Lead

(A) Monitoring

There is currently no automatic Lead monitoring being undertaken in North Wales (source www.welshairquality.co.uk)

Wrexham County Borough Council does not monitor for Lead as no significant sources exist within the County Borough. The first round of review and assessment showed that there were no locations within Wrexham County Borough that would exceed the 2004 objective for Lead of 0.5 µgm³. It is also unlikely that there will be any exceedences of the 2008 objective of 0.25 µgm³.

(B) New industrial sources

There are no new industrial processes within Wrexham County Borough or it's neighbouring authorities that need to be considered further with regards to levels of Lead

(C) Industrial sources with substantially increased emissions or new relevant exposure

There are no sources with substantially increased emissions or new relevant exposure within Wrexham County Borough or that have been identified in neighbouring authorities that need to be considered further with regards to levels of Lead.

Conclusion

No detailed assessment for Lead is required

(v) Nitrogen Dioxide

(A) Monitoring data

Wrexham County Borough Council is part of the Automatic Urban and Rural Network (AURN) for Air Quality. With Nitrogen Dioxide (NO₂) being one of the pollutants monitored at Wrexham.

Monitoring has shown that over the monitoring period no exceedences of the NO₂ objective were recorded. The average annual readings since the start of monitoring are:

Year	% Data Capture	Annual mean NO ₂ level µgm ³	Number of exceedences of the 1 hour mean
2002 ¹	94.4	24.0	0
2003	97.6	25.4	0
2004	94.7	20.3	0
2005 ²	95.6	19.0	0

1 – Monitoring did not start in 2002 until March 6th. Hence the 2002 data quoted is for this point on (i.e. almost 10 months).

2 - The last quarter's data for 2005 has not yet been ratified.

Using the method outlined in LAQM.TG(03) the following projections for future years can be made for the annual mean Nitrogen Dioxide levels at the AURN site:

Location	Projected annual mean NO ₂ Concentration µgm ³				
	2006	2007	2008	2009	2010
AURN	16.40	13.64	10.90	8.34	6.12

Wrexham also monitors for NO₂ with diffusion tubes at sixteen locations throughout the County Borough (in 2005).

As well as this, a triplicate co-location study with diffusion tubes was carried out at the Victoria road AURN station in 2005. The co-location study has shown that a Bias Adjustment Factor (BAF) of 0.856 should be applied to the 2005 diffusion tubes results (see appendix.3). The table also projects the values for 2010 based on the method outlined in LAQM.TG(03) using the spreadsheet downloaded from the Local Air Quality Management website (<http://www.airquality.co.uk/archive/laqm/tools.php>).

Location	Monitoring location type	Measured annual mean concentration for 2005 ($\mu\text{g}/\text{m}^3$)	Corrected annual mean concentration for 2005 ($\mu\text{g}/\text{m}^3$)	Projected annual mean concentration to 2010 ($\mu\text{g}/\text{m}^3$)
Grosvenor Road, Wrexham	Roadside	38.9	33	27.76
Crown Buildings, Chester Street, Wrexham	Background	21.8	19	16.62
Redwither, Wrexham Industrial Estate	Background	14.6	13	11.37
Plas Madoc, Cefn Mawr	Background	18.3	16	13.99
Ceiriog School, Chirk	Background	18.3	16	13.99
Gardden View, Ruabon	Roadside	21.0	18	15.14
Hugmore Lane, Wrexham Industrial Estate	Roadside	25.6	22	18.51
Old Farm Road, Rhostyllen	Roadside	22.4	13	18.84
Mold Road, Wrexham	Roadside	27.5	23	19.35
Chester Road, Wrexham	Roadside	32.8	28	23.55
Holt Road, Wrexham	Roadside	26.4	23	19.35
Holyhead Road, Chirk	Roadside	21.5	18	15.14
Gresford RBT – Chester Road ¹	Roadside	33.2	28	23.55
The Sycamores, Chester Road ²	Roadside	34.0	29	24.39
Rhostyllen Roundabout, Wrexham (A483)	Roadside	33.8	29	24.39
Bus Station, Wrexham	Roadside	33.1	28	23.55

1 – Monitoring finished at the Gresford Roundabout in July 2005, when the diffusion tube was relocated to (newly completed) The Sycamores, as this was identified as a more relevant monitoring site. The Sycamores monitoring site is 85 meters from the Gresford Roundabout site.

2 - Monitoring did not start at the Sycamores until July 2005, hence there are 6 months of data

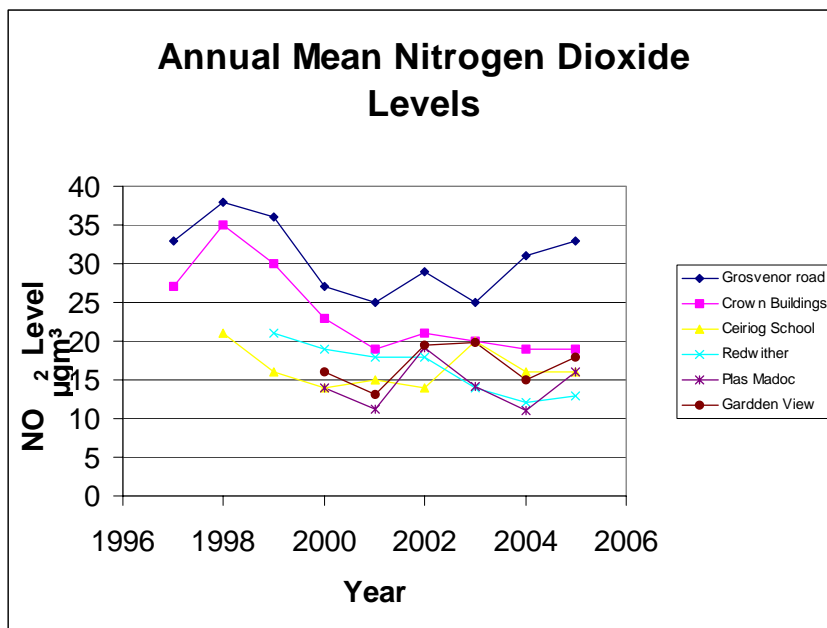
The NO₂ level recorded at Grosvenor Road is approaching the limit values specified in the Air Quality (Wales) Regulations 2000 and Amendment (Wales) Regulations 2002. This is a busy thoroughfare with business on either side. There are no residences, hence there are not considered to be any sensitive receptors as defined by LAQM.PG(03). Monitoring was conducted at this site (along with Benzene – see (i)) as it is one of the busier rush hour roads and often congested at these times, thus providing useful information with relevance to traffic emissions.

The results indicate that there will be no exceedences of the Air Quality (Wales) Regulations 2000 and Amendment (Wales) Regulations 2002 for NO₂ at any sensitive locations within Wrexham County Borough.

Of the above sixteen monitoring sites, six have been running for five years or more:

Site	Start Date
Grosvenor Road	May 1996
Crown Buildings	May 1996
Ceiriog School	June 1997
Redwither	Nov 1998
Plas Madoc	Jan 2000
Gardden View	May 2000

The following chart shows the trend at these monitoring sites (the readings for 2004 & 2005 have been BAF adjusted).



The overall trend for the four monitoring sites has been downward, though Grosvenor Road is showing an increase in NO₂ levels. However, as has been previously commented Grosvenor Road contains no sensitive receptors.

(B) Monitoring data within an AQMA

There are no AQMA's in Wrexham County Borough Council

(C) Narrow congested streets with residential properties close to the kerb

There are no narrow congested streets with traffic flows of greater than 10,000 vehicles per day.

(D) Junctions

These locations have been examined in previous rounds of review and assessment and were not highlight as areas where the objectives would be exceeded. There is no new data available to suggest that this situation has changed.

(E) Busy streets where people may spend 1 hour or more close to traffic

There are no streets in Wrexham County Borough where member of the public are likely to spend more than 1 hour with traffic flows of 10,000 vehicles per day.

(F) Roads with a high flow of buses and/or HGVs

Hugmore Lane is the main link road onto the Wrexham Industrial Estate, where it carries a bulk of the HGV's from the A483. Even though the nearest property to the road is greater than 10 meters distance the Council has monitored the Nitrogen Dioxide levels there with a diffusion tube since 2001. The annual mean levels that have been recorded since monitoring began are:

Location	NO ₂ Concentration µgm ³				
	2001	2002	2003	2004	2005
Hugmore Lane	20.3	31.8	21.0	18.0	18.5

Note: The 2004 and 2005 levels have been BAF adjusted as described above.

Projections to future years can be made by using the method outlined in LAQM.TG(03):

Location	Projected annual mean NO ₂ Concentration µgm ³				
	2006	2007	2008	2009	2010
Hugmore Lane	16.4	14.0	11.7	9.4	7.3

The above monitoring and modelling has shown that the Nitrogen Dioxide levels have not exceeded or are likely to exceed the objectives.

(G) New roads constructed or proposed since the previous round of R&A

As part of the redevelopment of the former Brymbo Steel Works, a new road is to be constructed which links the surrounding villages and also serves as access onto the (planned) new houses on the site. No air quality assessment was carried out for the proposed redevelopment (in terms of traffic). However, a Traffic Impact Assessment was required. This assessment gave the expected volume of traffic to be of the order of 1500 vehicles a day. The plans for the site do indicate that some of the houses may be within 10 meters of the road and so a Design Manual for Roads and Bridges (DMRB) assessment was carried out. Using data from the Traffic Impact Assessment and background air quality data downloaded from <http://www.airquality.co.uk/archive/aqm/tools.php>, the DMRB assessment showed that the annual NO₂ levels are predicted to be 18.9 µgm³ at the relevant exposure, and hence below the objective levels.

(H) Roads with significantly changed traffic flows, or new relevant exposure.

No roads with significantly changed traffic flows have been identified in Wrexham County Borough.

(I) Bus Station's

There is only one bus station of significant size in the County Borough (located on Kings Street). A Nitrogen Dioxide tube has been monitoring the levels of this pollutant there since 2005:

Location	NO₂ Concentration µgm³ 2005
Bus Station	23.66

Note: The above figure has been BAF adjusted.

Projections to future years can be made by using the method outlined in LAQM.TG(03):

Location	Projected annual mean NO₂ Concentration µgm³				
	2006	2007	2008	2009	2010
Bus Station	20.9	17.9	14.9	11.9	9.3

Both monitoring and modelling results have shown that the objective or Nitrogen Dioxide is not being exceeded.

(J) New industrial sources

There have been no new industrial sources of Nitrogen Dioxide in Wrexham County Borough or it's neighbouring authorities.

(K) Industrial sources with substantially increased emissions, or new relevant exposure.

There are no industrial sources of substantially increased emissions of Nitrogen Dioxide in Wrexham County Borough and none have been identified in neighbouring authorities.

(L) Aircraft

There are no airports in Wrexham County Borough Council.

Conclusion

No detailed assessment for Nitrogen Dioxide is required.

(vi) Sulphur Dioxide

(A) Monitoring data

Wrexham County Borough Council is part of the Automatic Urban and Rural Network (AURN) for Air Quality. With Sulphur Dioxide (SO₂) being one of the pollutants monitored at Wrexham.

Monitoring has shown that over the 2002, 2003, 2004 & 2005 calendar periods no exceedences of the SO₂ objectives were recorded. The relevant readings since the start of monitoring are:

Year	% Data Capture	No of Exceedences of the 15 minute mean	No of Exceedences of the 1 hour mean	No of Exceedences of the 24 hour mean	Annual mean
2002 ¹	83	0	0	0	5
2003	97	0	0	0	5
2004	87	0	0	0	3
2005 ²	97	0	0	0	3

1 – Monitoring did not start in 2002 until March 6th. Hence the 2002 data quoted is for this point on (i.e. almost 10 months).

2 – The last quarter's data for 2005 has not yet been ratified.

The annual mean value is shown for comparison to the diffusion tube monitoring data, which is tabulated below. As there are no criteria within the Air Quality (Wales) Regulations 2000 and Amendment (Wales) Regulations 2002 for annual Sulphur Dioxide levels.

In addition to the AURN monitoring, Wrexham County Borough Council monitors for Sulphur Dioxide at four locations within the County Borough using diffusion tubes:

Llay Estate Office - Llay
Blast Road – Brymbo
Maes-Y-Waun – Chirk
Victoria Road – Wrexham (Co-located with the AURN Station)

Location	Sulphur Dioxide Annual Mean Concentration µgm ³					
	2000	2001	2002	2003	2004	2005
Llay	21.6	12	17	11.6	9.1	4
Brymbo	5.4	3	6	3.8	3.8	7
Chirk	6	9	5.9	5.3	6.0	4
Wrexham	-	-	-	-	4.7	5

As can be seen both Llay and Brymbo have shown a general downward trend. Chirk has remained reasonably consistent over the monitoring period.

(B) Monitoring data within an AQMA

There are no AQMA's within Wrexham County Borough Council.

(C) New Industrial Sources

There are no new industrial sources of Sulphur Dioxide with Wrexham County Borough or it's neighbouring authorities.

(D) Industrial sources with substantially increased emissions, or new relevant exposure.

There are no industrial sources of substantially increased emissions of Sulphur Dioxide in Wrexham County Borough or it's neighbouring authorities.

(E) Areas of domestic coal burning.

This has been considered under previous reviews and assessments. However, Wrexham County Borough Council maintains its monitoring program for Sulphur Dioxide (and Particulate matter – see section vii) in the main area of domestic coal burning in the County Borough.

Previous reviews and assessments highlighted the village of Chirk as an area of domestic coal burning. Wrexham County Borough Council maintains a Sulphur Dioxide diffusion tube to the north of the main coal burning region (in the direction of the prevailing wind direction). Whereas there are no objectives for an annual mean for Sulphur dioxide the results from this monitoring can be compared to the tube co-located at the Automatic Network monitoring station in Wrexham. This diffusion tube has been in situ since 2000 though the network station has only been in operation since 2002:

Location	Annual Sulphur dioxide levels μgm^3					
	2000	2001	2002	2003	2004	2005
Chirk	6	9	5.9	5.3	6.0	4.0
Wrexham – Diffusion tube	-	-	-	-	4.7	5.0
Wrexham – Automatic monitor	-	-	5.0	5.0	3.0	3.0

The above monitoring indicates that the levels of Sulphur Dioxide in Chirk are unlikely to be exceed the objective values.

(F) Small boilers > 5MW (thermal)

This has been considered under previous round of review and assessment. Where no boilers fitting the criteria were identified, there is no new data to suggest that this situation has changed.

(G) Shipping

There are no ports in Wrexham County Borough

(H) Railway Locomotives

Previous rounds of review and assessment did not identify any areas of relevant exposure where diesel locomotives were stationary for 15 minutes or more. There is no new data to suggest that this situation has changed.

Conclusion

No detailed assessment for Sulphur Dioxide is required

(vii) Particulate Matter

(A) Monitoring data

Wrexham County Borough Council is part of the Automatic Urban and Rural Network (AURN) for Air Quality, with Particulate Matter (PM₁₀) being one of the pollutants monitored at Wrexham.

Monitoring has shown that over the 2002, 2003, 2004 & 2005 calendar periods no exceedences of PM₁₀ objective were recorded. The average annual readings since the start of monitoring are (the monitoring has been conducted gravimetrically and therefore has not required correction):

Year	% Data Capture	Annual mean PM ₁₀ Level µgm ³	Number of exceedences of 50µgm ²
2002 ¹	93	25	21
2003	87	36	38
2004	92	20	9
2005	92	22	22

1 – Monitoring did not start in 2002 until March 1st. Hence the 2002 data quoted is for this point on (i.e. 10 months)

The above table shows that there have been no exceedences of the objectives with the exception of 2003. The previous round of review and assessment explained that the 2003 exceedences were due to the three PM₁₀ episodes recorded nation-wide that year.

Additionally to the AURN station, Wrexham County Borough Council has monitored for PM₁₀, in 2005, again gravimetrically, at two sites:

Monitoring Site	Start Date	Finish Date
Chirk – Chirk Court	16.05.03	Ongoing
Llay – Housing Estate Office	06.11.02	23.03.05

The monitoring site at the Llay Housing Estate office was discontinued on 23rd March 2005, as the monitoring program that was run during the switch from domestic coal burning to gas, had concluded. The results for this scheme were reported in the 2003 & 2004 Progress Report.

Chirk Court PM₁₀ monitoring:

Year	% Data Capture	Annual mean PM ₁₀ Level µgm ³	Number of exceedences of 50µgm ²
2004	91.0	22.0	9
2005	83.5	21.9	17

The above table shows that Chirk did not exceed the objectives for PM₁₀ in 2005. As mentioned in the Sulphur Dioxide (section vi), Chirk was identified as a region of

significant coal burning. For this reason Wrexham County Borough Council has located a Particulate Matter monitor (gravimetric) to the north (in the direction of the prevailing wind) of the main coal burning region. A fuller explanation of this was included in previous rounds of review and assessment.

The reduced data capture rate for 2005 was due to a temporary relocation (six weeks) of the particulate monitor where it was used to assess for any impact a demolition of an industrial site may have had on another hamlet within the County Borough.

As previously mentioned, the Particulate Monitoring program at Llay was completed in March 2005. This means that only data for three months of the year is available. This is shown below for completion sake.

Llay Estate Office (3 months of monitoring only)

Year	% Data Capture	Annual mean PM ₁₀ Level µgm ³	Number of exceedences of 50µgm ²
2005	17.58 (76)	26.24	6

The % data capture column shows the percentage of data captured for the entirety of 2005, with the bracket value being the data capture percentage for the January to March monitoring period.

As part of the reclamation of the former Brymbo Steel Works Wrexham County Borough Council also monitored for PM₁₀ at two locations during 2005 in:

Site Name	Grid Ref.	Description
Pentre Broughton	SJ3053	Located at the back of a residential property overlooking site
Tanyfron	SJ2952	Located on the edge of a residential area

Details of the reclamation work and the open cast coal mining carried out by Brymbo Development Limited (BDL) were reported in the 2003 & 2004 Progress Report. Though it is worthy of mentioning that the monitors used were Osiris' that are based on the TEOM technology. Hence the recommended scaling factor of 1.3 was applied to data recorded by these units to give the gravimetric equivalent.

The PM₁₀ monitoring program was completed at the end of October 2005 though the Tanyfron site was run until 31st December 2005 in order to have a complete year worth of data. The bracketed % Data Capture quoted for Pentre Broughton shows the data capture for the monitoring period (January to October).

Site	% Data Capture	Annual mean PM ₁₀ Level µgm ³	Number of exceedences of 50µgm ²
Pentre Broughton	56.0 (67.1)	22.1	9
Tanyfron	90.9	24.8	21

Sporadic power failure to the site in Pentre Broughton resulted in the low data capture rate. This data was, however, evaluated in conjunction with the on site monitors run by BDL's environmental consultant, which showed that the objective for PM₁₀ was not exceeded.

(B) Monitoring data within an AQMA

There are no AQMA's within Wrexham County Borough Council

(C) Busy roads and junctions in Scotland

Not applicable.

(D) Junctions

These locations have been examined in previous rounds of review and assessment and were not highlight as areas where the objectives would be exceeded. There is no new data available to suggest that this situation has changed.

(E) Roads with a high flow of buses and/or HGV's

Hugmore Lane (as mentioned in section v – Nitrogen Dioxide) is the main road that sees a large number of HGV's. However the nearest site of relevant exposure is greater than ten meters for the road and therefore there are no sensitive receptors.

(F) New roads constructed or proposed since the last round of review and assessment

As part of the redevelopment of the former Brymbo Steel Works. A new road is to be constructed which links the surrounding villages and also serves as access onto the (planned) new houses on the site. No air quality assessment was carried out for the proposed redevelopment (in terms of traffic). However, a Traffic Impact Assessment was required. This assessment gave the expected volume of traffic to be of the order of 1500 vehicles a day. The plans for the site do indicate that some of the houses may be within 10 meters of the road and so a Design Manual for Roads and Bridges (DMRB) assessment was carried out. Using data from the Traffic Impact Assessment and background air quality data downloaded from <http://www.airquality.co.uk/archive/aqm/tools.php>, the DMRB assessment showed that the annual PM₁₀ levels are predicted to be 16.2 µgm³ at the relevant exposure, and hence below the objective levels.

(G) Roads with significantly change traffic flows or new relevant exposure

No roads with significantly changed traffic flows have been identified in Wrexham County Borough.

(H) Roads close to the objective during the second round of review and assessment

There were no roads identified as being close to the objective in the second round of review and assessment.

(I) New Industrial sources

There are no new industrial sources of Particulate Matter within Wrexham County Borough or it's neighbouring authorities.

(J) Industrial sources with substantially increased emissions, or new relevant exposure.

There are no industrial sources of substantially increased emissions of Particulate Matter in Wrexham County Borough or its neighbouring authorities.

(K) Areas of domestic coal burning.

Previous rounds of review and assessment highlighted the village of Chirk as an area of domestic coal burning. Wrexham County Borough Council maintains a Particulate Matter monitor to the north of the main coal-burning region (in the direction of the prevailing wind direction).

Monitoring has shown (see above) that there were no exceedences of the Particulate Matter objective in Chirk.

(L) Quarries and Landfills

Landfill

2005: Stryd Las Landfill site licence was surrendered. This site was a landfill site situated in Johnstown (x: 329871, y: 346179), that excepted only inert waste and hence it is not considered to have any relevance with regards to the air quality objectives.

Quarries

2005: Open-cast coal operations cease at Brymbo – This was part of the reclamation of the former Brymbo Steelworks site as discussed in the previous progress report. Both on site monitoring carried out by BDL's consultant and off site monitoring carried out by Wrexham County Borough Council showed no exceedences of the PM₁₀ objectives during these operations (see Tanyfron and Pentre Broughton monitoring results)

(M) Aircraft

There are no Airports in Wrexham County Borough.

Conclusion

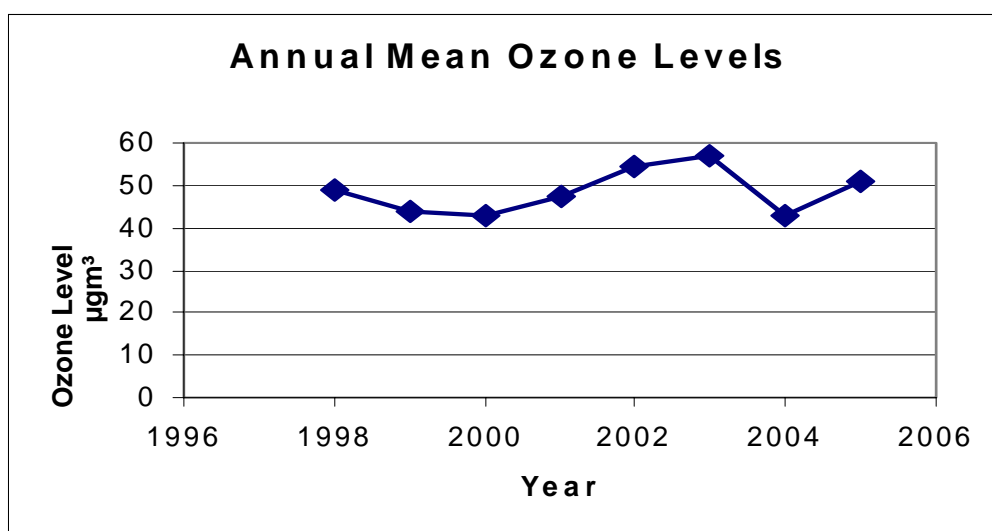
No detailed assessment for Particulate Matter is required

(vi) Ozone

Even though Ozone (O₃) is not included in the Air Quality objectives Wrexham County Borough Council has undertaken monitoring for it at one location in the County Borough – Chirk. The monitoring has been carried out using a diffusion tube, which can't be directly related to the guideline values as stated in the Air Quality objectives. However, it is able to provide general trend information:

Location	Measured annual mean concentration for 2005 (µgm ³)
Chirk	51

The annual mean Ozone levels for the Wrexham County Borough Councils monitoring program are shown from the start of the program (1998).



The above chart does show that the Ozone levels have remained reasonably consistent over the monitoring period at 50 ± 10 µgm³.

Conclusion

No detailed assessment for Ozone is required

New Local Developments

(i) New Residential & Retail

With a significant risk of impacting on air quality (planning approval containing air quality related conditions):

For 2005: None identified

With a lower risk of impacting on air quality (planning approval not containing air quality related):

Site Name	Grid Reference	Development Type and Scale	Planning Status and Reference Number	Air Quality Implications
HOLT Francis Lane	340800 353478	Housing 17 units	Permission Granted P/2005/0092	Traffic
BRYMBO Former Steelworks	329439 353842	Housing 469 units	Permission Granted P/2005/0114	Traffic
GWERSYLLT Mold Road	331803 353227	Housing 75 units	Permission Granted P/2005/0259	Traffic
BROUGHTON Station Road	330060 353531	Housing 69 units	Permission Granted P/2005/0263	Traffic
CAIA PARK Eagles Meadow	333732 350133	Mixed use Residential and Commercial	Permission Granted P/2005/0328	Traffic
GRESFORD Chester Road	334867 354351	Housing 59 units	Permission Granted P/2005/0613	Traffic
OFFA Croesnewydd Road	331904 350585	Housing 128 units	Permission Granted P/2005/1464	Traffic

Additional Information

Air Quality Monitoring Station

Wrexham County Borough Council has recently purchased an air quality monitoring station. This is situated at the primary school in Isycoed, which is near the Wrexham Industrial Estate and monitors continuously for:

Nitrogen Dioxide
Sulphur Dioxide

The station also monitors for Particulate Matter (PM₁₀) Though as this is a gravimetric monitor it is only capable of giving daily readings.

Meteorological equipment has also been incorporated to allow a better understanding and modelling of any results supplied by the station.

Monitoring results from this station will be reported in the 2006 Progress Report.

Air Quality Impact Assessment for Chirk

The 2003 & 2004 Progress report stated:

Additional modelling for pollutants is currently being undertaken for the village of Chirk and the results will be reported in the 2005 Update and Screening Assessment.

Chirk is a village locate some 10 miles to the south west of the town of Wrexham. Within this village there are two large industrial sites:

Cadbury Schweppes Plc – Food processing plant
Kronospan Ltd – Formalin and Chipboard plant

Using data supplied by Kronospan and Wrexham County Borough Council the Environment Agency's AQMAU Unit modelled a set of four pollutants for the village of Chirk.

The methodology associated with the particular kind of modelling the Agency used (H1) involved firstly determining the predicted concentration of pollutants in the environment, called the Process Contribution (PC). Which was done by use of dispersion modelling. Dispersion modelling uses a computer program to calculate the ground level concentration of pollutants by taking into account stack heights and release velocity, the surrounding terrain, buildings and meteorological conditions.

These predicted concentrations are then compared with environmental benchmarks that are referred to as Environmental Assessment Levels (EAL's) and can be based on:

The Air Quality Standards
World Health Organisation guidelines
Guidance for protection of vegetation
Derived from Health and Safety executive limits for workplace exposure

The following table shows the models results, in terms of the background levels for Chirk and how much of this is contributed to from the chipboard and formalin plant (PC).

Pollutant	Long Term PC	Background
Nitrogen Dioxide	2.0 µgm ³	16.0 µgm ³
Formaldehyde	0.7 µgm ³	4.0 µgm ³
PM10	1.0 µgm ³	16.6 µgm ³
PM10*	4.0 µgm ³	16.6 µgm ³
VOC*	3.0 µgm ³	2.7 µgm ³

* - includes condensable volatile organic compounds which are Carbon-containing compounds that evaporate into the air (with a few exceptions). VOCs contribute to the formation of smog and/or may themselves be toxic. VOCs often have an odour, and some examples include petrol, alcohol, and the solvents used in paints.

When the above values are compared to the EAL's the model predicted that Kronospan contributed the following amounts:

Pollutant	Comparison to EAL
NO ₂	7.5% of EAL
Formaldehyde	14% EAL
PM ₁₀	2.5% EAL
VOC (inc COVC)	60% EAL
PM ₁₀ (inc CVOC)	10% EAL

Which can be seen is a small percentage a majority of the pollutants.

The 60% value predicted for VOC's is an estimation based on the models assumption that the VOC's will form into CVOC's in the atmosphere. However, some doubt exists as to the validity of this, as they may become PM₁₀. Kronospan is undertaking some analysis to identify which of these predictions is correct.

SUMMARY OF KEY POINTS AND FUTURE ACTIONS.

This progress report concludes that:

1. No detailed assessment is required with respect to any of the pollutants identified in the Air Quality Strategy and predictions for future years indicate that the Air Quality objectives will be met at all locations in Wrexham County Borough Council.
2. The findings of the Progress Report continue to remain valid
3. That there has not been any change in local circumstances to indicate a possible exceedance of the air quality standards and objectives.
4. That potential changes in local circumstances will most likely relate to increases in traffic (e.g. as a result on increased housing development) at sensitive locations.
5. The future recommendations as outlined in the Progress Report continue to remain valid, namely:
 - a – WCBC will continue its monitoring program.
 - b – The co-location study into the Nitrogen Dioxide diffusion tubes located at the Victoria Road AURN station will continue.

APPENDIX 1

Air Quality Standards

The following table shows the pollutants as classified by the Air Quality (Wales) Regulations 2000 and (Amendment) (Wales) Regulations for the purpose of Local Air Quality Management. These Air Quality Regulations have adopted into UK law the limit values required by EU Daughter Directives on Air Quality:

The permitted atmospheric levels have been determined by what is known about their effect on human and environmental health.

The objective expresses the level of pollutant that is permitted in the air over a given period of time. This level is often expressed as:

μgm^3 - micrograms per cubic meter, where one micogram is one millionth of a gram.

mgm^3 - milligrams per cubic meter, where one milligram is one thousandth of a gram.

The table also shows the date by which this level should be achieved.

Pollutant	Air Quality Objective Concentrations	Measured as	Target date
Benzene	16.25 μgm^3	Running Annual Mean	31.12.2004
	5.00 μgm^3	Annual Mean	31.12.2010
1,3-Butadiene	2.25 μgm^3	Running Annual Mean	31.12.2003
Carbon Monoxide	10.0 mgm^3	Maximum Daily Running 8 Hour Mean	31.12.2003
Lead	0.50 μgm^3	Annual Mean	31.12.2004
	0.25 μgm^3	Annual Mean	31.12.2008
Nitrogen Dioxide	200 μgm^3	1 Hour Mean Not to be exceeded more than 18 times per annum	31.12.2005
	40 μgm^3	Annual Mean	31.12.2005
Ozone (not included in regulations)	100 μgm^3	Running 8 Hour Mean Not to be exceeded more than 10 times a year	31.12.2005
Particulate Matter PM ₁₀	50 μgm^3	24 Hour Mean Not to be exceeded more than 35 times a year	31.12.2004
	40 μgm^3	Annual Mean	31.12.2004
Sulphur Dioxide	266 μgm^3	15 Minute Mean Not to be exceeded more than 35 times a year	31.12.2005
	350 μgm^3	1 Hour Mean Not to be exceeded more than 24 times a year	31.12.2004
	125 μgm^3	24 Hour Mean Not to be exceeded more than 3 times a year	31.12.2004

APPENDIX 2 (i)

Diffusion Tube Locations (table)

Nitrogen Dioxide

Location	OS Grid ref.	Site Classification	Notes
Grosvenor Road, Wrexham	SJ3350	Roadside	
Crown Buildings, Chester Street, Wrexham	SJ3350	Urban Background	
Redwither, Wrexham Industrial Estate	SJ3850	Industrial	
Plas Madoc, Cefn Mawr	SJ2843	Urban Background	
Ceiriog School, Chirk	SJ2938	Urban Background	
Gardden View, Ruabon	SJ3044	Roadside	
Hugmore Lane, Wrexham Industrial Estate	SJ3751	Roadside	
Old Farm Road, Rhostyllen	SJ3148	Roadside	
Mold Road, Wrexham	SJ3251	Roadside	
Chester Road, Wrexham	SJ3352	Roadside	
Holt Road, Wrexham	SJ3450	Roadside	
Holyhead Road, Chirk	SJ2838	Roadside	
Gresford Roundabout, Wrexham	SJ3251	Roadside	Monitoring discontinued July 2005
The Sycamores Chester Road, Wrexham	SJ3251	Roadside	Monitoring started July 2005
Rhostyllen Roundabout Wrexham (A483)	SJ3048	Roadside	
Bus Station, Kings Street, Wrexham	SJ3350	Roadside	

Sulphur Dioxide

Location	OS Grid ref.	Site Classification	Notes
Llay Housing Office	SJ3355	Suburban	
Blast Road, Brymbo	SJ2953	Urban Background	
Maes-Y-Waun, Chirk	SJ2938	Urban Background	

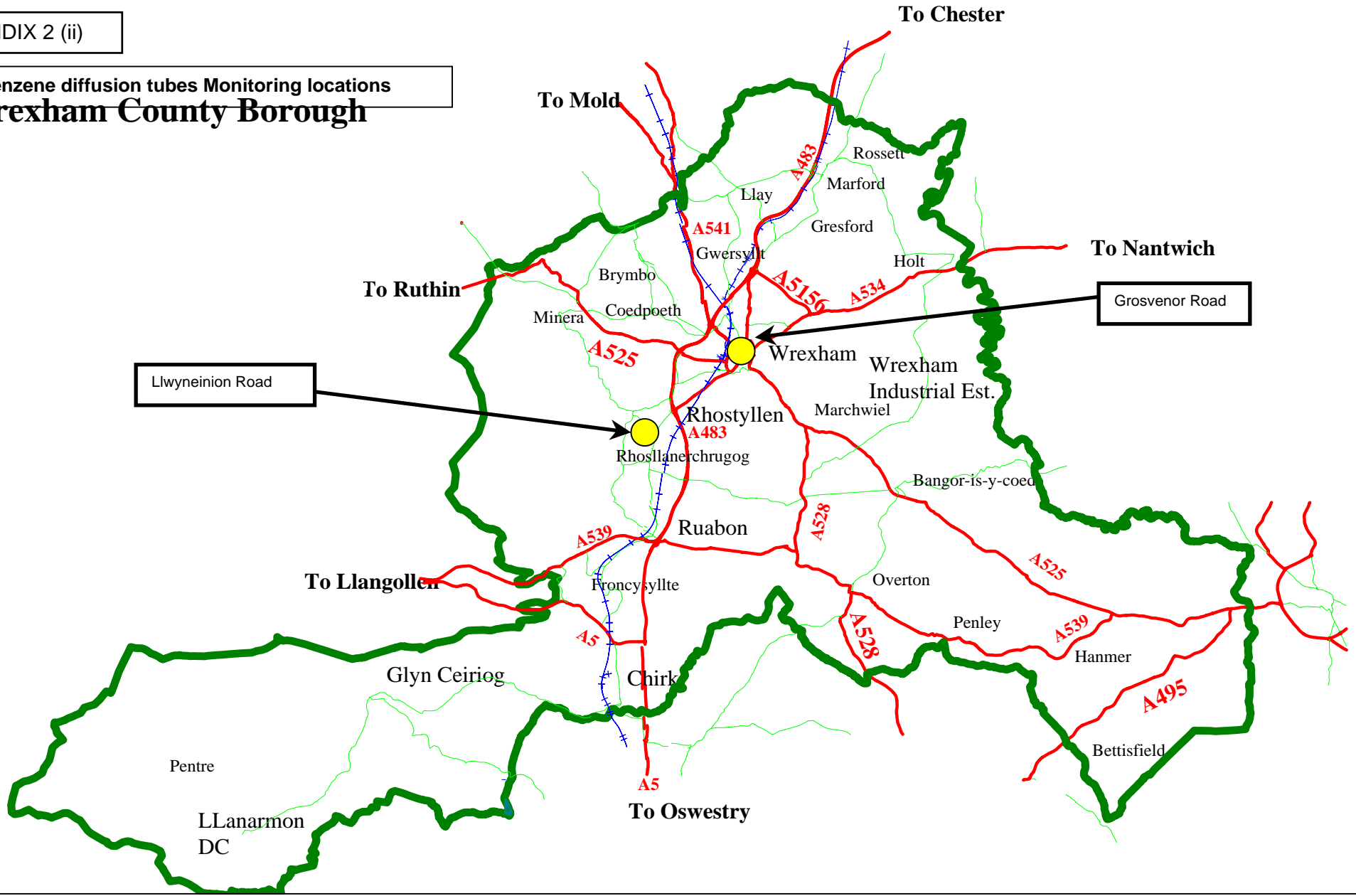
Benzene

Location	OS Grid ref.	Site Classification	Notes
Grosvenor Road, Wrexham	SJ3350	Roadside	
Llwyneinion Road, Rhosllanerchrugog	SJ2847	Other	Monitoring program near landfill site

Ozone

Location	OS Grid ref.	Site Classification	Notes
Maes-Y-Waun, Chirk	SJ2938	Urban Background	

Benzene diffusion tubes Monitoring locations
Wrexham County Borough



Wrexham County Borough

ORDNANCE SURVEY DIGITAL MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. CROWN COPYRIGHT RESERVED. WREXHAM COUNTY BOROUGH

Nitrogen Dioxide diffusion tubes Monitoring locations
Wrexham County Borough

Rhostyllen Roundabout (A483)
Old Majestys Stationery

Gresford Roundabout
The Sycamores

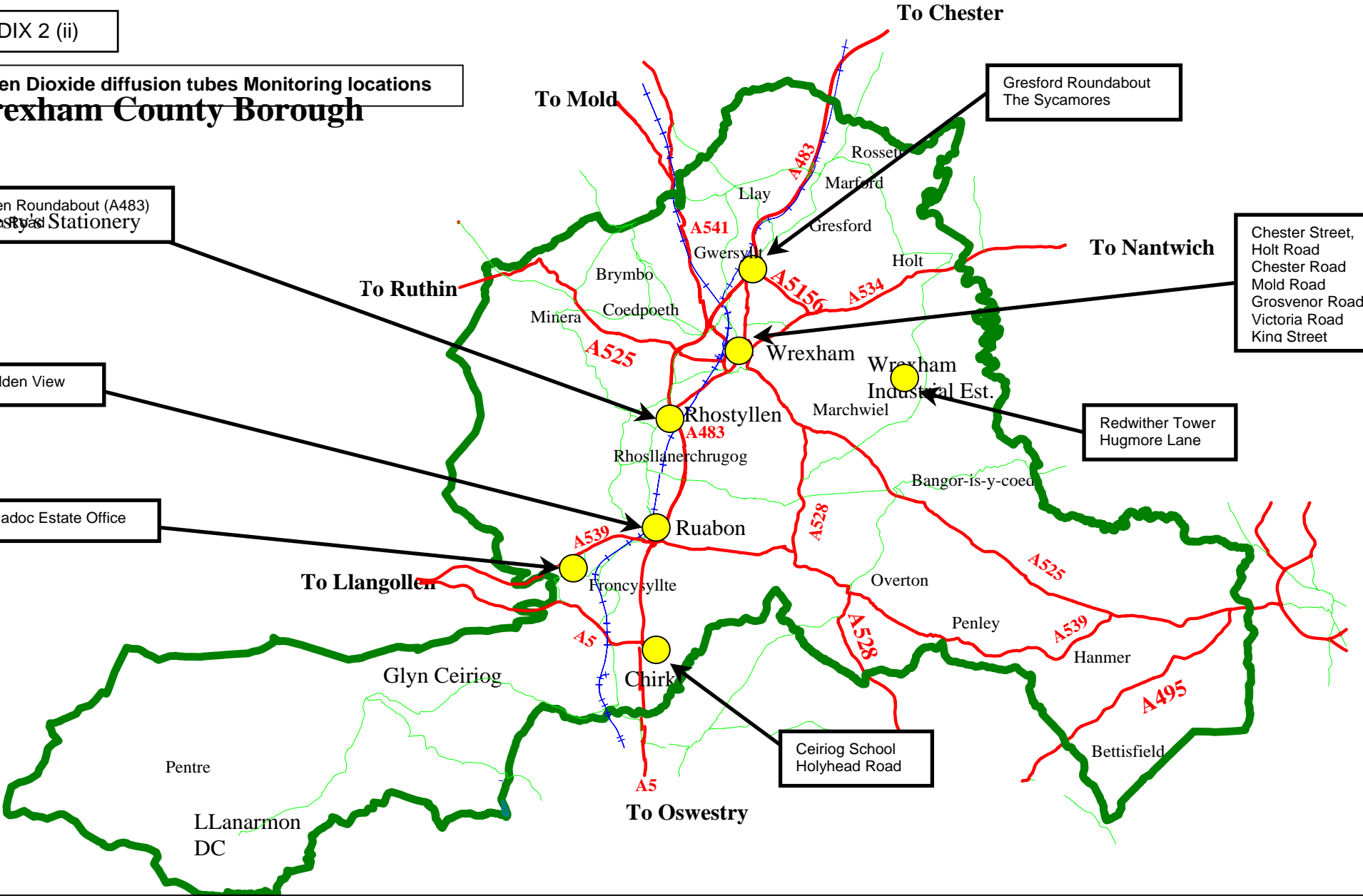
Chester Street,
Holt Road
Chester Road
Mold Road
Grosvenor Road
Victoria Road
King Street

Garden View

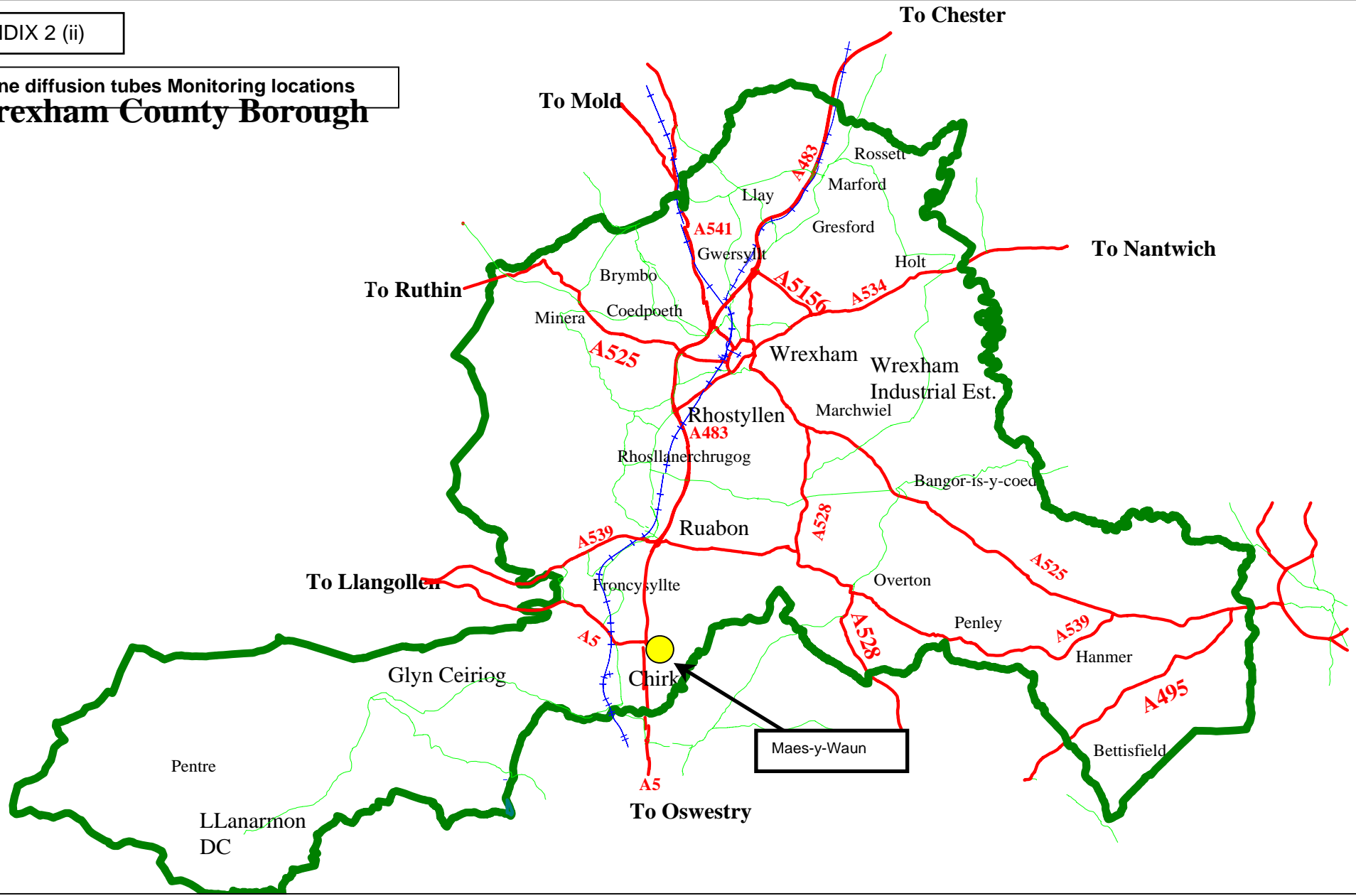
Redwither Tower
Hugmore Lane

Plas Madoc Estate Office

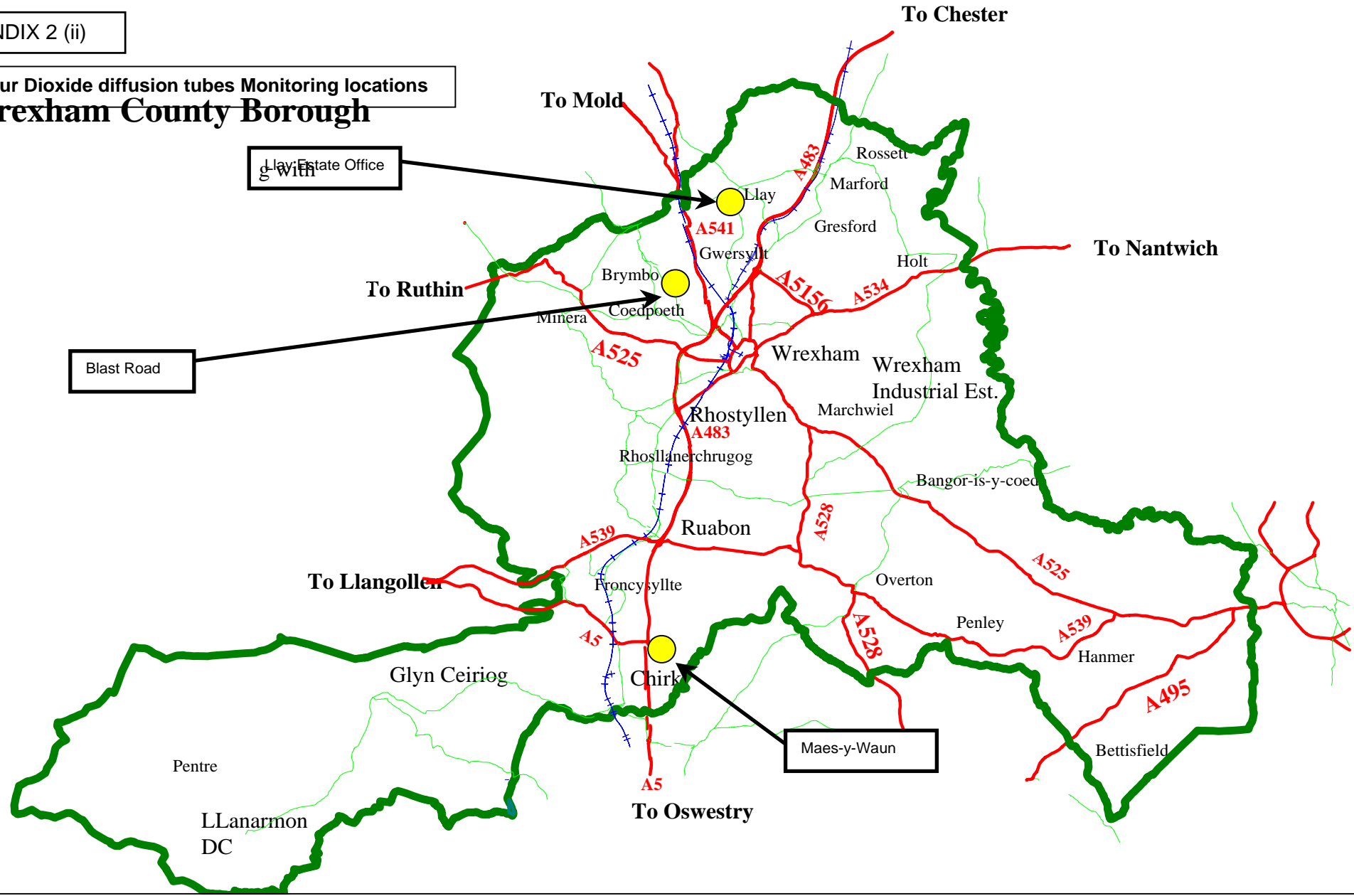
Ceiriog School
Holyhead Road



Ozone diffusion tubes Monitoring locations
Wrexham County Borough



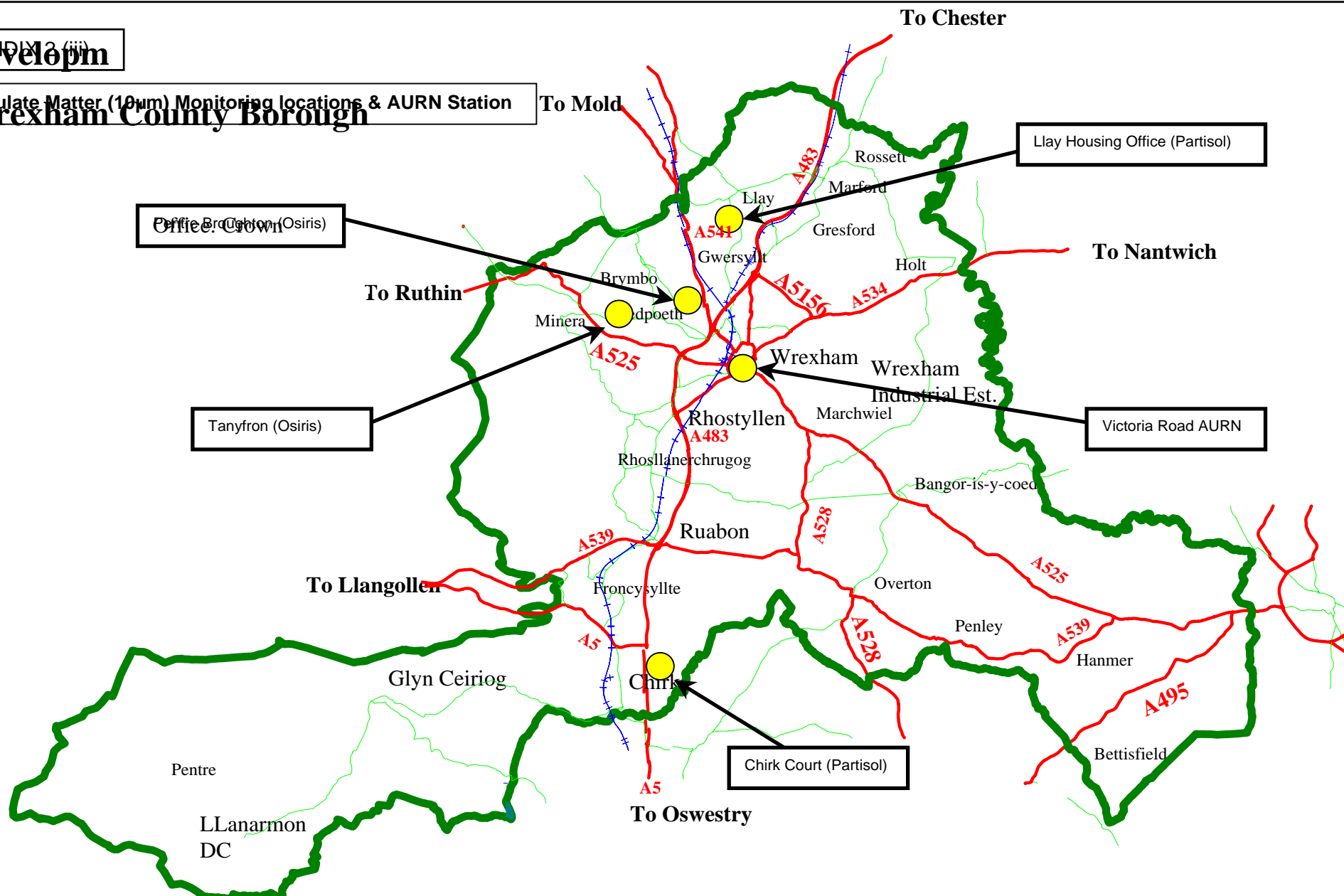
Sulphur Dioxide diffusion tubes Monitoring locations
Wrexham County Borough



Wrexham County Borough

ORDNANCE SURVEY DIGITAL MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. CROWN COPYRIGHT RESERVED. WREXHAM COUNTY BOROUGH

Particulate Matter (10µm) Monitoring locations & AURN Station
Wrexham County Borough



Wrexham County Borough

ORDNANCE SURVEY DIGITAL MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. CROWN COPYRIGHT RESERVED. WREXHAM COUNTY BOROUGH

APPENDIX 3

Nitrogen Dioxide diffusion tube analysis and bias adjustment

Test laboratory:

Casella CRE Air
The Heath Technical & Business Park
Runcorn
Cheshire
WA7 4QX

Quality Control etc:

UKAS accredited and participation in the WASP scheme for both Nitrogen Dioxide and Benzene tubes.

Tube preparation method:

10% TEA in water

Bias Adjustment Factor

2004 Bias Adjustment Factor (BAF) used in this report = 0.856 is based on a 12 month monitoring period at the Victoria Road AURN station in Wrexham County Borough. See following page for NETCEN's spreadsheet used to calculate the BAF.

Checking Precision and Accuracy of Triplicate Tubes



Period	Diffusion Tubes Measurements									Automatic Method		Data Quality Check	
	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{g m}^{-3}$	Tube 2 $\mu\text{g m}^{-3}$	Tube 3 $\mu\text{g m}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (DC)	Tubes Precision Check	Automatic Monitor Data Capture Check
1	10/01/2005	03/02/2005	25.0	24.0	26.0	25	1.0	4	2.5	15.86	95.49	Good	Good
2	03/02/2005	02/03/2005	27.0	29.0	21.0	26	4.2	16	10.3	25.56	91.05	Good	Good
3	02/03/2005	04/04/2005	28.0	29.0	21.0	26	4.4	17	10.8	26.66	95.58	Good	Good
4	04/04/2005	04/05/2005	24.0	19.0	22.0	22	2.5	12	6.3	17.83	95.28	Good	Good
5	04/05/2005	01/06/2005	19.0	20.0	21.0	20	1.0	5	2.5	15	95.39	Good	Good
6	01/06/2005	30/06/2005	18.0	16.0	12.0	15	3.1	20	7.6	14	92.82	Poor Precision	Good
7	30/06/2005	29/07/2005	19.0	19.0	16.0	18	1.7	10	4.3	14	91.97	Good	Good
8	29/07/2005	31/08/2005	10.0	13.0	14.0	12	2.1	17	5.2	12	92.52	Good	Good
9	31/08/2005	05/10/2005	26.0	23.0	23.0	24	1.7	7	4.3	20	95.71	Good	Good
10	05/10/2005	02/11/2005	35.0	33.0	31.0	33	2.0	6	5.0	22	99.4	Good	Good
11	02/11/2005	30/11/2005	25.0	29.0	25.0	26	2.3	9	5.7	23.67	97.47	Good	Good
12	30/11/2005	09/01/2006	33.0	32.0	34.0	33	1.0	3	2.5	29.03	99.49	Good	Good
13													

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

Overall survey ->

Good precision Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: **Wrexham 42**

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

Accuracy (with 95% confidence)
without periods with CV larger than 20%

Bias calculated using 11 periods of data

Bias factor A **0.848 +/- 0.092**

Bias B **22 +/- 11 %**

Diffusion Tubes Mean: **24 $\mu\text{g m}^{-3}$**
Mean CV (Precision): **10**

Automatic Mean: **20 $\mu\text{g m}^{-3}$**
Data Capture for periods used: **95**

Adjusted Tubes Mean: **20 +/- 2 $\mu\text{g m}^{-3}$**

Accuracy (with 95% confidence)
with all the data

Bias calculated using 12 periods of data

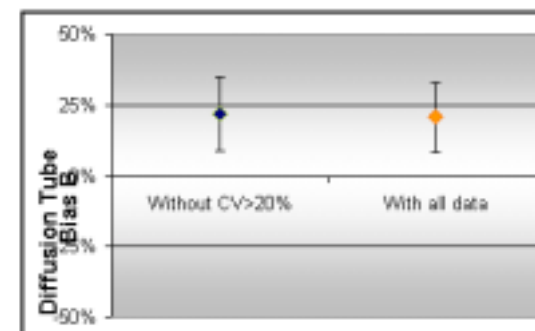
Bias factor A **0.856 +/- 0.086**

Bias B **21 +/- 10 %**

Diffusion Tubes Mean: **23 $\mu\text{g m}^{-3}$**
Mean CV (Precision): **10** **caution**

Automatic Mean: **20 $\mu\text{g m}^{-3}$**
Data Capture for periods used: **95**

Adjusted Tubes Mean: **20 +/- 2 $\mu\text{g m}^{-3}$**



Jaume Targa netcen

jaume.targa@netcen.co.uk

Version 01 - April 2007

