Air Quality

Taking Care of Warrington's Air

AIR QUALITY PROGRESS REPORT 2008

Warrington Borough Council

Environmental Health and Protection
Community Services Directorate

AIR QUALITY MANAGEMENT PROGRESS REPORT 2008

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EXECUTIVE SUMMARY

The quality of the air in many areas is satisfactory, however we continue to face a number of challenges in terms of improving our air quality.

A number of key areas are close to or in some cases above the relevant objectives. The latest research has also advocated the health benefits of reducing levels of general exposure to fine particulates. Whilst the whole of the town is predicted to comply with all the objectives by 2010, the overall trend in air quality improvements, observed in the monitoring data, has continued to slow in line with the national situation.

It is clear that concerted action is required now not only to improve air quality in the key areas but also to protect air quality across the town in the longer-term.

We need to continue to monitor levels in close proximity to the motorways and to lobby for improvements, where possible. We also need to deliver the management plan for the area around Parker Street.

The continued regeneration and growth of the town, whilst being key to our continued economic success, means that we must continue to be vigilant with regards to any deterioration in air quality levels. We also need to guard against the introduction of sensitive developments within areas where no relevant exposure has previously occurred. Indeed further targeted monitoring is required to determine whether any new Air Quality Management Areas are required.

We intend to integrate air quality with our work on climate change. This will provide a renewed focus on reducing our own emissions, which we are required to report on. It will also help us to engage further with the local community in order to assist them in 'shrinking' their own footprint. Teaching packs will also be provided for schools in order that they can build air quality into the school curriculum.

We are also seeking to upgrade our particulates monitor in order to ensure that it complies with the national equivalence test and to enable us to monitor the finer dust fractions, which are increasingly being linked to health effects.

The progress report includes information boxes on the key findings for each pollutant, these are set out below to provide a summary of the main points.

Conclusions from the assessment of nitrogen dioxides

- Concentrations of nitrogen dioxide associated with the motorway network continue to exceed the annual nitrogen dioxide objective.
- Concentrations of nitrogen dioxides within the town centre AQMA, designated in 2006, continue to exceed the annual objective close to the road.
- A new AQMA may be required for a small development adjacent to Brian Bevan roundabout, although further monitoring to prove likelihood is required.
- Further monitoring is required in Liverpool Road to confirm the situation.
- A new AQMA around Green Street is likely to be required, although further monitoring is needed to determine the likely extent.
- Concentrations of nitrogen dioxide along the major arterial routes are likely to be close to the objective, although detailed modelling predicts that all areas will comply.
- Urban background areas easily comply with the objective.

Conclusions from the assessment of particulates

- Concentrations of particulates continue to comply with the current air quality objectives.
- The authority will need to keep under review performance against the new national exposure reduction target for PM2.5.

Conclusions from the assessment of sulphur dioxide

- Ambient concentrations of sulphur dioxide associated with the coal-fired power station are unlikely to be significant.

CHAPTER A: OVERVIEW OF NATIONAL POLICY AND AN UPDATE ON RECENT CHANGES

POLICY OVERVIEW

A1.01 The Environment Act 1995 requires the production of a National Air Quality Strategy and that policies are kept under review. The most significant change in 2007 was, therefore, the production of a new Air Quality Strategy (ref 1). One of the main challenges for the strategy was to respond to the report from the Committee on the Medical Effects of Air Pollution (Comeap) (ref 2), which highlighted the increased risk posed by fine particulates. A national exposure reduction target, aimed at achieving a 15% reduction in concentrations of particulates at urban background in the PM2.5 fraction between 2010 and 2020, was therefore introduced. This exposure reduction approach replaces the indicative 2010 objectives for PM10, which was set out in the addendum to the original strategy.

A1.02 Whilst the primary changes to the strategy reflect the increased importance of fine particulates, the strategy largely retains the existing objectives for the other pollutants. However, potential new objectives for ammonia and objectives for the protection of vegetation and ecosystems, with respect to nitrogen oxides and sulphur dioxide, were not introduced.

A1.03 The strategy also provided the primary basis for the UK's response to the EU on its plans and programmes to meet the EU limit values (ref 3). The Preliminary Assessment of Performance against the objectives in 2007 indicated that the UK would satisfy the objectives for sulphur dioxide, benzene, 1-3 butadiene, carbon monoxide and lead once the monitoring data had been confirmed. Exceedances of the particulates, nitrogen dioxide and ozone objectives continued to be recorded, with over 180 authorities having designated air quality management areas (AQMA's) (ref 3).

INDICATOR UPDATE

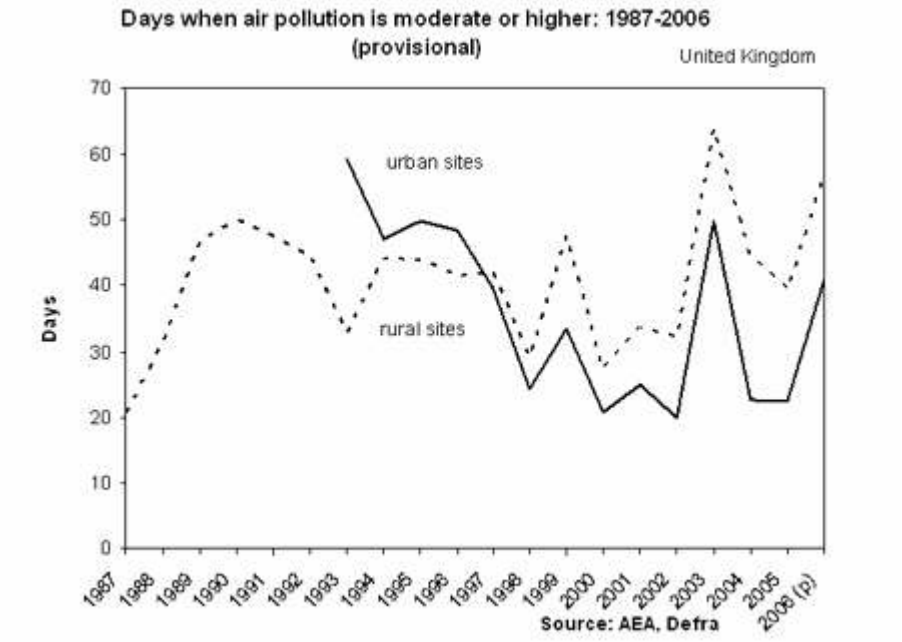
A1.04 In 1999 an air quality "headline" indicator was introduced in support of the UK Sustainable Development Strategy. When the strategy was updated in 2005 a new part (a) to the original indicator was added. The new indicator was primarily introduced due to concerns about the effects of long-term exposure to particulates at lower levels of pollution.

A1.05 The results show that particulate levels have increased slightly over the last two years, although there has been an overall decreasing trend since 1993. Whilst there is no clear trend in rural ozone levels urban levels have shown an overall increasing long-term trend since 1993. This is believed to be due to reductions in nitrogen oxides, which react with ozone in the atmosphere (ref 3).

A1.06 The composite headline indicator, which looks at a general trend in pollution across five pollutants, has shown a degree of variation due to the influence of weather, particularly during hot summers, as exhibited by the data peaks in 1999 and 2003. Days when air pollution is moderate or higher 1987-2006 is shown in figure A1.

A1.07 The Local Government White Paper introduced a new local performance framework in July 2007. The Government announced in October 2007 that a new air quality indicator would form part of the framework of 198 indicators. The indicator will measure the reduction in nitrogen oxides and particulates associated with local authority estates and operations.

Figure A1: Days when air pollution is moderate or higher 1987-2006



CHAPTER B: LOCAL AIR QUALITY MANAGEMENT AND THE PURPOSE OF THE PROGRESS REPORT

B.01 In September 2001, Defra and the Devolved Administrations commissioned a detailed evaluation of the first round of reviews and assessments of air quality. The evaluation report published in March 2002 (ref 4) set out a requirement for an Updating and Screening Assessment to be completed by May 2003 to identify any changes since the original review and assessment. Any authority identifying a need for further action was subsequently required to complete a detailed review by the end of April 2004. Authorities are also required to complete a progress report in any year in which a review and assessment has not been completed. The current work programme is set out in table A1 (ref 5).

Table A1: Recommended timescales for submission of reviews and assessments and progress reports.

LAQM Activity	Completion date	Which authorities?
Updating and Screening Assessment (USA)	End of May 2003	All authorities
Detailed Assessment	End of April 2004	Those authorities (1) which have identified the need for one in their April 2003 USA.
Progress Report	End of April 2004	Those authorities (1) which identified that there was no need for a Detailed Assessment in their April 2003 USA.
Progress Report	End of April 2005	All authorities
USA	End of April 2006	All authorities
Detailed Assessment	End of April 2007	Those authorities (1) which have identified the need for one in their April 2006 USA
Progress Report	End of April 2007	Those authorities (1) which identified that there was no need for a Detailed Assessment in their April 2006 USA.
Progress Report	End of April 2008	All authorities
USA	End of April 2009	All authorities
Detailed Assessment	End of April 2010	Those authorities (1) which have identified the need for one in their April 2009 USA
Progress Report	End of April 2010	Those authorities (1) which identified that there was no need for a Detailed Assessment in their April 2006 USA.

(1) All local authorities in England and Wales (except London local authorities) that have designated AQMAs; they will be expected to submit a USA by the end of 2003 or earlier if possible and complete the second round by the end of 2004-where Detailed Assessments are required.

B1.02 Warrington Borough Council has successfully reported on all key stages. The findings to date have been that the town as a whole exhibits a good level of air quality across a broad range of pollutant objectives. However, it has been necessary to designate two AQMAs. The first in 2003 was for areas of potential residential exposure within 50m of the motorway, whilst the second, designated in 2006, was due to traffic congestion near to the town centre. Both areas were designated due to likely exceedances of the annual nitrogen dioxide objective. The findings of the previous reports are summarised in table A2.

Table A2: Summary of the findings of previous air quality assessments.

Report	Summary of findings
Detailed Assessment 2000	Industrial emissions will not result in any exceedance of the objectives. Exceedances of the annual nitrogen dioxide objective were predicted for areas within 50m of the three motorway corridors. Areas in close proximity to the major arterial routes around the town centre where predicted to be close to the annual nitrogen dioxide objective.
Further detailed assessment (stage 4) 2002. (Published as part of the action plan).	Predicted that the original designation was precautionary because the worst case meteorological year was used and that the method of converting NOx to $N0_2$ (Pratt method) gave the higher results. The road transport sector was identified as the most significant source in terms of ambient air quality. Heavy goods vehicles were the most relevant subsector.
The Updating and Screening Assessment (May 2003).	Confirmed the findings of the original assessment and the validity of the AQMA. The assessment confirmed that no significant road transport sources were misrepresented in the original review. The USA did, however, support the conclusion that the annual levels of nitrogen dioxide around the major arterial routes remained close to the objective. Further research into levels around Stockton Heath were also recommended.
Detailed Assessment 2004.	The detailed assessment found that air quality levels within the AQMA were likely to fluctuate depending on a number of factors such as meteorological conditions, topography, flow and availability of ozone. The 50m boundary of the AQMA was however believed to represent the typical situation. Annual levels of nitrogen dioxide around Parker Street and Wilson Pattern were predicted to be above the objective value on the basis of further modelling. Air quality levels in Stockton Heath village were predicted to be below the hourly objective level. Further research was recommended into the annual levels away from the immediate roadside monitoring position.
Progress Report 2005	The report confirmed that air quality was generally good and that air quality was better than 2003 due to the cooler weather. The reported highlighted the continuing requirement for the motorway AQMA but it confirmed that an AQMA for Stockton Heath was not necessary.
The Updating and Screening Assessment 2006	The report found that our understanding of air quality to date was fundamentally sound and that no changes to approach were necessary. A DMRB assessment was carried out for all major developments and no potential issues were highlighted, although a further detailed assessment was recommended due to changes in the transport model.
Detailed Assessment 2007	All areas were predicted to meet the relevant objectives by 2005 and 2010.

Box 1
The purpose of this report is therefore to:

- To consider the trends in local air quality and how these can direct action planning.
- To review any significant changes in emissions since the 2006/07 review and to consider their potential to affect the previous findings.
- To provide an update on air quality levels recorded in 2007.
- To report on the progress made on the implementation of Warrington's Air Quality Management Plan (AQMP).
- To report on progress made towards the development of an Air Quality Management Plan for the town centre area.

CHAPTER C: AIR QUALITY MONITORING IN WARRINGTON

C1 THE MONITORING NETWORK

C1.01 A diverse air quality monitoring network has been established which seeks to provide information on typical urban and rural background levels, whilst specific areas of the borough are also targeted. The information on background levels is used within dispersion modelling and to monitor general trends in air quality.

C1.02 The targeted monitoring programme looks at specific issues such as air quality within the two AQMA's. The council does not monitor for carbon monoxide, benzene, 1,3 butadiene, polyaromatic hydrocarbons or lead as these have been discounted in previous review and assessments. Ozone is not monitored as it is considered to be a regional pollutant outside of direct local authority control, although the council has access to the data from the national network site in Glazebury, which falls within our borough boundary.

C1.03 Two main monitoring methods are used. The main monitoring method is nitrogen dioxide passive diffusion tubes. The tubes are relatively inexpensive and have the advantage of requiring no power or telecommunications. They are, therefore, an ideal method for assessing air quality over a wide area.

C1.04 The tubes operate on the principle of molecular diffusion, with molecules of gas diffusing from a region of high concentration at the open end of the tube to an area of low concentration at the closed end of the tube, which contains an absorbent. The tube, which is exposed for a known period, is then sent to an accredited laboratory for analysis.

C1.05 The locations of the diffusion tubes are shown in figure C1.

C1.06 Specific air quality issues are targeted using more expensive 'real time' methods such as chemiluminescence, and ultra violet fluorescence. Chemiluminescence works producing 'activated' nitrogen dioxide species by reacting it with ozone, as the activated species losses its energy the intensity can be measured. Ultra violet fluorescence relies on the ability of sulphur dioxides to absorb UV radiation, which results in fluorescence at a known frequency. Particulates are measured using a tapered oscillating microbalance, which relies on particulates impinging on the head changing the frequency of oscillation.

C1.07 These sites require a power supply and telecommunications are also required to transfer the data to a central computer for processing. The units are expensive, although they have the advantage of providing instant access to potentially more accurate information depending on quality assurance and data ratification.

C1.08 The Council operates two sites, an air quality laboratory with the capability to monitor for nitrogen oxides, sulphur dioxide and particulates, and a roadside cabinet monitoring nitrogen dioxides.

C1.09 The air quality laboratory is located in an urban background location, within a school playing field, which is approximately 115m from a dual carriageway**.** The site is 1.5Km from the town centre. It typically represents air quality levels at a background location, although it is situation within an area of potential plume grounding, as predicted by dispersion models, for a coal-fired power station. The station is approximately 5.7km from the site to the SW.

C1.10 The roadside monitor is located close to an AQMA, which experiences traffic flows in the order of 23,000 vehicles a day (based on a five day average) and periods of congestion. The road provides the main access to the central gyratory system from the west of the town.

Figure C1: Location of nitrogen dioxide diffusion tube monitoring sites.

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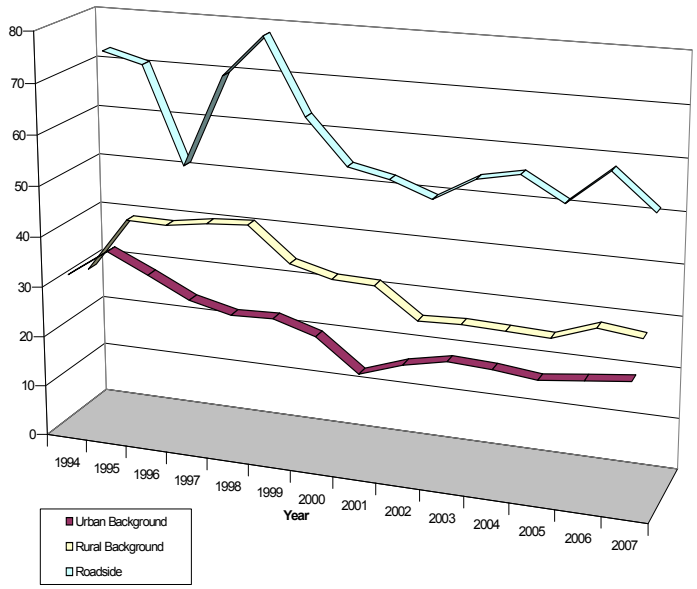
C2 THE GENERAL TREND AND STATISTICS ON LOCAL PERFORMANCE

Box 2
What is the trend in air quality?

The general trend in local air quality over the last ten years, using nitrogen dioxide as a marker pollutant, has seen an improvement in air quality. This can be seen in figure C2. This largely reflects the national trend. The improvement in air quality, however, appears to have shown a slight incline, although it can be seen from table C1 that the number of days of moderate or high pollution levels, at an urban background location, remains low.

C2.01 Air quality issues in Warrington have changed from the smogs experienced in the 1950's to largely traffic related problems. The general trend in local air quality since 1994 can be seen in figure C2.

Figure C2 Trend in Nitrogen Dioxide Levels In Warrington between 1994-2007
Ug/m3(raw data).



C2.02 A steady reduction in concentrations has been observed, largely associated with technological improvements. However the recent up turn in concentrations reflects the national situation with the latest strategy (ref 1) acknowledging that "levels are not declining as fast as expected and trends are flattening or even reversing". The trend with respect to nitrogen oxides is believed to be due to a change in the percentage of road traffic emissions emitted directly as nitrogen dioxides. The increasing move towards light duty goods vehicles fitted with oxidation catalysts and catalytic regenerative particulate traps on heavy goods vehicles is one probable cause.

C2.03 The trend against the current national indicator is also shown in figure A1. The results demonstrate that the rural background ozone levels are mirroring the national situation, whilst episodes associated with other pollutants have not been generally observed. Pollution episodes associated with particulates where observed in 2003 due to the warm weather, whilst the 2007 figures reflect the recent upturn in particulate concentrations observed nationally over the last two years.

C2.04 The current trend is not totally repeated in local modelling data for 2010 (ref 6). The model predicts that all of Warrington will comply with the relevant objectives by 2010, including the two AQMA's. The latest contour plot, taken from the 2007 Detailed Assessment is shown in figure C3.

C2.05 Whilst the validation model using actual monitoring data has exhibited a good degree of correlation at urban background locations, it is possible to speculate that the model is mis-representing the primary nitrogen oxide component in areas in close proximity to busy roads. This is not a purely local phenomenon and it highlights the importance of making decisions based upon both monitored and modeled data. It therefore remains unlikely, considering the observed upturn in concentrations, that air quality within the two management areas will comply with the objectives by 2010 without any direct intervention.

Figure C3: Contour plot NO_2 concentrations 2010

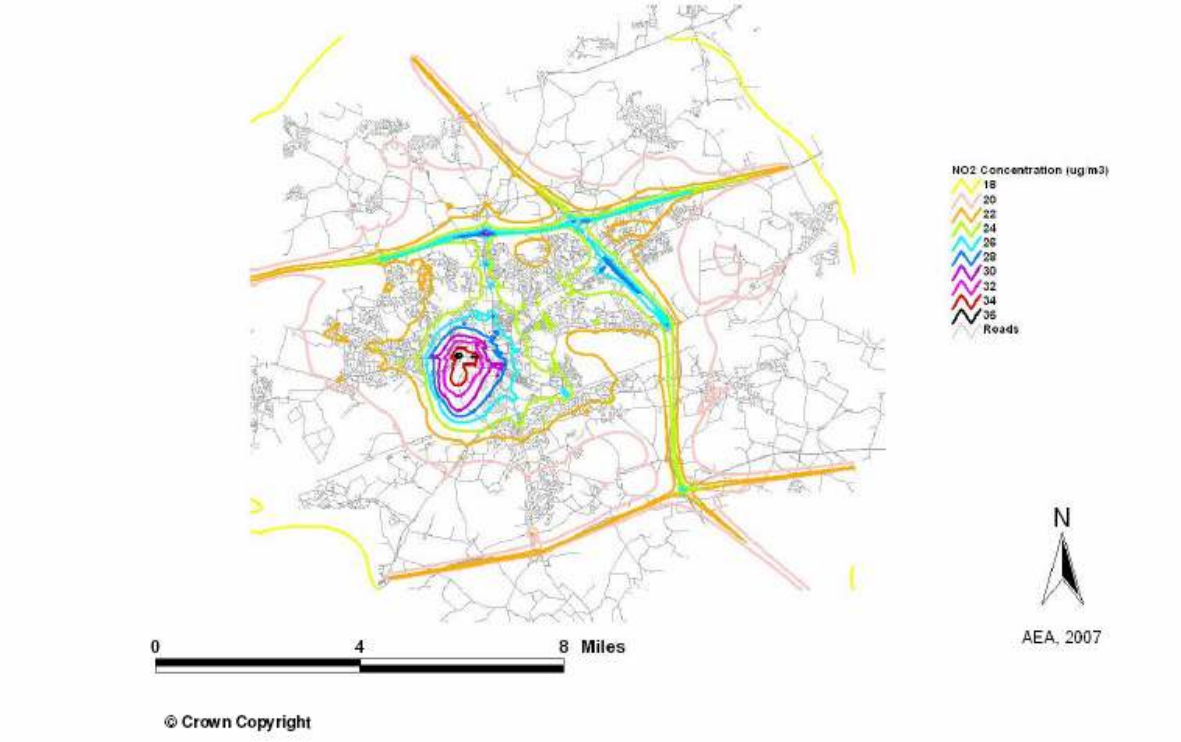


Table C1: Number of days when air quality was classified as being moderate or high in Warrington.

YEAR	PM10 DAYS MODERATE OR HIGH	NITROGEN DIOXIDE DAYS MODERATE OR HIGH	OZONE DAYS MODERATE OR HIGH*	SULPHUR DIOXIDE DAYS MODERATE OR HIGH
1999	1	0	13	Not recorded
2000	0	0	10	8
2001	0	0	10	4
2002	1	0	4	0
2003	10	0	15	2
2004	0	0	10	0
2005	0	0	11	0
2006	0	0	23	0
2007	4	0	8	0

*Taken from National Automatic Monitoring Site at Glazebury.
Monitoring site moved from Knutsford Road to Selby Street in 2002.

Classified according to the national air quality bandings (ref 10)

C3 ASSESSMENT OF NITROGEN DIOXIDES

QUALITY CONTROL AND ASSURANCE

C3.01 The main method for assessing nitrogen dioxides, particularly over a wide geographic area, is passive diffusion tubes. A wide variation in the performance of tubes can be experienced. It is vital that appropriate quality controls are in place in order that the results can be used with confidence. The Council has integrated the procedures in section 4.2.1 of the UK $N0_2$ Diffusion tube Instructions Manual (ref 7) into its work practices and the recommendations within the latest practical guidance on ambient diffusion tube monitoring will be adhered to (ref 8).

C3.02 Triplicate tubes are also co-located with the Council's Air quality laboratory to assess the degree of any bias. The results are set out in table C2. The performance of Bureau Veritas laboratories, who analyse the tubes on behalf on the Council is also monitored through the WASP accreditation scheme and the inter-laboratory exercise.

Table C2: 2007 Diffusion tube bias correction.

Month	**Tube1**	**Tube2**	**Tube3**
January	23	20	22
February	38	36	37
March	28	28	24
April	23	27	26
May	17	18	17
June	28	23	23
July	21	20	25
August	14	17	15
September	26	26	24
October	30	29	32
November	31	28	31
December	60	44	43
Annual average	26.58	24.75	24.92
Annual mean (tubes)	26.53		
Annual mean (Chemiluminescent)	24.6		
Data capture	NOx tubes=100%	Chemiluminescent=98%	
Bias adjustment factor	24.6/26.53=**0.927**		
Diffusion tube bias	(26.53-24.6)/24.6=7.85%		

C3.03 It can be seen that the tubes have exhibited a high level of accuracy and that little bias is evident when compared to the chemiluminescent analyser. The result agrees with the value derived from the 2007 inter-laboratory comparison test with the Marylebone AUN site for Bureau Veritas Laboratories who analyse our tubes.

C3.04 The laboratory also benefits from a full quality control programme. Daily auto calibrations and fortnightly remote calibrations using certified lab gases are carried out. The performance of the laboratory is checked bi-annually by NETCEN and the latest report confirmed that the converter was 99% efficient, that there were no leaks, the response to the span and zero checks were good and that the cylinder was stable.

C3.05 Daily data checks are carried out in order to minimise data losses due to any equipment failure and the data is ratified by the Council and independently by Bureau Veritas. The stability and performance of the analyser is, therefore, considered to give a good value by which to bias correct the tubes.

RESULTS

Urban and rural background locations

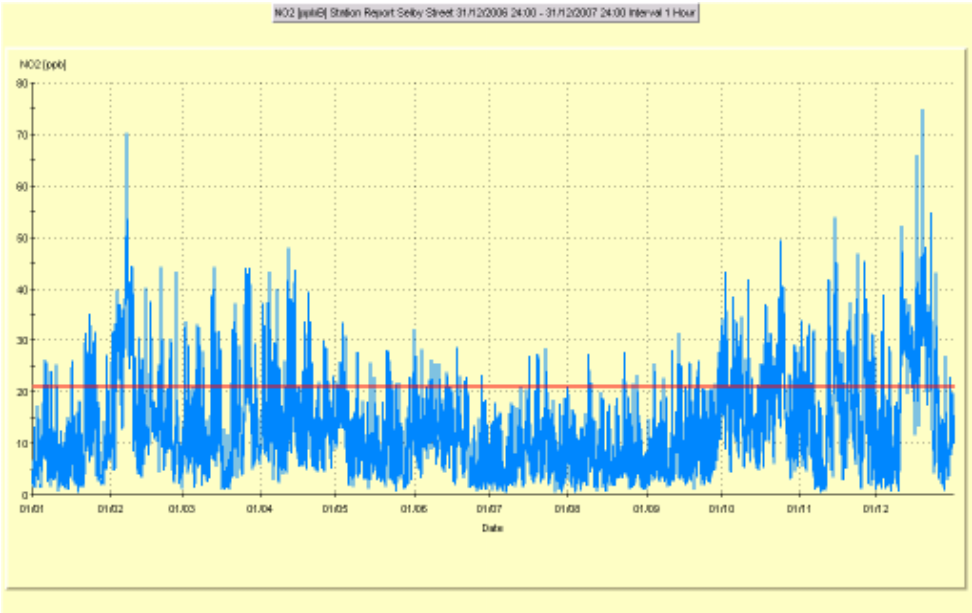
C3.06 The bias corrected diffusion tube results are presented in table C8. The results demonstrate that urban background locations within Warrington have a good level of air quality when compared to the national objectives and neighbouring authorities.

C3.07 The results from the air quality laboratory also provide further evidence that these locations continue to easily comply with the relevant objectives. The results from the laboratory are set in table C3 and figure C4. The results in figure C4 are reported in ppb due to the configuration of the software, 21 ppb is equivalent to the 40 $\mu g/m^3$ objective. The modelled data, presented in figure C3, provides further supporting evidence that no exceedances of the relevant objectives are likely in these areas.

Table C3: Laboratory NO_2 2007 results

Data Capture	Objective	Result against the objective	Comment
99%	40$\mu g/m^3$ expressed as an annual mean.	24.4 μgm^3	No exceedances as percentiles. Insufficient data capture to assess exceedances per year.
	200$\mu g/m^3$ (1hr) not to be exceeded more than 18 times per year. Equivalent to a 99.8%ile.	96.0 μgm^3 as a 99.8%ile. There were no exceedances in the 200 $\mu g/m^3$ limit.	

Figure C4: NO_2 (ppb) 1hour mean 2007



Targeted locations

C3.08 Monitoring locations have also been targeted to key areas identified in previous review and assessments as being either close to or above the relevant objective. These areas warrant further consideration.

Stockton Heath (Tubes 5 and 6)

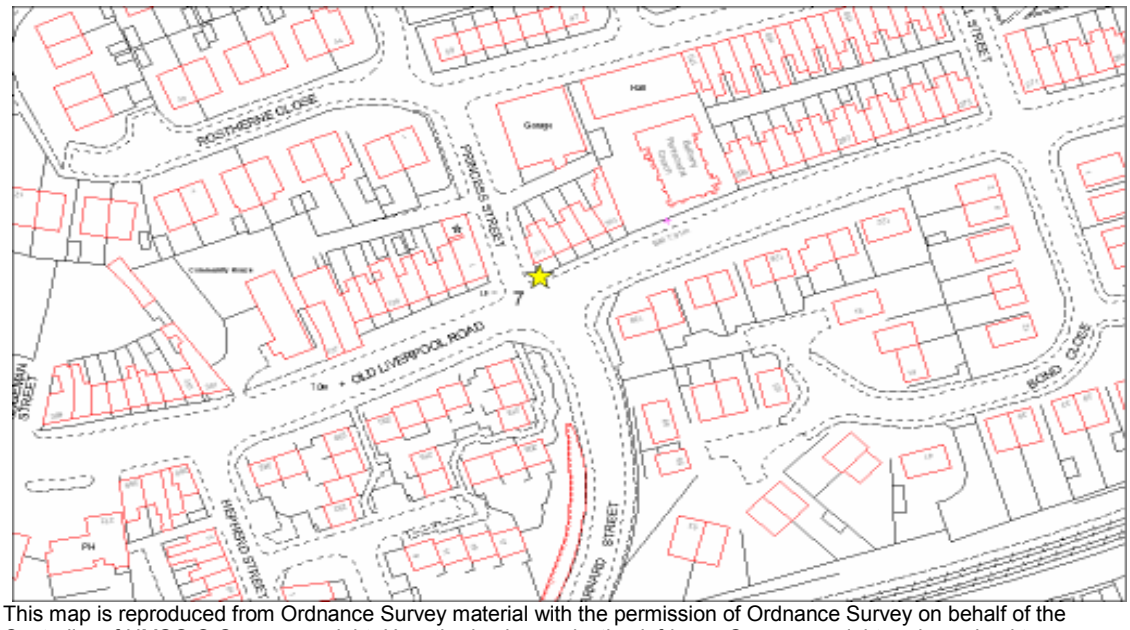
C3.09 The A49, which runs through the village of Stockton Heath, provides one of the key routes into the town from the south. The village can experience periods of traffic congestion, particularly when the swing bridge to the Manchester ship canal is in operation. A roadside diffusion tube (site 5) has been historically located within the heart of the village to inform a national survey into *roadside* pollution levels. This tube has consistently recorded some of the higher non-motorway related levels. However, whilst the tube has recorded levels in excess of the annual nitrogen dioxide objective, it is important to understand that it's location is designed to target roadside emissions only and that it does not represent a residential situation. The results cannot, therefore, be compared directly to the annual objective. Instead, a second monitoring position (site 6) close to the short section of housing within the village centre has been established. This has consistently recorded levels below the relevant objective. Furthermore, dispersion modeling has not highlighted any potential exceedances for areas of greater housing density, which are located slightly away from the main junction within the village centre. The concentrations recorded from the roadside tube have also been consistently below 65 $\mu g/m^3$, which is the level identified in research (ref 9) above which exceedances of the hourly objective may be possible. This objective is more typically used to assess short-term exposure, such as retail use, and as such no relevant exceedances are believed to be likely within the village or the surrounding area.

Figure C5: Location of diffusion tubes in Stockton Heath

Liverpool (Old) Road (Tube 7)

C3.10 Liverpool Road, within Sankey Bridges, carries local and secondary traffic, which chooses not to use the main A57, into the town from the west. The road also provides access to Gatewarth Industrial Park, Warrington North Effluent Treatment Works and Arpley Landfill Site. A major residential development is also presently being constructed within the area. Site 7 is located next to the junction that serves these areas. The result has been consistently close to the annual nitrogen dioxide objective. However, the tube is located in a worst-case location some 2.5m from the kerb. The results from the detailed assessment of this junction, undertaken as part of the Updating and Screening Assessment report (ref 10), did not identify any issues for the area. This finding was repeated in the 2007 detailed assessment (ref 6), although the potential uncertainties over the ability of the model to accurately predict levels of nitrogen dioxide next to busy roads needs to be recognised. Whilst there is no conclusive evidence warranting the designation of the area as a management area, It is proposed to create a second monitoring location to inform the situation and to report accordingly.

Figure C6: Location of diffusion tube on Liverpool (Old) Road

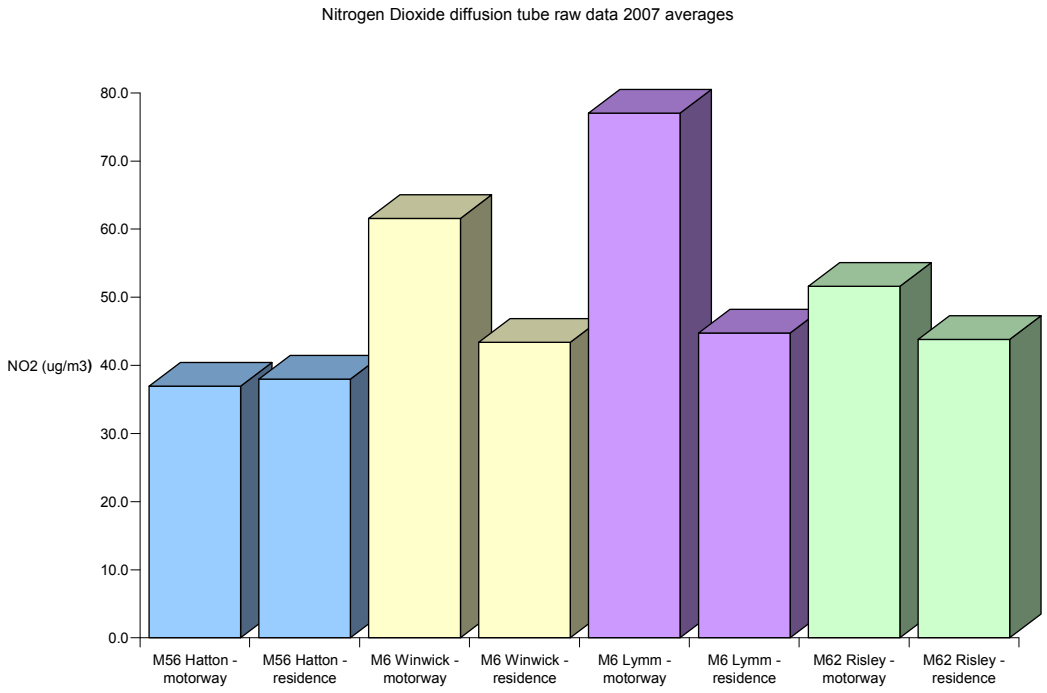


Motorway locations (Tubes 8 and 9)

C3.11 Tubes 8 and 9 are targeted specifically at the motorways. These tubes continue to provide evidence for the ongoing requirement for the motorway related AQMA. Extensive investigations of the motorways have been undertaken as part of previous reviews and assessments. The tubes are therefore maintained for confirmatory purposes only as the overall situation along each route has been well established.

C3.12 The Council also contributes to the Highway's Agency study, which includes a number of tubes positioned at both 'kerbside' and receptor, e.g. housing, locations. The results, shown in figure C7, largely confirm the findings of the Council's own research. The levels of air quality close to the M56 are believed to be marginally within the annual nitrogen dioxide objective, whilst slight exceedances are recorded at residential locations. A reduction in concentration is also experienced from kerbside to receptor locations on the other networks. It is important to note, however, that a significant variation in levels was experienced in our research along the network with more open areas experiencing the highest levels (ref 11). This potential effect is shown in the M6 data recorded in an open space area close to the motorway. Whilst the kerbside concentration is similar to the Highways Agency figure the concentration at 30m is significantly higher. This demonstrates that there are numerous potentially compounding factors that can affect air quality levels, particularly wind direction and possibly the existence of mounds and close boarded fencing.

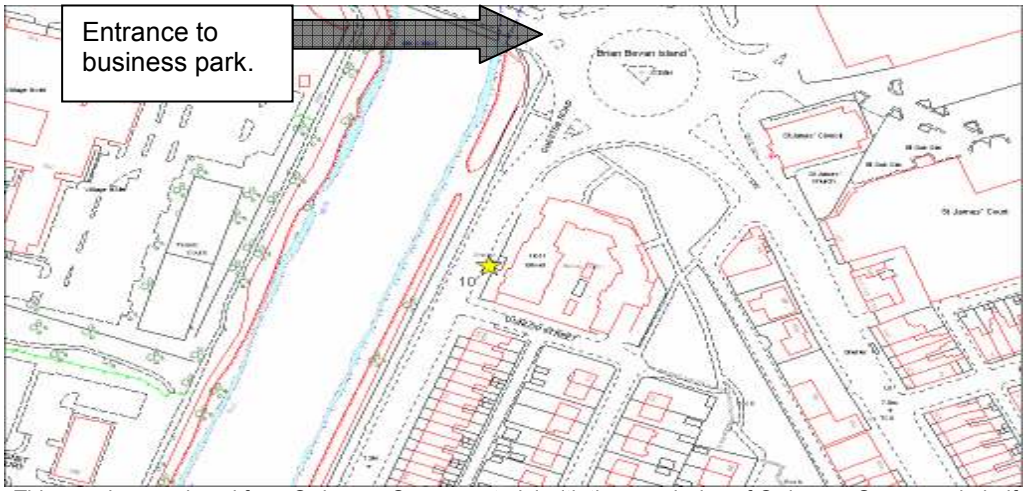
Figure C7: NO_2 diffusion tube 2007 Highway Agency study (raw data)



Brian Bevan roundabout (Tube 10)

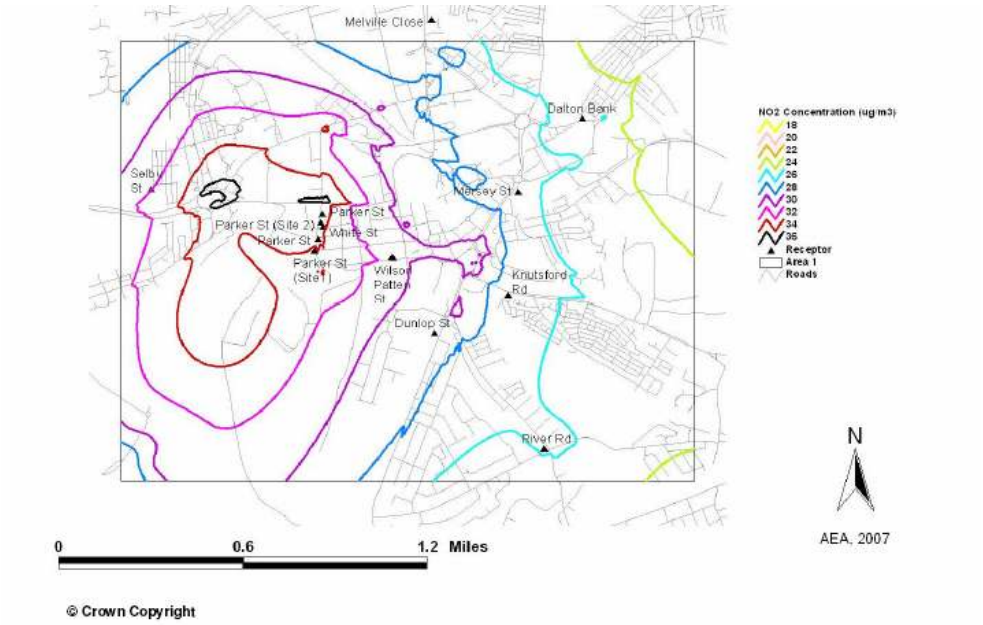
C3.13 In 2004 a new apartment development was approved close to 'Brian Bevan' roundabout, which is an area that has been highlighted as being close to the annual nitrogen dioxide objective but with no relevant exposure.

Figure C8: Location of diffusion tube by Brian Bevan roundabout



C3.14 A diffusion tube location (Site 10) was established in June 2006, seven months monitoring was available to the December 2006 review and a 'raw' mean of 37 μg/m^3 was recorded. This result was just below the objective value of 40 μg/m^3. Detailed dispersion modelling was also undertaken at the same time. The 2005 modelled annual mean was 32 μg/m^3 for 2005 and 29 μg/m^3 for 2010. The contour plot covering the area is shown in figure B9 and the specific location is Dunlop Street. A more detailed location plan is shown in figure B8. The 2006 Update and Screening Assessment also specifically considered air quality at the new location using DMRB to assess the roundabout. A concentration of 38 μg/m^3 was reported. It was therefore concluded, on the balance of the evidence available at that time, that there was insufficient information to determine whether an exceedance of the annual objective was likely.

Figure C9: Contour plot for Brian Bevan roundabout



C3.15 The 2007 annual dataset, however, recorded a bias corrected mean of 45 μg/m^3. This result is above the relevant objective of 40 μg/m^3. The local authority must therefore consider under S 83(1) of the Environment Act 1995 whether the relevant objective is unlikely to be met. It is important to re-consider the evidence and to explore the discrepancies between the modelled data, the 2006 monitored period mean and the 2007 annual result.

C3.16 Air quality levels, particularly the secondary component formed in the atmosphere, are highly dependent on the weather. As last few years, according to the Met Office, have been the warmest years on record, it is therefore unlikely that weather patterns would account for the significant increase, as there has been no major fluctuation in weather patterns between the two years. A comparison of the 2006 data for the whole borough against the 2007 data does not reveal any significant overall shift in concentrations.

C3.17 The apparent increase could therefore be attributed to the fact that the seven-month dataset in 2006 may not have accounted for the overall seasonal variation within that year. It is possible to test the effects of seasonal variation using the procedure laid down in box 6.5 of LAQM.TG(03) (ref 12).

C3.18 Data was taken from the national website for three urban background national monitoring sites for both the relevant period and the full calendar year. The results are set out in table C4.

Table C4: National urban background NO_2

Site	**Period mean (Pm)**	**Annual Mean (Am)**	**Ratio (Am/Pm)**
Manchester South	13.8	16.0	1.159
Wirral	17.1	19.2	1.123
Liverpool Speke	18.3	22.0	1.202
Seasonal correction ratio as a mean of the ratio.			**1.16**

This gives a 2006 seasonally corrected raw mean value of 43 μg/m^3 (37x1.16).

C3.19 A locally derived seasonal correction from the diffusion tube background site at Woodale Close was also derived as a comparison. A value of 1.33 was calculated resulting in a seasonally adjusted raw mean value of 49 μg/m^3.

C3.20 It is also important to recognise that the potential bias within the monitored dataset has not been accounted for. The bias correction value for the 2006 diffusion tube data set, when compared to the results of the chemiluminescent analyzer, was 1.078. This has the effect of increasing the overall concentration to a range of 46-53 depending upon the method of correcting the seasonal variation within the dataset.

C3.21 It is therefore possible to conclude that the seasonal variation within the 2006 dataset may have accounted for the apparent discrepancy between the 2006 and 2007 monitored data. Furthermore, the calculations result in both datasets recording potential exceedances, which contradicts the modelled data. Whilst the dispersion model exhibited a good degree of correlation at urban background locations, it is possible that the discrepancy at roadside locations maybe due to the complexity of the traffic movements in this area and the ability of the model to account for primary nitrogen dioxide direct from the traffic.

C3.22 Another compounding factor could be any changes to the traffic flows around the apartments. It is possible that the entrance to the nearby business park, highlighted in figure C8, could be placing an increasing demand on the general traffic flows around the roundabout. The traffic light sequencing has been changed in order to try and optimise the flows and to control access off the roundabout. The issue over access to the business park will need to be closely monitored with regard to any resultant effect on air quality, particularly as planning applications continue to be received for future developments on the park.

C3.23 It needs to be considered whether there is sufficient information to determine whether an exceedance is likely, as opposed to possible. It is also important to consider the location of the diffusion tube. The tube is located close to the road due to lack of suitable infrastructure upon which to site the tube. As the original purpose was to determine the general air quality levels in the vicinity of the flats the location was deemed to be suitably representative. However, given the high levels recorded the tube is not considered to be sufficiently representative of the situation at the flats due to the fact that it is effectively a roadside tube, located close to a bus stop, and that it is some 60m from the traffic island. The landowner will be approached to enable a more targeted campaign to be established and satellite tubes will be created at the nearby residential housing, which is south of Dunlop Street. Any decision to move towards designation will be made as soon as the dataset is deemed to be representative of the site conditions. A minimum of 3 months data will be required to provide an initial snapshot.

Parker Street Air Quality Management Area (Tubes 11 to 16)

C3.24 Tubes 11 to 16 are located within the AQMA designated in 2006. The area was identified using the 37.5 μg/m^3 contour line from the dispersion model snapped to the nearest street. The results demonstrate, as would be expected, that the concentrations decrease away from the road. The results for the tubes immediately away from road exhibit a good correlation with the 37.5 μg/m^3 contour line. The areas included as a result of extending the boundary to the nearest natural feature are generally around 35 μg/m^3. The effect can be seen in figure C10. It can be concluded that whilst the boundary of the AQMA is likely to be slightly greater that the minimum area of actual exceedance it provides a good representation of the area of likely exceedance and a sound basis for action planning.

C3.25 A chemiluminescent analyser is also located close to the area as shown in figure C10. The roadside monitoring position could not be located within the actual confines of the management area due to the need to maintain adequate pedestrian access along the footpath. However, its location on the opposite footpath, which is wider, is designed to closely represent the conditions at the nearest sensitive property to the road. The result for 2007 was 49 μg/m^3 and the general dataset is presented in table C5 and figure C11.

Figure C10: Location of Parker Street analyser

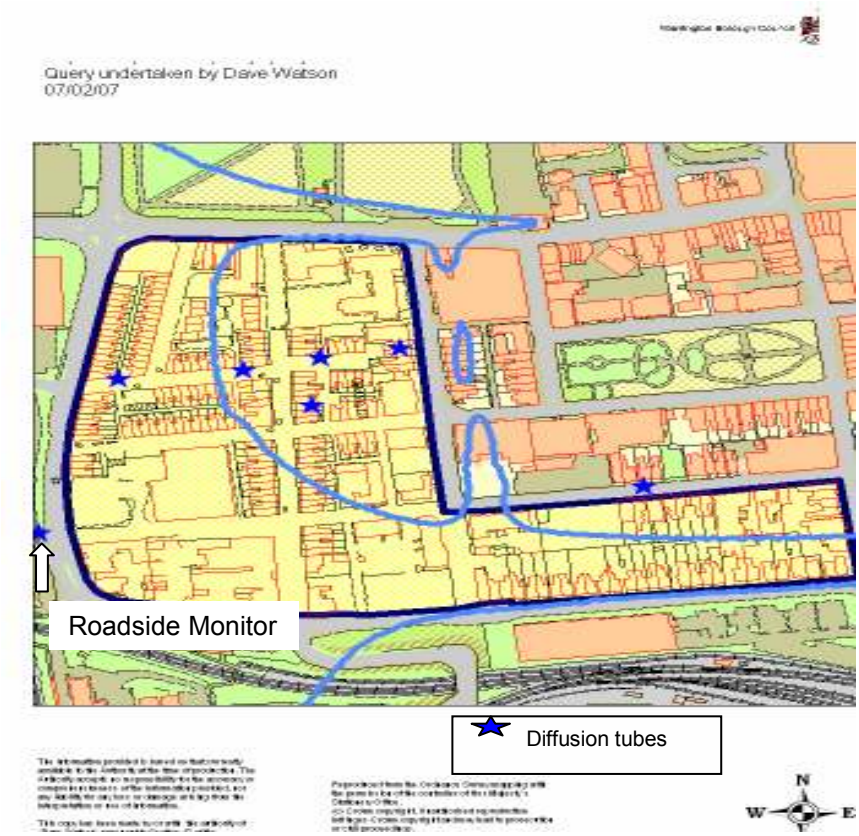
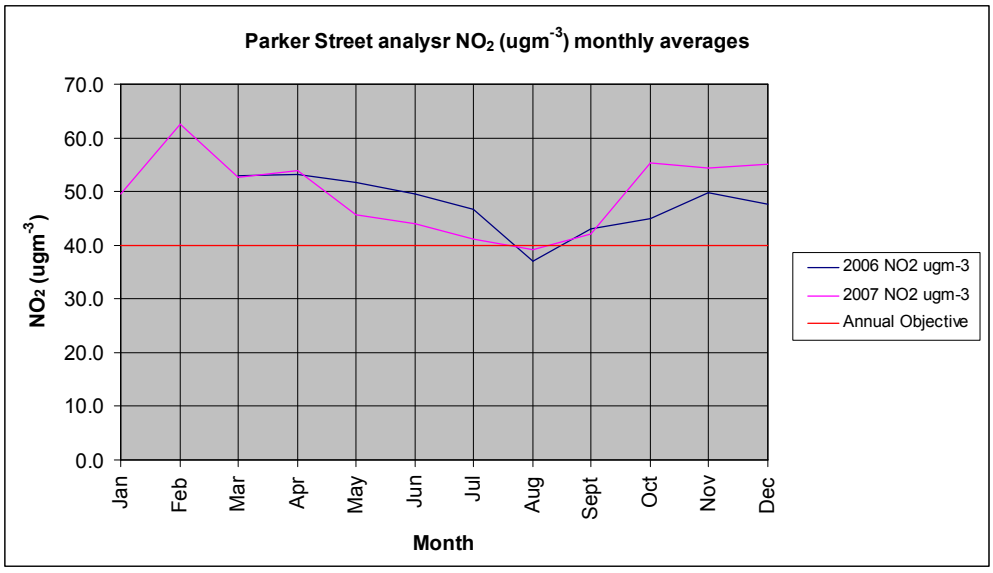


Table C5: Parker Street monitor monthly NO_2

Month	2006 NO_2 µg/m^3	2007 NO_2 µg/m^3
Jan		49.6
Feb		62.5
Mar	53.0	52.8
Apr	53.1	53.9
May	51.7	45.7
Jun	49.6	44
Jul	46.6	41.1
Aug	37.0	39.3
Sept	43.0	42.2
Oct	45.1	55.3
Nov	49.8	54.3
Dec	47.7	55

Figure C11: Parker Street analyser NO_2 2007 monthly averages



C3.26 The results from the analyser largely support the NOx tube data in that exceedances are highly likely at the residential properties closest to the road.

Green St/Crosfields Island (tube 17)

C3.27 Green Street is located in close proximity to a roundabout and it is situated between two roads, which exit the roundabout. A proxy monitoring position was created close to the continuation of Green Street, which runs adjacent to Sankey Way exit.

Figure C12: Location of diffusion tubes on Green St/Crosfields Island

B3.28 The location was located close to the road and it was believed to be a worst case location. It consistently recorded bias corrected annual means in the order of 38 $\mu g/m^3$. Detailed modelling, undertaken in 2004, predicted levels of 36-38$\mu g/m^3$. It was, therefore, concluded that levels remained close to but below the relevant objective.

B3.29 A decision was made in 2006 to reposition the monitoring location to the section of Green Street closest to the roundabout. Monitoring was undertaken within the boundary of a residential property between January to May 2006, after which the monitoring was suspended at the resident's request. The period mean was 48 $\mu g/m^3$.

B3.30 The period mean was corrected for any seasonal variation using both local and regional monitoring data. The early period of 2006 was observed to exhibit higher concentrations than those recorded throughout the year. The data is presented in table C6.

Table C6: National Monitoring Sites.

Site	Period mean (Pm)	Annual Mean (Am)	Ratio (Am/Pm)
Manchester South	19.8	16	0.81
Wirral	22.0	19.2	0.86
Liverpool Speke	26.7	22.0	0.82
Seasonal correction ratio as a mean of the ratio.			**0.83**

Table C7: Local Monitoring Sites (Diffusion tube data).

Site	Period mean (Pm)	Annual Mean (Am)	Ratio (Am/Pm)
Woodale Close (background)	34	25	0.74
Rostherne Close (background)	29	22	0.76
Seasonal correction ratio as a mean of the ratio.			**0.75**

C3.31 A seasonally corrected raw mean value of between 36 (48x0.75) and 40 (48x0.83) was calculated with a bias corrected range, of 39-43 $\mu g/m^3$ (using a correction value of 1.078).

C3.32 The monitoring position was re-established in June 2006 and the June to December period raw mean concentration was 39 $\mu g/m^3$.

C3.33 A bias corrected 2007 annual mean value of 45 $\mu g/m^3$ was recorded.

C3.34 The 2007 detailed assessment covered the area and the model predicted likely compliance at 36 $\mu g/m^3$.

C3.35 It is possible to conclude that the properties closest to the roundabout may exceed the relevant objective. It is proposed to carry out more targeted multi tube monitoring around the properties and those to the south of the roundabout around Baxter Street. An informed decision will then be taken regarding the need for any formal designation.

CONCLUSIONS

It is possible to conclude that:

Box 3 Conclusions from the assessment of nitrogen dioxides

- Concentrations of nitrogen dioxide associated with the motorway network continue to exceed the annual nitrogen dioxide objective.
- Concentrations of nitrogen dioxides within the town centre AQMA, designated in 2006, continue to exceed the annual objective close to the road.
- A new AQMA may be required for a small development adjacent to Brian Bevan roundabout, although further monitoring to prove likelihood is required.
- Further monitoring is required in Liverpool Road to confirm the situation.
- A new AQMA around Green Street is likely to be required, although further monitoring is needed to determine the likely extent.
- Concentrations of nitrogen dioxide along the major arterial routes are likely to be close to the objective, although detailed modelling predicts that all areas will comply.
- Urban background areas easily comply with the objective.

Table C8: 2007 Bias corrected diffusion tube results in μgm^3.

Site Reference	Grid Reference	Location	Relevant Exposure	Raw Mean	Bias Corrected Mean	Comment
1 N2WA26 WOODALE CLOSE	360.857 385.696	URBAN BACKGROUND 25m from nearest road 2m sample height	Suburban rear garden.	22.8	21	Represents typical urban background levels in Warrington.
2 N2WA12 ROSTHERNE CLOSE	358.667 387.755	URBAN BACKGROUND 22m from nearest road 2.2m sample height	Suburban rear garden. Part of National Diffusion Tube Network.	27.4	25	Represents typical background levels in a mixed-use area.
3 N2WA14 BRUCHE AVENUE	362.792 389.503	URBAN BACKGROUND 28m from nearest road 2.2m sample height	Suburban rear garden. Part of National Diffusion Tube Network.	27.1	25	Represents typical urban background levels in Warrington
4 N2WA08 RISLEY MOSS	366.939 386.194	RURAL BACKGROUND 285m nearest road 2.2m sample height	Nature Reserve. No relevant exposure.	32.7	30	Designed to represent rural background levels.
5 N2WA03 STOCKTON HEATH LONDON ROAD	361.393 386.194	NEAR ROADSIDE 2.5m from kerb 3m sample height The monitoring position is within the village centre with frequent queuing traffic throughout the week between traffic signals. There is also a swing bridge nearby that is operated on a regular basis.	Represents worst-case short-term exposure in village centre. No relevant longer-term exposure. Part of National Diffusion Tube Network.	56.4	51	Roadside levels are typically falling year on year.

6 N2WA25 STOCKTON HEATH LONDON ROAD	361.382 386.307	NEAR ROADSIDE 2.5m from kerb 3m sample height	Represents actual residential exposure within the Village Centre away from the roadside. Urban background classification.	33.8	31	
7 N2WA11 LIVERPOOL ROAD SANKEY BRIDGES	358.800 387.643	NEAR ROADSIDE 2.5m from kerb 3.5m sample height	Located near traffic lights on residential main road to address local concerns about traffic movements to a landfill site.	43.5	40	Represents worst case exposure, as the site is located at a traffic junction that controls traffic entering a commercial area. The rest of the road is likely to experience lower levels.
8 N2WA16 M6 MOTORWAY NICOL AVENUE WOOLSTON	365.605 389.959	NEAR ROADSIDE 7m from kerb 2.2m sample height	Worst-case motorway site, no relevant receptors. Designed to represent potential levels at key receptors.	81.6	74	This site forms part of our wider research programme on air quality levels adjacent to key motorway corridors around the town.
9 N2WA17 M6 MOTORWAY NICOL AVENUE WOOLSTON	365.619 389.965	INTERMEDIATE NEAR ROADSIDE 30m from kerb 2.2m sample height	Worst-case motorway site, no relevant receptors. Designed to represent potential levels at key receptors at the boundary of the existing AQMA.	76.5	70	This site forms part of our wider research programme on air quality levels adjacent to key motorway corridors around the town.

10 N2WA27 BRIAN BEVAN ISLAND CHESTER ROAD	360.679 387.470	NEAR ROADSIDE	Tube located on the pavement near to residential apartments, nearby bus stop may influence the results.	49.0	45	This site forms part of our wider research programme on air quality levels adjacent to key motorway corridors around the town.
11 N2WA20 PARKER STREET	360.012 387.904	NEAR ROADSIDE	Tube located to access whether the geographical extent of the AQMA is correct.	62.1	56	
12 N2WA21 WHITE STREET	360.058 388.028	NEAR ROADSIDE	Tube located to access whether the geographical extent of the AQMA is correct.	45.9	42	
13 N2WA60 WHITE STREET 2	360.130 388.035	NEAR ROADSIDE	Tube located to access whether the geographical extent of the AQMA is correct.	41.9	38	
14 N2WA59 MUSEUM STREET	360.362 387.942	NEAR ROADSIDE	Tube located to access whether the geographical extent of the AQMA is correct.	43.8	40	
15 N2WA61 HENRY STREET	360.175 388.045	NEAR ROADSIDE	Tube located to access whether the geographical extent of the AQMA is correct.	37.5	34	
16 N2WA62 ARPLEY STREET	360.149 387.941	NEAR ROADSIDE	Tube located to access whether the geographical extent of the AQMA is correct.	37.5	34	
17 N2WA29 CROSFIELDS ISLAND LIVERPOOL ROAD	359.468 388.240	NEAR ROADSIDE	Represents residential exposure close to a busy roundabout.	49.5	45	

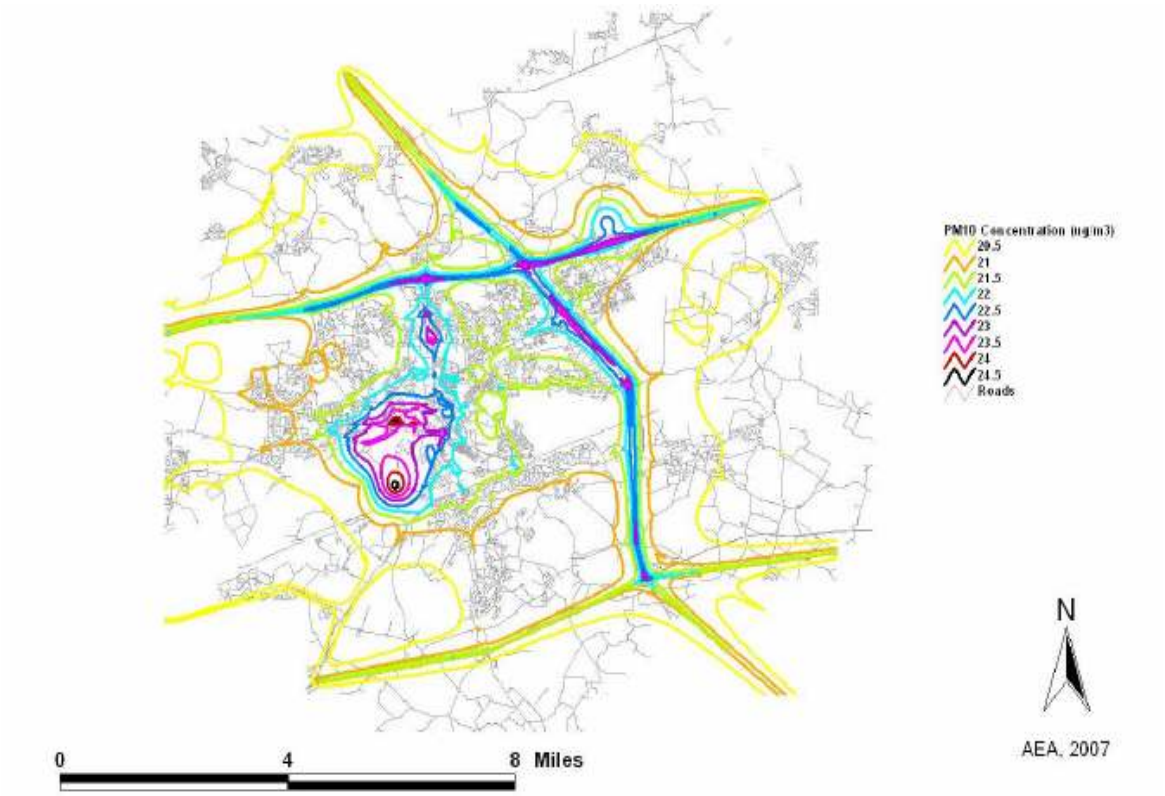
All tubes (palmes) are analysed on a monthly basis by Bureau Veritas Laboratories using 10% triethanolamine in water.

C4: ASSESSMENT OF PARTICULATES

C4.01 There is no readily available reliable monitoring method to sample particulates across a wide geographic location, which does not require a considerable capital investment. Particulate concentrations have, therefore, been assessed using dispersion modeling supplemented by a single monitoring location, which is the air quality laboratory based in Selby Street.

C4.02 The results of the latest dispersion modeling carried out in 2007 are reported in the Detailed Assessment of that year (ref 6). The assessment concluded that no areas of Warrington are likely to exceed the relevant objectives. The 2010 contour plot for the borough is reproduced in figure C13.

Figure C13: 2010 Warrington contour plot

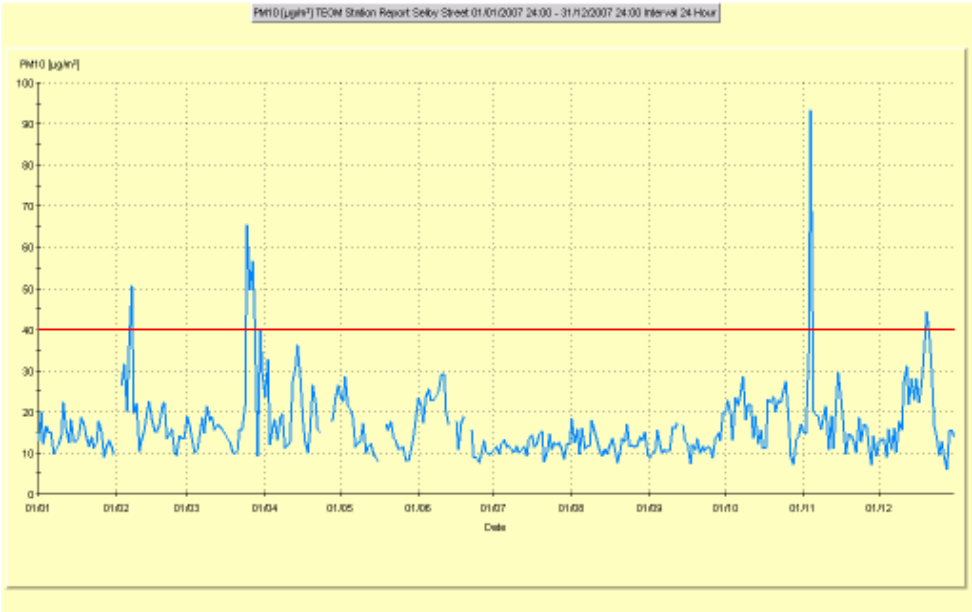


C4.03 Particulate levels in the PM10 fraction are monitored at the laboratory in Selby Street. The results are set out in table C9 and figures C14 and C15. The latest NETCEN audit demonstrated that the TEOM was performing well in terms of being leak free. It also scored well with respect to the known filter weight tests and flow through the sample inlet. The analyser can, therefore, be considered to be performing well.

Table C9: PM10 2007 results

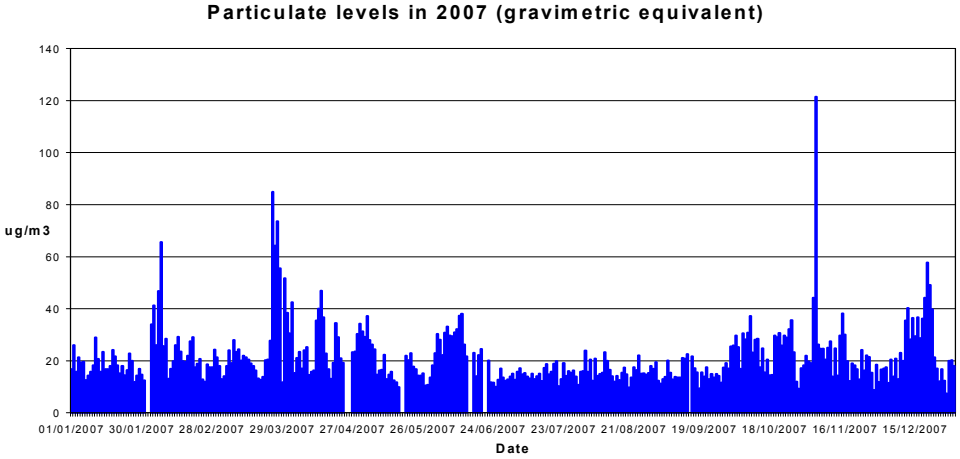
Data capture	Objectives	Results against the objectives	Comment
96%	40μg/m^3 as an annual mean concentration	16.6 μg/m^3 (TEOM) 21.3 ug/m3 (gravimetric)	All TEOM values have been adjusted by 1.3 as recommended in LAQM.TG (03) to give a gravimetric equivalent.
	50μg/m^3 (24 Hr mean) not to be exceeded more than 35 times per year. Equivalent to a 90.4%ile.	25.5 μg/m^3 (TEOM) as a 90.4%ile. 33.2 μg/m^3 (gravimetric).	

Figure C14: PM10 TEOM 24 hour averages 2007



C4.04 The particulate results when compared as a gravimetric equivalent value are below the prescribed objectives, although the annual mean value would have slightly exceeded the 2010 indicative objective of 20 μg/m^3, this objective has now been replaced with a national exposure reduction target.

Figure C15 2007 Indicative gravimetric equivalent particulate (PM10) data taken from TEOM data corrected by 1.3.



C4.05 It is important to note that whilst the TEOM is used extensively throughout the national monitoring network, it fails the equivalence of ambient air monitoring methods issued by the EU, as it is unable to satisfy the Data Quality Objective for uncertainty. Local authorities are recommended to replace equipment for areas where they are close to the objective. Although there is no definitive guidance on what level should be applied, it is generally assumed to be the range of 30 to 40 days (as corrected by 1.3) (ref FAQ AEA technology helpdesk). The results for 2007 recorded only 17 days above the annual objective and hence there is no pressing need to replace the equipment. The local authority instead intends to take an informed view once the sites that are affiliated to the national network begin to select their method of choice for replacing or upgrading the TEOMs. The authority is also considering replacing the PM10 head for a PM2.5 in order that it can assess local air quality against the smaller fractions, which are believed to represent a significant health risk, although the situation will be monitored nationally as part of the new exposure reduction target.

CONCLUSIONS

It is possible to conclude that:

Box 4 Conclusions from the assessment of particulates

- Concentrations of particulates continue to comply with the current air quality objectives.
- The authority will need to keep under review performance against the new national exposure reduction target for PM2.5.

C5: ASSESSMENT OF SULPHUR DIOXIDE.

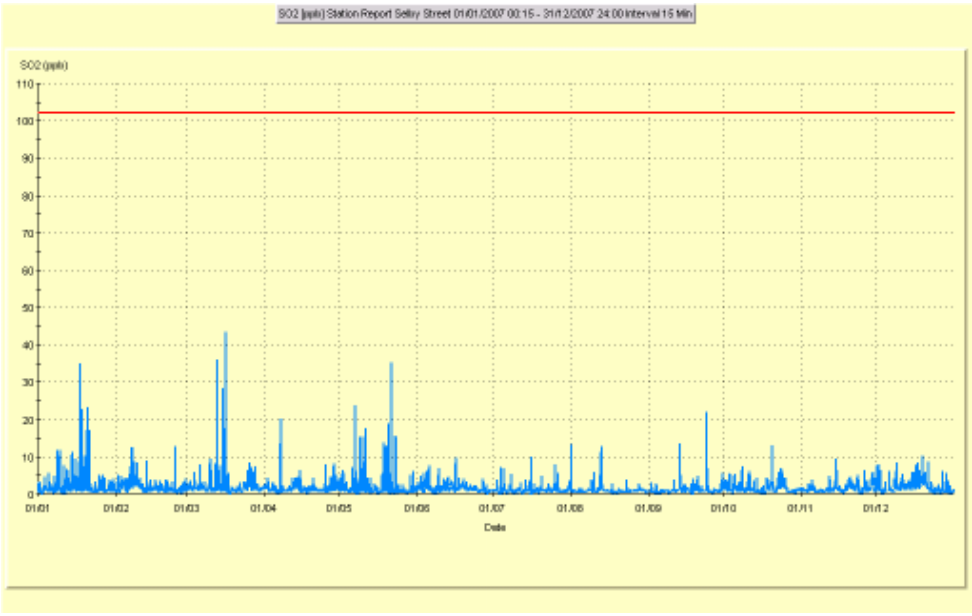
C5.01 Sulphur dioxide concentrations across the borough have been found to be below the relevant objectives according to both modelled and monitored data. However, levels are still monitored due to the presence of a coal-fired power station.

C5.02 The results from the laboratory continue to demonstrate that recorded levels within the area of the predicted maximum concentration are well within the relevant objectives. The results for 2007 are shown in table C10 and figure C16. The results of the latest NETCEN audit demonstrate that the equipment was leak free with a good response to span and zero checks, the cylinder was proven to be stable.

Table C10: SO_2 2007 results

Data Capture Rate	Objectives	Results against the objective	Comment
99%	266 μg/m^3 (15mins) not to be exceeded more than 35 times a year. Equivalent to a 99.9%ile.	38.8 μg/m^3 as a 99.9%ile.	No exceedances recorded either expressed as a percentile of days per year. The emissions from the coal-fired power station are, therefore, not impacting on this receptor.
	350μg/m^3 (1hr) not to be exceeded more than 24 times per year. Equivalent to a 99.73%ile.	24.0 μg/m^3 as a 99.73%ile.	
	125μg/m^3 (24 hr) not to be exceeded more than 3 times per year. Equivalent to a 99.18%ile.	11.9 μg/m^3 as a 99.18%ile.	

Figure C16: SO_2 15 minute averages 2007



CONCLUSIONS

It is possible to conclude that:-

Box 5 Conclusions from the assessment of sulphur dioxide

- Ambient concentrations of sulphur dioxide associated with the coal-fired power station are unlikely to be significant.

C6: REVIEW OF EMISSION SOURCES

INCREASE IN VEHICLE TRIPS

C6.01 Reductions in nitrogen dioxides are generally associated with improvements in vehicle technology. The assumption is that we will continue to see a reduction in nitrogen dioxide levels due to improvements in technology and the gradual replacement of the older vehicle fleet until 2010. The increase in the number of vehicle trips will gradually begin to lessen the predicted improvement in air quality.

C6.02 The trend data at a local level, figure C2, suggests that we are starting to see this effect sooner than expected. The results, however, must be treated with caution, as local concentrations of nitrogen dioxide are dependent upon the availability of ozone, so the association between nitrogen dioxide levels and vehicle trips is not a direct effect.

C6.03 The trend has, however, been compared to local traffic growth figures to consider the possibility that an increase in vehicle trips is beginning to mitigate the effect of technological improvements.

C6.04 National data compiled by Department for Transport (ref 13) demonstrates that road traffic has grown by 79% since 1980. Most of the growth has occurred between 1980 and 1990. The estimated growth since 1995 to 2006 has slowed to 16% for Warrington. The majority of the growth has been in car traffic, which has been influenced by an increase in car ownership, an increase in drivers, falls in occupancy and various fiscal measures. The estimated growth excluding trunk roads has been less marked with a growth of 8.8% between 1995 and 2006.

C6.05 These figures confirm that vehicle trips are increasing at the same time as the long-term trend in air quality improvements is slowing. Furthermore, a high level of growth is being experienced away from the town centre, which is likely to increase levels of emissions within these areas as they become more developed. Whilst, current pollution levels in these areas remain well within the objectives the situation will need to be monitored with regard to a longer term creep in background levels.

C6.06 The general situation is too complex to draw any definitive conclusions at this time, but it seems reasonable to hypothesize that the increased growth in vehicle trips is largely responsible for the slowing of improvements in air quality. The effect is likely to be influenced by regional growth as well as local.

Box 6
It is clear that, whilst the number of days of moderate or high air pollution remains relatively low, the maintenance of urban background levels is dependent on managing local and regional transport flows and conditions. The effect is likely to be exacerbated in areas where sensitive developments are in close proximity to roads with high flows and or periods of congestion. Complementary action is required to manage this situation.

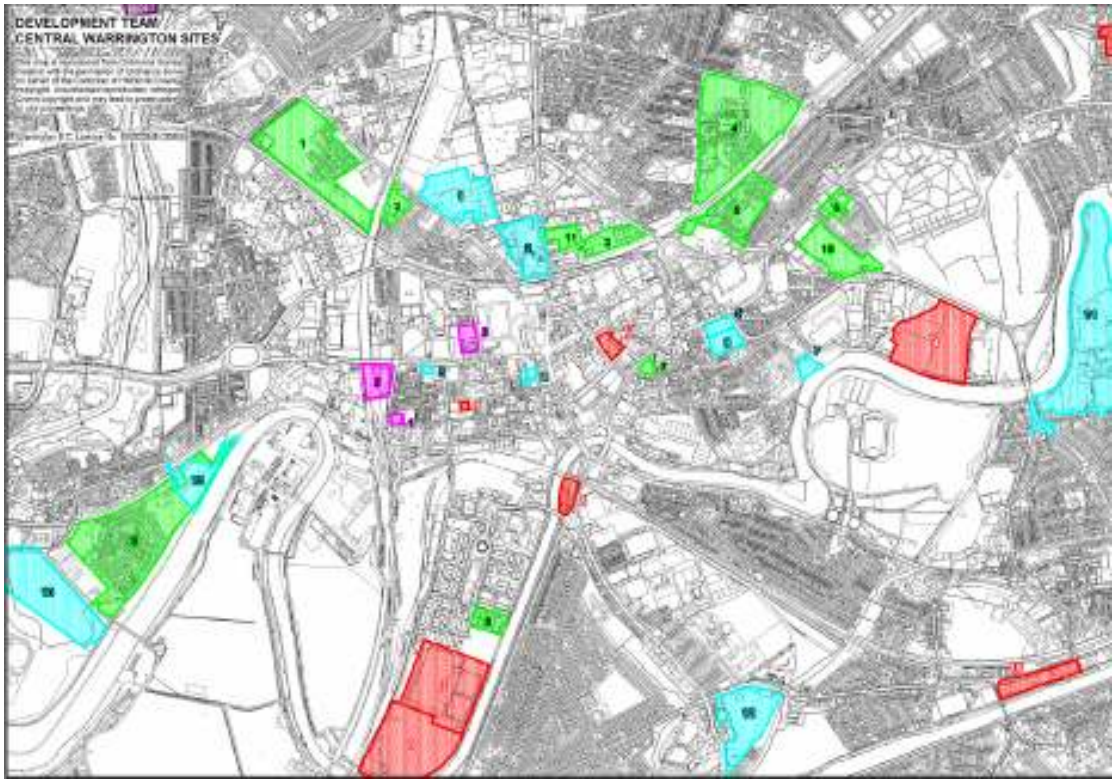
DEVELOPMENT GROWTH

C6.08 Warrington is developing rapidly as a town. The expansion of the satellite developments, originally created by the commission for New Towns and subsequently taken on by English Partnerships, has seen a growth in both commercial and residential developments away from the traditional town centre.

C6.09 The increase in traffic in these areas has put pressure on the road network, particularly the gyratory system around Bridgefoot, which provides the main east to west, north to south route. The current oversupply of housing has in turn seen new residential developments within the traditional town centre. The town centre itself is seeing a growth in retail and leisure provision.

C6.10 Figure C17 shows major developments within the inner wards, which are either under construction (shaded green), have planning permission (shaded aqua), or are yet to determined (shaded purple). Sites for which pre application discussions have been held are also shown (shaded red). The reference numbers relate to another document from which the figure has been taken but they are referred to below when discussing particular sites.

Figure C17: Map of inner area potential development sites.

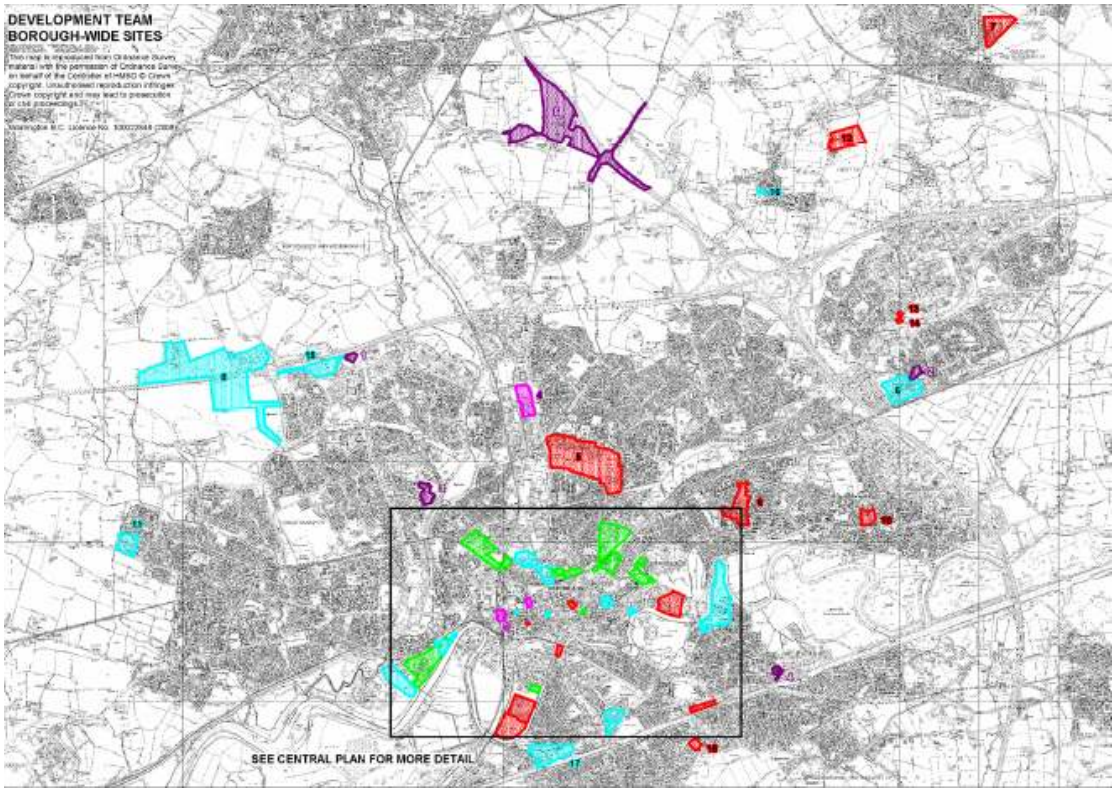


C6.11 The figure shows a number of developments to the north of the town, the most significant being site 8 (aqua), which represents an expansion of the town centre area. The development was assessed for any impact on air quality and found not to demonstrably affect existing air quality levels. The scheme has also recently been amended with an associated reduction in car park provision. Several other developments are shown that have been deemed to be sustainable within existing air quality levels. There are also two development opportunity sites close to or within the existing Parker Street AQMA. Any residential use class, or application with the potential to generate significant additional vehicle trips, will need to be closely controlled.

C6.12 Sites to the south include pre-application discussions on the area of Slutcher's Lane (red 8&9), which is presently the subject of pre application discussions. This area and the wider Bridgefoot area remain key areas in terms of air quality and discussions will have to have due regard to air quality. The emerging Area Action Plan, which makes reference to air quality, will also direct any development in these areas.

C6.13 Developments to the east and west of the town centre have again been deemed to be sustainable, although the council is mindful of potential 'background creep'. The potential rise in background levels is being monitored through the annual review and assessment process.

Figure C18: Map of wider developments across Warrington



C6.14 Figure C18 shows the wider developments the most significant of which are the Omega development to the west of the town and the Parkside rail interchange to the North. The Omega development, a large commercial park, currently benefits from outline planning approval. No potential exceedances of the relevant air quality objectives have been predicted and the motorway link along with sustainable transport initiatives should help to alleviate some of the potential impact on the local network. Sections of the site are also within the motorway related AQMA and the use classes in these areas will need to be non-sensitive. The proposed rail freight interchange could have an overall regional benefit in terms of air quality, although its potential impact on the local environment is currently being assessed before any application is determined.

C6.15 Overall, it is possible to conclude that the continued regeneration of the town will continue to demand that close attention is given to air quality. The current planning constraint layer and the regular forward planning meetings should help to provide the necessary controls to mitigate against any significant impact. Performance measures, relating to air quality, have also been included in the Corporate Plan. The identification of additional resources to take forward climate change, health and sustainability should also help in the delivery of wider air quality initiatives.

INDUSTRIAL SOURCES

C6.16 There were 62 installations and activities regulated by Warrington Borough Council for air emissions in 2007 under the Environmental Permitting Regulations permitting system. These are regulated due to their sectors being designated by national Government as having the potential to have an impact on local air quality.

C6.17 The number of installations regulated has slightly increased on previous years due to the inclusion in 2007 of the dry cleaning sector into the permitting system. Other activities regulated include petrol stations, vehicle resprayers, printing, concrete batching, animal hide and skin, isocyanate use, human cremation, brick making and small waste oil burners. All the activities regulated met the statutory emission limits and no enforcement notices were issued.

C6.18 The Environment Agency regulates 14 industrial installations under the Environmental Permitting Regulations within Warrington for all environmental emissions to air, land and water. These tend to be the larger scale potentially more polluting sites than those regulated by the Council. Activities regulated include organic chemical manufacture, landfill sites and the power station at Fiddlers Ferry.

C6.19.Modelling has demonstrated that emissions from local industries have a minor impact on local air quality when compared to traffic related sources (ref 6).

C6.20 The operation of landfill gas generators at two major landfill sites have the potential to affect local air quality depending upon their location in relation to residential properties. Whilst, ambient air pollution is high at the point of generation, research conducted by one operator has confirmed compliance with the relevant objectives at the site boundary.

CONCLUSIONS

B6.21 Air quality levels in the town are generally very good although elevated levels have been identified in relation to the motorway network and the some of the primary arterial routes. The increase in residential developments in these areas and the potential for background creep in the outer areas highlights the need for the continued integration of the transport, planning, air quality, economic development and regeneration policies.

CHAPTER D: Air Quality Management Plan Progress Report 2007/08

CHAPTER D1: INTRODUCTION

D1.01 The primary purpose of the plan is to address ambient air quality levels associated with the motorway network, following the designation of the air quality management area in November 2003. A key step was to accurately quantify ambient air quality levels adjacent to the motorway, which has now been completed. Action planning beyond local highway improvements has been dependent on the ability of the Highways Agency to deliver local improvements within their national programme.

D1.02 Warrington is a vibrant town, which is experiencing rapid growth and regeneration. The Council takes its environment seriously and additional measures are included within the plan to look at the overall sustainability of the town's air quality.

D1.03 The specific aims and objectives of the action plan are listed in tables 1 and 2. The objectives reflect the need to deliver a sustainable and healthy environment through complementary action on local transport and planning: The plan, therefore, draws heavily on actions contained within the Local Transport Plan (ref 15) and the Development Plan (ref 16).

D1.04 Whilst the vast majority of the town complies with the objectives it is evident that concerted action is required to manage development growth and to tackle traffic congestion. This is particularly the case as the year on year improvements in air quality are no longer being observed at a national and local level.

Table D1: The Aims of the Air Quality Management Plan. (Revised April 2008)

• To support the achievement of the National Air Quality Objectives through appropriate local measures linked to outcome based targets.
• To maintain and where practical improve local air quality, to protect local health, reduce health inequalities and to support policies designed to aid social inclusion.
• To ensure greater integration and joint working with key stakeholders on air quality in order to achieve common goals and objectives.
• To deliver and support cost effective actions that are proportional to the risk of exceeding the prescribed air quality objectives.
• To raise awareness on air quality and it's role in sustainable action planning.

Table D2: The Objectives of the Air Quality Management Plan.

1	TO MANAGE THE IMPACT OF THE MOTORWAY NETWORK ON LOCAL AIR QUALITY.
2	To reduce traffic growth through the promotion of alternative transport modes.
3	To improve people's quality of life and reduce health inequalities through the introduction of schemes that control vehicle access, speed and flow.
4	To manage the impact of emissions associated with road freight movements.
5	To support commuters in reducing the number of car based commuter journeys.
6	To assess air quality levels against national objectives and to evaluate the performance of the plan.
7	To raise awareness on health and environmental impacts and to improve access to information.
8	To regulate emission sources and to secure reductions where appropriate.
9	To aid the development and regeneration of the town through the creation of a sustainable environment.
10	To reduce emissions associated with Council activities.

CHAPTER D2: MONITORING THE PLAN

Box 7 The aim of the action plan
The primary aim of the plan is to take action with regard to the motorway network. Performance indicators with key dates are, therefore, specified within objective 1. Objectives 2 to 10 relate to the provision and maintenance of a sustainable and healthy environment. They do not relate to a specific AQMA. More generic performance indicators are stated within these objectives.

C2.01 The targets and indicators contained within the Agenda 21 Strategy, Local Transport Plan and Development Plan provided the basis for setting performance measures. These are summarised at the bottom of each objective within the main plan. **Progress against these indicators is primarily monitored through these strategies, although the council's Climate Change Strategy and other related strategy documents have now largely replaced the A21 Strategy. It is not the intention of this report to duplicate these monitoring arrangements, as objectives 2-10 are discretionary ones that are not directly related to any AQMA. The information provided in the report is instead intended to provide a summary of action taken and to give an indication of current trends.**

C2.02 Whilst, progress on the action plan can be monitored against the performance indicators, it is important to assess actual compliance with the air quality objectives. This is achieved using targeted air quality monitoring programmes and computer models. The overall performance of the plan can be assessed in this way.

C2.03 The reporting process is divided into three main categories. The first section focuses on the motorway related AQMA. A general overview of the objectives relating to the management of air quality is provided, whilst a brief section on the AQMA designated in 2006 is provided, although progress on improving air quality within this AQMA will be reported separately.

CHAPTER D3: PROGRESS TO DATE ON THE MOTORWAY AQMA (OBJECTIVE 1)

TO MONITOR EMISSIONS AND TO REVIEW THE REQUIREMENT FOR AN AQMA

D3.01 The plan was launched in August 2003. The initial phase of the plan was to quantify air quality levels in close proximity to the motorway network to determine both the degree of exceedance and its geographical extent. This stage has now been completed with the main research completed as part of the Update and Screening Assessment (ref 17).

D3.02 The Council has established liaison meetings with representatives of the Highways Agency to discuss action planning. The Council has been unable to secure any specific remedial measures within the AQMA. This is because the Highway's Agency considers the AQMA in Warrington to be a low priority within the national programme. This is due to the following reasons: -

- Modelling results demonstrate possible compliance with the objective by 2010.
- Levels of nitrogen dioxide recorded in Warrington are lower than in other areas in the national network.
- There are a limited number of properties within the AQMA in relation to other national AQMA's.

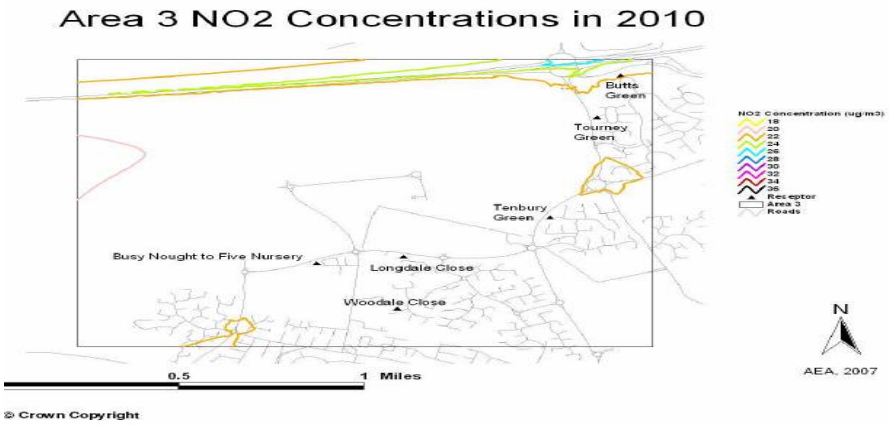
D3.03 The AQMA was designated for an area within 50m of the motorway carriageway. The number of relevant receptor locations within the AQMA is therefore limited to some 40 properties. It is possible to manage development growth in these areas through planning controls and the AQMA has been designated as a planning constraint area, such that any proposed development in these areas is 'flagged' for more detailed consideration.

D3.04 Research, as stated, has therefore largely concentrated on finding out more about air quality levels within the areas and in testing the predicted compliance by 2010. These issues have therefore been considered in more detail within this progress report.

POTENTIAL COMPLIANCE BY 2010 AND THE EXTENT OF EXCEEDANCE.

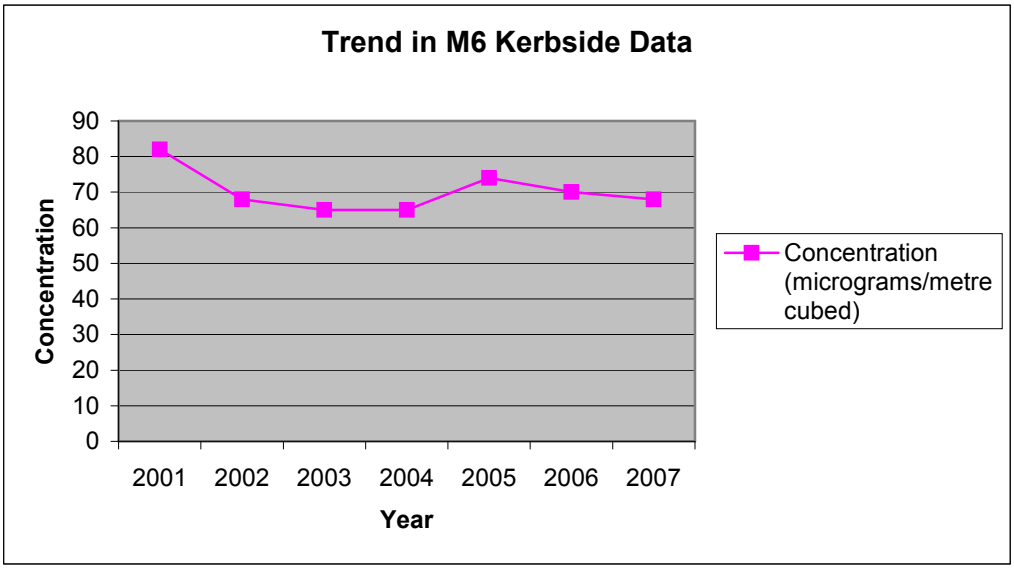
D3.05 The outputs from dispersion models depend on a number of key input parameters, including vehicle emission factors. These assume a relative reduction in emissions per vehicle sector over time as vehicle technology improves and the overall composition of the vehicle fleet shifts in favour of those benefiting from the latest technology. A resultant improvement in air quality is predicted. The results of the latest dispersion assessment, undertaken in 2007 (ref 6), support the assumption that all areas will comply with the annual objective by 2010. An example of a typical modelled contour is provided in figure D1.

Figure D1: An example of a typical modelled contour plot



D3.06 The ambient monitoring undertaken by the council, and to a lesser extent that undertaken by the Highways Agency itself, has not confirmed the predicted reduction in motorway related nitrogen dioxide concentrations. There, therefore, remains some doubt over whether compliance with the objective will be achieved at relevant receptor locations by 2010. Monitoring will continue in order to evaluate this situation, however, the current trend can be seen in figure D2. No observable improvement in air quality over a sustained number of years has been observed with the levels remaining around 65 $\mu g/m^3$, which is some 25 $\mu g/m^3$ over the objective value of 40 $\mu g/m^3$.

Figure D2: Unbiased corrected monitoring results for the M6 in Warrington.



D3.07 The Council has a comprehensive set of monitoring data for the motorway network, which it has developed since the designation of the AQMA in 2001. This has consistently shown that air quality levels fluctuate significantly depending upon the location of the monitoring position. The results have shown that some areas may comply with the objective, whilst significant exceedances at some distance from the carriageway have been predicted in other areas.

D3.08 Air quality levels adjacent to the motorway appear to be dependent on a number of factors. Air quality levels, as would be expected, seem to have a relationship with vehicle flows with the M6, which carries the most traffic, exhibiting the highest concentrations.

D3.09 It is also possible to speculate that road conditions, such as the presence of inclines, or specific factors to do with the monitoring position, such as the presence of embankments may be significant. Research by the Council (ref 11) has also demonstrated the importance of meteorological conditions such as wind direction and whether calm conditions are present.

D3.10 An interesting feature of the data to date is that levels seem to fluctuate significantly depending on whether the monitoring position is in an urban or semi-rural location; with the highest levels have being recorded in the more rural and open areas. This tendency is apparently evident within the Highways Agency dataset for the M6, with the lower levels being recorded in the more urban area.

D3.11 It is possible that this may be simply due to fact that wind speed and direction are more likely be significant in rural areas due to the more open areas. It is, however, possible that it may also be due to the greater availability of ozone in the more rural areas, which allows for the chemical conversion of excess nitrogen oxide generated by the motorway emissions.

D3.12 It is therefore possible to conclude, on the basis of results the monitored and modelled data to date, that compliance with the annual mean objective of 40 μgm^3 is possible by 2010, particularly along the M56 and sections of the M62 and M6. However, monitoring results on the M6 have not indicated any significant reduction in annual nitrogen dioxide levels and compliance seems to be highly dependent on the receptor location.

D3.13 The Council will, therefore, continue to monitor the situation and to pursue specific actions to improve air quality where possible. It is not proposed to revoke the existing order or amend its boundaries at this stage, although a case could be made for the revocation of the M56 section of the AQMA. The existence of a continuous AQMA provides clarity for the control of developments and the identification of areas of compliance along specific areas of the corridor is likely to involve a disproportionate amount of monitoring at numerous locations due to variation in air quality levels.

ACTION PLANNING.

D3.14 Specific actions within the plan included close working with the Highways Agency, research into the effects of speed reduction, to explore the use of Variable Message Signs (VMS), to assess the impact of developments on the network and to continue to work to reduce route diversions through the town.

D3.15 The Highways Agency was unable to make the results of the M1 speed reduction study available. However, it is understood that the results of the DMRB study have been variable and that any predicted improvements are less marked once improvements in the fleet data have been accounted for. The Council understands that the option of speed reduction for the routes passing through Warrington is not likely to be viable, as the economic costs of increasing journey time are high, and the relative benefit of such a scheme is therefore not sufficient to offset the economic impact. However, research (ref 18) has shown that improvements in air quality are theoretically possible.

D3.16 The use of VMS and the control of route diversions have been more successful. The Council has been able to secure access to ten cameras on the local motorway network to supplement its own system of cameras. The Highways Agency have also established a Regional Traffic Control Centre to reduce congestion, whilst work is continuing with the Highways Agency to agree strategic diversion routes to limit the impact on local roads in the event of an incident on the motorway network.

D3.17 The previous progress report identified improvements through the Highways Agency Route Management Strategies, including: -

- Improvement and signing to Lymm Truck stop at junction 20.
- Slip road improvement at Junction (21a) M62/M6 link.
- Trials on “parking pockets” to encourage car share between junctions 20 and 22.
- Improvements to junction 6 of the M62, which is operating close to capacity. It is proposed to add free-flow links, one from the M57 to the M62 eastbound and one from the M62 westbound to the M57.
- Several schemes are planned to reduce merge related delays on the M62 junction 10.

D3.18 The Highways Agency was approached for a latest update via the email contact details on their website, despite receiving an initial reply, no detailed response has been received to date. The council will, however, continue to lobby for improvements wherever possible.

CHAPTER D4 SUSTAINABLE ACTION PLANNING (OBJECTIVES 2-10)

D4.01 The Air Quality Management Plan includes a number of actions that do not directly relate to the two AQMA's. These actions have been included to allow air quality levels to be managed across the town and to allow for the principle of exposure reduction, whereby reductions below the objective values can deliver discernible health improvements for the wider population.

D4.02 The sustainable management options, which are detailed in objectives 2 through to 10, are largely dependent on the implementation of the Local Transport Plan (ref 15). Progress against the plan is reported separately in the LTP progress reports. Detailed performance figures are not, therefore, stated within this report. The latest modelling results (ref 6) have again indicated that the vast majority of Warrington will comply with the relevant objectives, although the results contained within this progress report have identified some potential exceedances of the annual nitrogen dioxide, which warrant further research.

D4.03 There is no LTP progress report for 2007 but the Environmental Health and Protection team have continued to work closely with the Strategic Transportation Team.

D4.04 The key issues related to the management of traffic growth and congestion and the main successes are described below. A specific breakdown is provided in table D3. The areas shaded red indicate areas of no progress, these mainly relate to freight management. However, a freight management strategy is in place, it is hoped that this will be formally adopted within the second phase of the LTP.

D4.05 One of the major achievements reported in 2006 was the introduction of the new bus station, which is located very close to Warrington's Central Station, thus providing a more integrated transport system. The bus station and associated improvements in the bus fleet, bus stops, passenger information and the use of real time information at bus stops has seen a significant increase in bus patronage figures. Indeed Warrington Borough Transport alone carried over 8 million passengers in 2006/07 and this figure is expected to continue to rise in 2007/08.

Figure D3: The new Bus Station.

D4.06 The Urban Traffic Control system is in place and a network of variable message signs has been rolled out. The system also allows for remote monitoring and fault diagnostics, real time information, automatic traffic counts and car park monitoring and guidance. Network conditions are also managed to optimise flows and to reduce congestion. Good progress has been made on linking the UTMC system to the air quality monitoring network. The software is in place and the air quality data is filtered in the UTMC system against local quality

thresholds, which are set at tighter levels than the national 'traffic light' scheme. This system will become fully automated in 2008. An example of a sign is shown in figure D4.
Figure D4 Variable message sign displaying air quality data

D4.07 Commuters are also been supported in reducing the number of car based commuter journeys through the adoption and promotion of travel plans and the implementation of a car share scheme.

D4.08 There has been a significant uptake in travel plans by employers. Work based travel plans now cover over 38,500 employees and 61 out of the 87 schools have adopted travel plans. There are also 38 safe routes to school and 17 walking bus schemes.

D4.09 With regard to cycling, the outer cordon of cycle routes is nearly 70% complete with over 6 Km of new and improved greenways and 15 Km of cycle track. 63% of respondents believed that the improvements to cycling facilities were worthwhile. Walkers have also been accommodated for and over 26Km of new footways have been introduced and 27 new pedestrian crossings have been established.

D4.10 Existing emission sources have been controlled through the regulation of industrial processes, which has seen a 100% inspection rate for permitted installations, where the local authority is the enforcing authority.

D4.11 The Council in partnership with the Greater Manchester authorities, remains one of the few local authorities to continue to operate a vehicle emission testing campaign.7 events were held in 2007/08 and over 324 cars where tested. The events continue to raise awareness on air quality and the importance of ensuring that cars are correctly maintained.

Figure D5: Pictures taken from one of the Clean Vehicle Campaign events.

D4.12 The Local Development Plan (Ref 16), which sets out the Council's town planning policies for guiding development and protecting the environment, was adopted in January 2006. It contains a specific policy on air quality, which states that the Council "will not permit development where the air quality limits will be exceeded…unless appropriate mitigation measures can be agreed. Proposed developments that may cause air pollution will require a detailed air quality assessment".

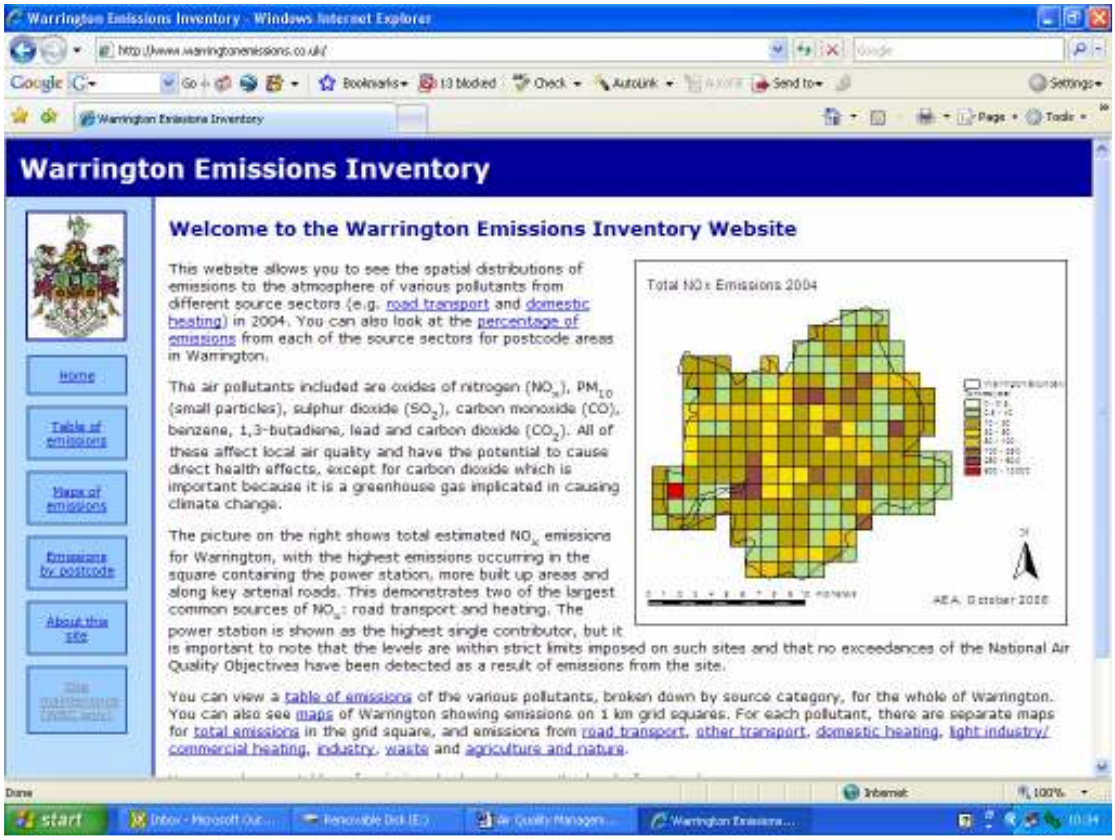
D4.13 The two AQMA's have also been set up as a standard planning constraint to ensure that due weight is given to air quality within the determination of applications within these areas. A wider protection area, based upon locations predicted to be above 35 μgm^3, has also been established as a planning constraint. This helps to ensure that new residential developments or schemes with the potential to significantly affect traffic growth or conditions are appropriately assessed. A guide to help developers and planners to secure sustainable developments has also been produced (ref 19).

D6 The Air Quality and Land Use Planning Guide

D4.14 The Council is actively pursuing options for improving data dissemination. It has revamped its website to include direct access to its inventory of emissions via the web and to provide access to monitored information. An example of the emission inventory pages is shown below. Seven educational talks were provided for educational groups and a series of over 30 presentations were given to key local interest groups and Parish Councils. We are also seeking to appoint a new officer to lead on Sustainability and Health issues, which will allow us to expand our community role and to address air quality as part of a holistic package of health and environmental issues. The address for the council's air quality web pages is

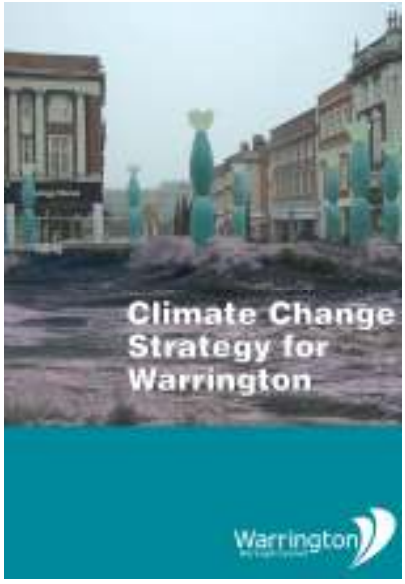
www.warrington.gov.uk/Environmentandplanning/Pollution/air_quality/

Figure D7 Example of the web based emission inventory.



D4.15 The Council has also honoured its commitment under the 'Nottingham Declaration' to take action on Climate Change. A strategy document (ref 20) has been produced, which sets out our initial aim of reducing our emissions by 10% by 2012, followed by a community based reduction of 20% by 2020. The links between air quality and climate change will be closely explored as part of this work to ensure that the measures remain complementary.

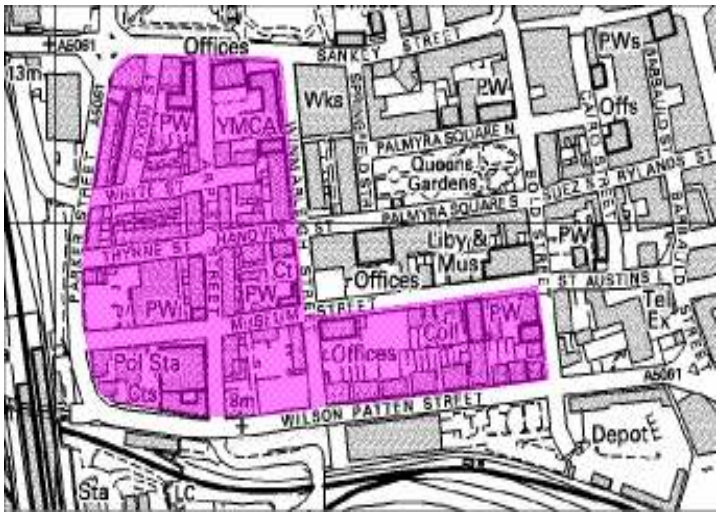
Figure D8: Climate Change Strategy for Warrington



D5 PROGRESS ON PARKER STREET AQMA.

D5.01 The review and assessment process has consistently identified elevated levels of nitrogen dioxides in an area close to the town centre (see figure D9). The levels are mainly associated with large volume of traffic using the primary arterial route, which links the town centre and the west of the town and the associated congestion.

Figure D9: Parker Street AQMA



D5.02 The detailed assessment carried out in June 2000 predicted that the levels, whilst elevated in comparison with other areas, would be below the national objectives levels. A further detailed assessment undertaken in 2004, however, predicted exceedances of the annual nitrogen dioxide objective. The potential exceedance was confirmed by diffusion tube monitoring. A comprehensive network of monitoring sites has since been set up, which incorporates a chemiluminescent analyser.

D5.03 The area was designated as an Air Quality Management Area in February 2006. This placed a requirement on the council to publish a further assessment (stage 4) of air quality to determine which emission sources were contributing to the exceedance. This report was duly published in April 2007 (ref 21) along with other statutory reports required by Defra for that period. Whilst this date fell outside of the statutory 12 month period for submitting the stage 4 report, Defra accepted that it would make sense to submit one composite report. The report concluded that transport emissions where the primary source.

D5.04 The council is under no legal compulsion to develop a formal action plan for the area due to its 'excellent' score in the Comprehensive Performance Assessment (CPA), which seeks to reduce the 'burden' on those authorities who have already demonstrated a high degree of effectiveness and competence. However, a plan will be produced with our Local Transport Plan Team, in accordance with Policy Guidance (ref 22), which advocates the incorporation of the action plan within the local transport plan process, where transport emissions are the main cause of the exceedance.

D5.05 The guidance (ref 5) sets out a non-statutory 18 month period for the completion of the action plan. The development of remedial options were, however, reliant on the development and validation of the strategic transport model and the associated 'paramics' model, which provides a mechanism for testing options. These models were not available within the required time period and the project plan has been adjusted accordingly to accommodate the detailed testing required.

D5.06 The intended date for the publication of the draft strategy is September 2008 a phased package of measures will be set out for consultation. It is, however, important to recognise that measures have already been taken to optimise the traffic light sequences and hence maximise the smooth flow of traffic. Planning policy measures for the area are also being developed and a masterplan or area action plan will be published to manage developments in the area.

D5.07 The latest review and assessment (ref 6) for 2007 predicts that the area will comply with the annual nitrogen dioxide objective by 2010. The monitoring to date figure C11 indicates that compliance with the objective without direct intervention will continue to be challenging. The apparent discrepancy between the monitored and modelled data can be attributed to the inherent uncertainties associated with modelling, the difficulty in accurately predicting the primary nitrogen dioxide component, and the ability of the model to accurately account for congestion in its queuing assumptions.

D6: PERFORMANCE AND EFFECT ON AIR QUALITY

D6.01 The Council has conducted numerous detailed reviews and assessments of air quality since the publication of the first review in 2000, which built upon the results of the existing monitoring programme. There is, therefore, a clear body of evidence, which demonstrates that the vast majority of the town complies with all the relevant objectives. Indeed, a comprehensive reassessment of the town's air quality (ref 17), undertaken in 2006/07, reaffirmed that the town has a good standard of air quality. Furthermore, the dispersion modelling results indicate that all areas will comply with the relevant objectives by 2010; assuming predicted fleet improvements actually deliver improvements in vehicle emissions.

D6.02 However, the results of the latest monitoring have shown a distinct reduction in air quality improvements and exceedances of the annual nitrogen dioxide objective are possible at certain discrete locations identified within this report. It is, therefore, evident that action future action planning should concentrate on the principles of sustainable development and exposure reduction, whilst an informed decision will need to be made on whether further air quality management areas are likely.

D6.03 The motorway related AQMA continues to remain valid, although there is a wide variation in levels between each motorway and locations along each route. Little direct progress has been made beyond the initial characterisation of the air quality due to the fact that the Highways Agency have assigned it as a low priority.

D7: FUTURE ACTIONS

D7.01 Air quality has been integrated within The LTP and Local Development Plan and it also features within the Corporate Plan. It is clear, however, that complementary action must be taken to manage both the residential growth around the town centre, to control the introduction of any future receptors, and to manage traffic growth and congestion. The corporate development team will provide the mechanism for monitoring these issues and action will be taken under related strategies and policies.

D7.02 We also intend to build a stronger external air quality profile. This will be achieved through the introduction of a new post. We also intend to explore the feasibility of joining the Care4Air campaign.

D7.03 We need to reach a decision on the exceedances identified within the key areas, in terms of any requirement to designate these areas as air quality management areas. We also need to deliver the Parker Street Air Quality Management Action Plan.

D8: FUNDING FOR AIR QUALITY MANAGEMENT

D8.01 Revenue funding is provided to support the air quality monitoring network and the maintenance of the emission inventory. There are a number of activities that are supported through partnership working and by bids for capital support through the Government's grant system.

Table D3: Air Plan Objectives

Objective 1 *To manage the impact of the motorways on local air quality.*

Action	Performance Indicator	Performance Achieved	Outcome	Effect on Air Quality	Comments
1. To review the requirement for a motorway related AQMA.	Decision to be made in June 2004	• Major research programme completed by June 2003. • Additional research completed into the M6 in March 2005.	The monitoring and modelling results have demonstrated that the AQMA is valid, but actual levels are thought to vary considerably within the area depending upon local conditions. Levels along the M56 are lower than those experienced on the other routes.	No direct effect on air quality but local conditions have been effectively characterised.	This stage is now largely complete. Action needs to concentrate on assessing trends, lobbying the Highways Agency and the consideration of measures available to the local authority.
2. To lobby the multi-modal studies to achieve the maximum air quality benefit where possible.	Publication of Study Findings and consultation responses.	• Consultation responses sent May 2003. • Attendance at route planning consultation meetings. • M6 route management study completed.	The study scenarios selected are predicted to be air quality neutral.	No direct improvement, but no increase in levels for traffic growth/route expansion.	No new studies were developed in 2004. The M6 multi-modal study has now been completed.
3. To undertake an evaluation of the effect of reducing motorway speeds to 50 MPH during elevated air quality periods.	Scheme evaluated as part of plan, discussions to take place with HA and decision made by June 2004	• The literature review has been completed. • The Highways Agency has commented on the M1 study.	Research has indicated that reductions in nitrogen oxides are possible. However, the Highways Agency have intimated that speed reductions are unlikely to be viable in Warrington as the economic cost in terms of journey time is too high.	Nil	Speed reduction trials are unlikely to take place in Warrington.

Objective 1 *To manage the impact of the motorways on local air quality.*

4. To explore the feasibility of using the VMS to display AQ information.	To evaluate the possibility by March 2004.	VMS signs now in place of the local motorway network.	Presently unable to display AQ messages as the signs use standard text.	Will depend upon the feasibility of speed reductions and route planning options.	The issue is to be addressed as part of the regular liaison meeting with the HA.
5. To assess the impact of all planning applications that may impact on the AQMA.	Number of applications determined within AQMA	No planning applications within the AQMA, other than previously approved consents prior to AQMA.	Planning applications are screened for any air quality implications.	Prevents relevant exposure.	AQMA integrated within development control decision-making process. The boundary of the AQMA is shown as a potential planning constraint.
6. To continue to work closely with the Highways Agency to reduce diversions off the motorway through Warrington.	Traffic count data	WBC and the HA have agreed a package of measures to manage and mitigate local diversions of the motorway. Traffic count data is not been recorded so no comparison can be made against the PI. Traffic count data coverage is being improved.	Manages traffic growth on local routes.	Helps to ensure that air quality on these routes is sustainable, long-term improvements possible.	LTP makes additional provision for 330K for local link improvements.
7. The introduction of Junction 8 off the M62	Junction due to open December 2002. Traffic count data	Scheme completed.			

Objective 2 *To introduce measures that reduce traffic growth through the promotion of alternative transport modes.*

Action	Performance Indicator	Performance Achieved	Outcome	Effect on Air Quality	Comments
1. Vehicle Priority Lanes	Number of corridors introduced.	No additional corridors were introduced in 2006/07.	No outcome in 2007.	Nil effect in 2006/07 from new schemes. The effect from existing measures is dependent on achieving a modal shift.	Forms part of a wider package of measures to promote public transport.
2. Cycling Strategy and Routes.	Number of routes introduced.	7 routes in the last two years.	Index of 132 in 2006/07, against a baseline of 100.	No material effect but the infrastructure is in place to promote a significant model shift.	
3. Walking Strategy	Strategy Targets	Over 13km of new/improved footways introduced since 2001/02	Walking to the town centre has increased.	Reduction of school trips at peak hours could have a demonstrable effect.	
4. Variable message signs at bus stops	The introduction of information points	250 signs now in place and scheme completed.	Public feedback good and bus patronage up.	Promotes choice and uptake of public transport, actual effect depends upon modal shift.	Package of measures to promote sustainable travel choices. Smart Cards for buses have been sent out.
5. The creation of quality bus networks.	Number of network improvements undertaken.	New bus station completed, low floor bus access on track with over 400 in place, VMS signage at bus stops programme completed.	Programme completed. Public feedback good and bus patronage up.	Promotes choice and uptake of public transport, actual effect depends upon modal shift.	
6.The Introduction of Bus priority measures	The introduction of the UTC system and physical changes at junctions	Schemes in development for A57 and A49 corridors.	Increase in journey time reliability predicted.	Smoothes access and flow for public transport, promoting modal change	
7. The introduction of Smart Cards	The introduction of the cards	Objective confirmed in LTP2 and public transport strategy.	Requires further investigation	Promotes choice and ease of access.	

Objective 2 *To introduce measures that reduce traffic growth through the promotion of alternative transport modes.*

8. Information Line for public transport users	Use of the Information line.	Not currently monitored as a performance indicator as there is more emphasis on improved information distribution using various media.	Bus patronage is rising which is helped by increased and varied information on public transport.	Promotes choice.	
9. Improve Local Rail Facilities	Improved Facilities	Improvements underway at Central, Padgate and Bank Quay Stations	Programme on schedule	Promotes choice and uptake of public transport, actual effect depends upon modal shift.	

Objective 3 *To improve peoples quality of life through the introduction of schemes that control vehicle access, speed and flow.*

1. 20 MPH Zones	Number of schemes, Traffic Counts, AQ Surveys.	3 schemes in the last three years – Pilot schemes planned for possible wider implementation	Controls access and speed.	Reductions in air quality are possible depending upon any reduction in traffic flows.	
2. Traffic Calming	Number of Schemes introduced, Traffic counts, AQ Surveys.	4 schemes introduced in the last three years.	Improves local accident rates and encourages walking and cycling.	Unlikely to effect air quality unless traffic flow is reduced.	
3. Speed Regulation	Traffic Counts, AQ surveys.	Red route initiative introduced in 2007/08 on several corridors to tackle speed and accidents. Review of speed limits planned in 2008/09.	Local speed and accident reductions, and encourages walking and cycling.	Likely to be minimal.	
4. Home Zones	Number of Schemes introduced, Traffic counts, AQ Surveys.	2 scheme introduced in last three years.	Local improvements and access control, together with environmental improvements	Local improvements possible depending upon access control.	
5. Urban Renewal Areas	Number of Schemes introduced, Traffic counts, AQ Surveys.	2 Local schemes in place.	Local improvements and access control.	Local improvements possible depending upon access control.	
6. Urban Traffic Control System (UTC)	Introduction of System, including AQ sensors.	Urban traffic control scheme now implemented, the system has been linked to air quality monitors.	The optimisation of traffic flows and junction controls can assist in the management of air quality.	The integration of air quality sensors will help to provide a useful AQ management tool.	Wider role out AQ messages in 2008.
7. Bridgefoot Environmental Improvement	Scheme Implementation	Scheme not presently being progressed.	Outcome of transport assessment awaited	Scheme has the potential to improve AQ within the AQMA.	Congestion and access being looked at as part of the regeneration framework.
8. Pedestrianisation of town centre	Completed				

Objective 4 *To manage the impact of emissions associated with road freight movements.*

Action	Performance Indicator	Performance Achieved	Outcome	Effect on Air Quality	Comments
1. Implement the Burtonwood HGV restriction trial.	Scheme implemented. Environmental evaluation.	Scheme In Place. Further scheme being investigated.	Reduction of HGV movements through village.	Significant local effects, diversions back onto key routes within capacity.	
2. Promote the Powershift Scheme and alternative fuel usage.	Implementation of campaign to target freight operators.	Draft Freight Strategy included within LTP2. Awaiting confirmation and implementation.			Wider fleet management issues are being considered as part of the Climate Change Strategy.
3. To encourage fleet maintenance, management and the uptake of the Road Haulage Modernisation Fund.	Implementation of campaign to target freight operators.				
4. Locate generators of high volumes of freight traffic at sites with good access to the strategic road network and away from residential properties.	The determination of planning applications.	The Omega and Birchwood Park industrial parks provide capacity and excellent transport links, reducing local road movements.	The location of key strategic sites near motorway junctions reduces local road movements but may influence levels with the AQMA.	The siting of key parks near the motorway manages general air quality levels. Local air quality levels need to be addressed through the freight management strategy.	
5. Wherever practical freight development will be encouraged at sites with access to rail/waterways	The determination of planning applications.	Parkside is a current proposed which could deliver increased rail freight but has yet to be taken forward.	Parkside planning application in process	No effect to date	
6. Freight Management Strategy	Strategy Implemented, membership of regional Freight task group.	Draft Freight Strategy included within LTP2. Awaiting confirmation and implementation.			
7. Employ Consultants to develop freight management options.	Implementation of Study				

Objective 5 *To support commuters in reducing the number of car based commuter journeys.*

Action	Performance Indicator	Performance Achieved	Outcome	Effect on Air Quality	Comments
1. Implementation and promotion of Travel plans	Number of plans introduced.	41 school travel plans introduced in last three years making 54 in total. Sustainable School travel strategy introduced in 2006/07. 33,700 company employees in schemes.	PI achieved.	Local improvements due to a reduction in peak hour movements.	
2. Appointment of Travel Plan co-coordinator and Car share officer	Officers in place	Three travel plan co-ordinators now in place; one covering workplaces and the other two covering schools.			
3. Town centre car parking strategy and potential decriminalisation of parking.	Long stay parking in car parks. Feasibility study on the decriminalisation of parking.	Decimalised parking implemented	Measures to discourage long stay parking implemented and on-road regulation strictly enforced.	Reduction in commuter movements will reduce peak hour flows on key routes.	
4. Promote the use of land that is well served by public transport.	Planning Applications and decisions	These are specific policies within the UDP and developing Local Development Framework. The Chapelford Urban Village provides significant housing capacity with employment areas and rail and bus access. There is now significant movement towards residential development within the heart of the town centre, which provides excellent transport links. Accessibility strategy within LTP2 emphasises the importance of land use planning decisions and accessibility considerations, with links made to health, housing and employment sectors.			
5. Ensure that housing land is readily accessible to facilities and areas of employment.	Planning Applications and decisions				

Objective 6 *To assess air quality levels against national objectives and to evaluate the performance of the plan.*

Action	Performance Indicator	Performance Achieved	Outcome	Effect on Air Quality	Comments
1. Continuous real-time monitoring of the Coal-Fired power station	Compliance with the objective. 95% data capture rate.	The data capture rates of 99% for NO_2 and SO_2 were much improved.	Demonstrates that emissions from the station are complying with the objectives.	No exceedances of the objectives have been observed.	Monitoring will continue.
2. Project based real-time monitoring of the motorway.	95 % data capture, review of AQMA in 2004.	Study completed March 2005. 99% data capture.	PI achieved.	Quantified the level of air quality improvement required.	
3. Co-location of indicative air pollution monitors (diffusion tubes and Learian Streetboxes) with the air quality laboratory.	90% data capture.	Triplicate diffusion tubes have been co-located. 90% data capture achieved. The use of the learian streetbox has been discontinued due to cross sensitivity issues.	PI achieved.	Allows diffusion tube network to be bias adjusted.	
4. Maintain the emission inventory for Warrington	Annual maintenance of the inventory	2003 update completed.	PI achieved.	Allows air quality levels to be modelled.	Looking at allowing access to the inventory online.
5. Model impacts of AQ Plan, UDP and LTP	Publication of results, annual review of AQ Plan.	2006 LTP modelled. Figures assumed certain UDP developments to be in place.	PI Achieved.	LTP manages growth but does not significantly reduce air quality levels. Significant changes dependent on modal shift and roll out of specific schemes.	Air quality management issues are being integrated within the development of the 2006-2010 LTP.
6. Review and assess Warrington's air quality in accordance with Government guidance.	Submission of Review and Assessment reports.	Detailed assessment and progress report completed on time.	PI achieved.	Allows air quality to the benchmarked and actions to be developed.	Looking at enhancing site to include "whats in my back yard" in 2005.

Objective 7 *To raise awareness on the environment and to improve access to information.*

Action	Performance Indicator	Performance Achieved	Outcome	Effect on Air Quality	Comments
1. To maintain the "Air About Us" campaign.	The undertaking of annual awareness events	Brand still being used to promote air quality.	Rebranded in 2007, looking to allocate additional resources for role out in 2008, looking at the feasibility of joining Care4Air.	Raises awareness and promotes sustainable transport choice.	
2. To support the National Don't Choke Britain campaign	The undertaking of annual awareness events	No specific events held in 2007.	No outcome.	None.	The focus was on the development of the air about us campaign.
3. To participate in the Healthy Schools initiative and to make air quality information available to schools	Participation in the scheme	Initial contact has been made, school packs are being developed.	No outcome.	None.	
4. To maintain Chartermark status	Maintenance of award	Suspended due to Council reorganisation.	No outcome	Customer focus award- no direct effect.	
5. To introduce an odour management plan	Introduce plan by August 2003 with prescribed targets for reducing the level of odour complaints	The plan is now in place.	Seeking improvements in odour control.	Addresses peoples concerns about the wider air quality issues relating to nuisance.	
6. To set up an air quality website that holds real-time data	Introduction of site by April 2003.	PI achieved.		Makes information on air quality available, promotes sustainable transport options.	Website restructured in 2007.

Objective 8 *To regulate emission sources and to secure reductions where appropriate.*

Action	Performance Indicator	Performance Achieved	Outcome	Effect on Air Quality	Comments
1. To introduce a vehicle emission testing scheme and to issue fixed penalties for non-compliance	Scheme implementation.	Scheme implemented.	7 events in 2007. 324 cars tested.	Likely to see localised improvements but regular events are required to maintain profile.	Monies secured for 2008.
2. To explore the feasibility of enforcing stationary vehicles to switch off their engines	Determine feasibility by December 2003	No significant progress to date.	No outcome to date.	Scheme cannot address queuing traffic, which is a key local issue but local benefits may be possible.	Need to progress.
3. To regulate industrial processes in conjunction with the Environment Agency.	Inspection returns monitored by DEFRA	100% inspection rate achieved.	Service standards raised to include management plan and enforcement plan.	Demonstrable effect in controlling emissions.	To measure performance against the new BVPI.
4. To work with the Police regarding traffic speed enforcement	Number of prosecutions	Community speed watch schemes and regional initiatives.	No measurement data.	Unlikely to have a significant impact by itself.	
5. To enforce nuisance legislation and the Clean Air Act 1993	Number of complaints actioned and notices served.	No pollution abatement notices served, 582 pollution service requests received.	On schedule. Localised emission sources dealt with.	The regulation of emissions can bring about local improvements.	
6. To enforce the Smoke Control Areas	Maintenance and operation of areas and enforcement	98% of Warrington is within an area, compliance is monitored.	On schedule.	Significant effect on local air quality levels.	
7. Reporting of Smokey Vehicles	Number of vehicles reported to Vehicle Inspectorate	2 vehicles reported.	No real progress at a local level.	Can help to reduce local emissions.	Warrington has joined with the Greater Manchester authorities to set up an awareness campaign.

Objective 9 *To aid the development and regeneration of the town through the creation of a sustainable environment.*

Action	Performance Indicator	Performance Achieved	Outcome	Effect on Air Quality	Comments
1. The integration of air quality within the UDP and Regeneration Strategy	Publication of UDP and Regeneration strategy AQ is included within both documents.	Air quality is a specific policy area within the UDP and Regeneration Strategy. Air quality considerations are integrated within development briefs. Supplementary planning guidance developed on travel plans.	Proactive management controls potential exposure and any potential impact from traffic growth.	Effect can be significant, although need to have regard to a potential for a background creep in air quality levels.	Inspector's decision on the UDP received April 2005.
2. The assessment of planning applications for any adverse air quality impact.	Number of AQ conditions imposed	It is not possible to monitor the number of air quality conditions imposed but it is routinely considered as a material planning consideration.	Proactive management controls potential exposure and any potential impact from traffic growth.	Controls potential exposure and manages traffic growth.	
3. The publication of guidance on Air Quality and Development Control	Publication of the guide by December 2003	Planning guide introduced in 2007	Ensures that AQ issues are considered and that the assessments are appropriate.	The planning guide will highlight air quality considerations and result in appropriate assessments by developers.	
4. Use of planning obligations, where appropriate.	Number of obligations imposed relating to AQ	Planning obligations have been used in Latchford to manage the effect of numerous residential applications on congestion and air quality.	Highway scheme is to be implemented as part of a 106 agreement to control traffic growth.	The highway scheme should mitigate against a significant increase in air quality levels.	

Objective 9 *To aid the development and regeneration of the town through the creation of a sustainable environment.*

5. The requirement for Environmental and Health impact studies for larger schemes	Number of conditions imposed	These are routinely undertaken for larger schemes, such as the Omega development. It is not possible to directly monitor the performance indicator.	Ensures that schemes are sustainable.	Prevents a significant increase in air quality levels through scheme design and mitigation.	
6. The maintenance of the AQMA and the assessment of schemes within the area, or impacting on it.	Number of planning applications determined within the AQMA.	There have been no recent planning approvals within the AQMA, although a development has commenced through a previous permission.	Prevents relevant exposure within the AQMA.	No direct effect on air quality but controls relevant exposure and any increase in the contribution of the local road network.	
7. To produce guidance on minimising dust from construction sites.	Demolition notices contain dust conditions. Production of guidance by March 2004	Leaflet produced 06	Promotes good practice on sites	Additional guidance may deliver local improvements.	
8. Ensure that Economic Development Strategy has strong links to UDP, LTP and AQ Plan.	The Council has published its Economic Development and Competitiveness Strategy.	The economic regeneration of the town is being managed at a corporate level allowing all factors to be considered.			

Objective 10 *To reduce emissions associated with Council activities.*

Action	Performance Indicator	Performance Achieved	Outcome	Effect on Air Quality	Comments
1. To implement a staff travel plan and car share scheme	Plan has been Implemented. Car share scheme is in operation.	Scheme in place.	Car share scheme operating.	Dependent on uptake.	
2. To ensure that taxi's licensed by the Council comply with vehicle emission checks	Continuation of requirement for testing under the licensing scheme	Scheme is still operational.	All licenced taxis comply with emission checks.	Helps to reduce emissions.	
3. To introduce e-Government policies, which reduce the need to travel.	% of Council services available by 2005.	Over 90% of services available.	Can assist in the reduction of trips.	Can be effective as part of a wider package of sustainable measures.	
4. Tackle energy conservation in the housing stock through the Energy Conservation Act and Urban Renewal	Energy Conservation Act Targets and number of Urban Renewal Schemes Completed	Eco hut launched in town centre in 2007.	A significant reduction in fuel usage will reduce the emission of pollutants.	Energy conservation can play a part in local air quality but it is key to regional policy and global warming.	Work forms part of the Council's Climate Change Strategy.
5. Reduce Emissions from Council buildings	Energy Conservation Officer Appointed	100% of electricity purchased is 'green' energy.	The Council is seeking to reduce emissions and use sustainable sources.	Will assist in the delivery of a sustainable environment.	Work forms part of the Council's Climate Change Strategy. NI adopted on C02 reductions from LA operations.
6. To maintain and update the Councils Vehicle fleet	% Composition of fleet	Maintenance and fuel monitoring schemes in place.	The maintenance and servicing of vehicles can reduce emissions.	The council is a large vehicle operator but actual air quality effects are likely to be minimal.	Work forms part of the Council's Climate Change Strategy.

Objective 10 *To reduce emissions associated with Council activities.*

7. To undertake a trial using catalyst solutions on vehicle fleet.	Complete evaluation by July 2003.	The evaluation phase has been completed and exhaust systems were fitted to vehicles operated by Warrington Borough Council in an attempt to promote uptake. The units have proved to be unreliable and they have been removed. Two unit still operating on the bus fleet.	Catalytic exhaust systems have been fitted but their operation has been problematic.	Unlikely to have any major impact. The council is unlikely to expand the scheme.	Alternative fuels will be revisited as part of the Climate Change Strategy
8. To ensure where possible that Waste policy helps to reduce HGV movements	Number of movements to Landfill sites	The town has three major landfill operations. Two of the sites are due to close in the short-term to medium term.	Unable to monitor.		

REFERENCES

1. DEFRA-“The Air Quality Strategy for England, Scotland, Wales and Northern Ireland" (2007)

2. A report by the Committee on the Medical Effects of Air Pollution, "Long-term exposure to Air Pollution, Effects on Motality".

3. DEFRA-Website March 2008

4. AEA Technology”ED50232 An Evaluation of the Air Quality Strategy.”

5. DEFRA, Part IV of The Environment Act 1995, Local Air Quality Management, Policy Guidance, LAQM.PG(03).

6. AEA Energy & Environment, "Warrington Detailed Assessment", E Davison and H Peace, (2007)

7. DEFRA-“UK NO2 Diffusion Tube Network Instruction Manual”(2000)

8. AEA Energy & Environment, "Diffusion Tubes for Ambient NO2 Monitoring Practical Guidance for laboratories and users" (2008)

9. Air Quality Consultants-“Analysis of the Relationship Between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites”, Professor Laxen and Dr Marner (2003).

10. Warrington Borough Council, "Updating and Screening Assessment" (2003)

11. Warrington Borough Council, "Detailed Assessment" (2004)

12. DEFRA-“Part IV of the Environment Act 1995, Local Air Quality Management, Technical Guidance LAQM.TG (03)”

13. Department for Transport Website March 2008

14. DEFRA-“The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum (2003)

15. Warrington Borough Council, “Local Transport Plan"

16. Warrington Borough Council, "Development Plan".

17. Warrington Borough Council, "Air Quality Updating and Screening Assessment and Progress Report" (2006).

18. DEFRA, "An Evaluation of the Air Quality Strategy, Additional Analysis: Local Transport Plan Measures" (2004)

19. Warrington Borough Council, " Air Quality and Land Use Planning Guide" (2007)

20. Warrington Borough Council, "Climate Change Strategy" (2007)

21. Warrington Borough Council, "Parker Street Air Quality Management Area Stage 4 report" (2007).

22. DEFRA-“Part IV of the Environment Act 1995, Local Air Quality Management, Policy Guidance LAQM.PGA (05)