



**Chesterfield Borough
Council
Air Quality Progress
Report 2008**

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EXECUTIVE SUMMARY

Local air quality management was introduced in the Environment Act 1995 and subsequent regulations. It places a statutory duty on Local Authorities to review and assess the air quality in their area with respect to health-based Government objectives for seven major air pollutants.

The third phase of this review and assessment was initiated in 2006 with an Update & Screening report. The findings for Chesterfield were that one of the seven air pollutants, namely Nitrogen Dioxide (NO₂) was at risk of exceeding these health-based objectives.

Consequently, there was a need for the Council to undertake a more detailed assessment of these pollutants in 2007. This entailed using advanced dispersion model ADMS Roads to assess the levels of NO₂ along 14km of roads, including Chatsworth/Markham Road (A619), Derby Road (A61) and Chesterfield Road to Staveley (A619). The results of this assessment showed there were persistent exceedences of the NO₂ annual mean air quality objective along these roads in 2005 and 2006. The GIS link in the model was used to produce concentration maps for the grid receptors and annual mean NO₂ contours of 36 ug/3 and 40ug/m³. The contour maps for 2005 show the exceedence of NO₂ annual mean air quality objective along the entire length of the A61 and A619 and extending to some smaller roads emanating from these main roads. The contour maps for 2010 show a few remaining hot spot locations that continue to exceed the NO₂ annual mean air quality objective.

Chesterfield Borough Council should now declare an AQMA under section 83(1) of the Environment Act 1995. During 2008, the AQMA has been plotted and a widespread consultation initiated for eight weeks from 1st September 2008. Formal Declaration is anticipated in winter 2008/2009.

This report constitutes the Air Quality Review and Assessment Progress Report for Chesterfield Borough Council for 2008. It details all new monitoring data across the Borough from both Nitrogen Dioxide diffusion tubes and the air quality automatic monitoring stations and makes predictions for future levels of pollution in the Borough. It also considers any new major developments that may impact on air quality and evaluates the current and longer-term strategies for local air quality management at Chesterfield. It reports on the AQMA consultation work and looks at the achievements in air quality since the last Progress Report was completed in 2005. A number of conclusions have been drawn from this report and recommendations made for the future monitoring and reporting of air quality within the Borough.

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1.0 Introduction

Local air quality management was introduced in the Environment Act 1995 and subsequent regulations. It requires a Local Authority to regularly review and assess the air quality in their area with respect to health-based air quality objectives for seven of the main air pollutants. Should any of these air quality objectives not be met by a required date, the Local Authority must declare an Air Quality Management Area (AQMA) and develop an Air Quality Action Plan (AQAP) to address the air quality issues. The air quality objectives are listed below:

1.1 Air Quality Objectives

Table 1: Summary of objectives in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 applicable to Chesterfield Borough Council.

| Pollutant | Concentration | Measured as | Date to be achieved by |
|--|---|-----------------------------------|------------------------|
| Benzene | 16.25 $\mu\text{g}/\text{m}^3$ (5ppb) | Running annual mean | 31/12/2003 |
| | 5.0 $\mu\text{g}/\text{m}^3$ (1.5ppb) | Annual Mean | 21/12/2010 |
| 1,3-Butadiene | 2.25 $\mu\text{g}/\text{m}^3$ (1ppb) | Running annual mean | 31/12/2003 |
| Carbon Monoxide | 10.0 mg/m^3 (8.6ppm) | Maximum daily running 8-hour mean | 31/12/2003 |
| Lead | 0.5 $\mu\text{g}/\text{m}^3$ | Annual mean | 31/12/2004 |
| | 0.25 $\mu\text{g}/\text{m}^3$ | Annual mean | 31/12/2008 |
| Nitrogen Dioxide* (NO₂) | 200 $\mu\text{g}/\text{m}^3$ (105ppb), not to be exceeded more than 18 times a year | 1 hour mean | 31/12/2005 |
| | 40 $\mu\text{g}/\text{m}^3$ (21ppb) | Annual mean | 31/12/2005 |
| Particles (PM₁₀) | 50 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 35 times a year | 24-hour mean | 31/12/2004 |
| | 40 $\mu\text{g}/\text{m}^3$ | Annual mean | 31/12/2004 |
| Sulphur Dioxide (SO₂) | 266 $\mu\text{g}/\text{m}^3$ (100ppb), not to be exceeded more than 35 times a year | 15 minute mean | 31/12/2005 |
| | 350 $\mu\text{g}/\text{m}^3$ (132ppb), not to be exceeded more than 24 times a year | 1 hour mean | 31/12/2004 |
| | 125 $\mu\text{g}/\text{m}^3$ (47ppb), not to be exceeded more than 3 times a year | 24 hour mean | 31/12/2004 |
| ppm = parts per million; ppb = parts per billion; $\mu\text{g}/\text{m}^3$ = micrograms per cubic metre The objectives for nitrogen dioxide are provisional. Assuming NO _x is taken as NO ₂ | | | |

The review and assessment process requires Local Authorities to report their air quality work to Defra on an annual basis through the production of formal reports. This process works in three yearly cycles and the type of report required for submission is dependent on the year of reporting and the results of air quality monitoring within a Local Authorities area. The list of reports required and their associated submission dates can be found in LAQM.TG(03) available to download from Defra website.

The most recent Air Quality Progress Report for Chesterfield was produced in 2005. Following this, an Update and Screening Assessment (USA) of all the air pollutants identified in the Air Quality Regulations and listed in Table 1, was produced in 2006. This report identified the Nitrogen Dioxide (NO₂) annual mean air quality objective at risk of exceedence along three arterial roads within Chesterfield. These findings necessitated the requirement to proceed to a Detailed Assessment (DA) in 2007 for Derby Road (A61), Chatsworth Road (A619) and Chesterfield Road (A619), Staveley.

In 2008, all Local Authorities must produce a Progress Report (PR). In order to provide a little background to this Progress Report 2008, a summary of the Progress Report 2005, Update & Screening Report 2006 and the conclusions of the Detailed Assessment in 2007 are summarised below:

1.2 Summary of Progress Report 2005

- The NO₂ hourly and annual mean concentrations for 2005 and 2010 for Whittington Moor Roadside air quality station did not show any risk of exceedence of the air quality objectives.
- One diffusion tube location, Derby Road; Lincoln Street, showed a risk of potentially breaching the NO₂ annual mean air quality objective. However since this location did not meet the minimum monitoring period criteria in 2004, this monitoring only provided an indication of a possible hotspot. Monitoring was improved at this location and detailed in subsequent reports.
- The SO₂ 1-hour, 24-hour and 15-minute mean air quality objectives did not show any risk of exceedence.
- The PM₁₀ 24-hour and annual mean air quality objectives for 2004 did not show any risk of exceedence. However the provisional PM₁₀ 2010 annual mean air quality objective showed a potential marginal exceedence.

1.3 Summary of Update and Screening Assessment 2006

- Air quality objectives for Carbon Monoxide, Benzene, 1,3-Butadiene, sulphur Dioxide, Lead and Particulate Matter were not at risk of exceedence and therefore a Detailed Assessment was not required for these pollutants.
- Diffusion tube data showed three locations at risk of exceeding the NO₂ annual mean air quality objective in Chesterfield. Therefore a Detailed Assessment was required to assess the levels of NO₂ along Derby Road (A61), Chatsworth Road (A619) and Chesterfield Road (A619), Staveley.
- The diffusion tube network was reviewed and expanded in 2005/2006 and the results detailed in subsequent reports.

1.4 Summary and conclusions of Detailed Assessment 2007.

- The Detailed Assessment 2007 was completed to include the roads identified in the Update and Screening (USA) 2006 as showing exceedences of the NO₂ annual mean air quality objective. This required a study area of over 14km of roads, including Chatsworth/Markham Road (A619), Derby Road (A61) and Chesterfield Road to Staveley (A619).
- Nitrogen Dioxide monitoring data for 2005 and 2006 was reviewed and suggested persistent exceedence of the NO₂ annual mean air quality objective, particularly at roadside locations, in both years.
- Advanced dispersion model, ADMS-Roads, was used to predict 2005 NO₂ annual mean concentration at specific grid receptors along the roads identified in the USA 2006 causing concern for the compliance of the NO₂ annual mean air quality objective. The model results for 2005 were projected for 2010 using the year correction factors provided by Defra.
- The model was verified by comparing model predictions for 2005 against the 2005 monitored data from roadside diffusion tubes. The two datasets showed good agreement.
- The NO₂ annual mean concentrations were predicted at 151 specific receptors placed at the façade of the buildings close to the modelled roads. The results showed that the NO₂ annual mean air quality objective exceeded at more than 56% receptors in 2005 and almost 10% of receptors in 2010. The NO₂ annual mean concentration for 2005, 54ug/m³ was predicted at the façade of a building located adjacent to the westbound uphill carriageway (Staveley to Chesterfield section) of Chesterfield Road, A619.
- The GIS link in the model was used to produce concentration maps for the grid receptors and annual mean NO₂ contours of 36 ug/m³ and 40ug/m³. The contour maps for 2005 show the exceedence of NO₂ annual mean air quality objective along the entire length of the A61 and A619 and extending to some smaller roads emanating from these main roads. The contour maps for 2010 show a few remaining hot spot locations that continue to exceed the NO₂ annual mean air quality objective.

The recommendations of the Detailed Assessment were as follows:

- To declare an AQMA under section 83(1) of the Environment Act 1995. The locations should be represented by the 40ug/m³ contour as presented in Appendix B. Checks should be made that these areas included within the contour line are representative for the relevant exposure. The Council should also consider some residential areas within 36ug/m³ contour, to take account of the uncertainties associated with modelling and meteorological influences.
- To continue monitoring NO₂ at all current (2006) diffusion tube locations in order to ensure that any future changes in air quality are detected.
- To establish additional monitoring for NO₂ at new locations close to worse case receptors representing the relevant exposure, identified in Appendix A, using the same methodologies as the existing tubes.
- To undertake Further Assessment to confirm the conclusions of this Detailed Assessment and apportion the source contributions and estimate the reductions in emissions required to achieve the objective.

2.0 Air Quality Achievements

This section deals with the air quality achievements since the last Progress Report 2005. It provides annual summaries of actions and achievements in implementing the air quality regime at Chesterfield Borough Council.

2.1 Chesterfield Borough Council air quality achievements in 2006

The majority of the actions of 2006 were based on the recommendations of the Progress Report 2005 and focussed on updating and developing the Local Air Quality Management (LAQM) regime operating at Chesterfield.

Table 2: Chesterfield Borough Council air quality achievements 2006

| Achievement | Details |
|---|---|
| Annual Report for Defra | Completion of Update and Screening Assessment 2006 |
| Review of NO ₂ diffusion Tube Network | Network reviewed and an additional 11 tubes provided to target likely problem areas. Some tubes retained to provide trend data. New secure mounts produced for all diffusion tubes, resulting in improved tube retention. Tube loss rates improved by 15% between 2005 and 2006 |
| Cessation of SO ₂ diffusion tube network | Network closed end of 2005. Funding invested into the NO ₂ diffusion tube monitoring network. |
| Relocation of AQ Station | Investigated a location for the air quality station on Derby Road (A61) however problems encountered obtaining power. Further locations in the Borough researched. |
| Publications | Air Quality Reports made available to view on the internet and published in a Borough wide council publication called 'Our Town'. |
| Review of in house QA/QC procedures. | All procedures reviewed and documented into a user manual, which is available upon request. |
| Review of local Air Quality Strategy | The Local Air Quality Strategy under review. |
| Review of Air Quality WebPages | Air Quality website reviewed and updated with all relevant information, all air quality reports, data and monitoring network details. |
| Major Developments | Close working relationship with Major Development Officer on pre-application discussions. Supplementary Planning Guidance regarding development and air quality being drafted. |

| | |
|------------------------|---|
| Local Transport Plan 2 | Contact made with Derbyshire County Council over course of 2006 and air quality updates included in the LTP2 progress report. |
| Industrial Processes | Two new industrial processes permitted in 2004 and two revoked. |
| Working Relations | Various contacts made over the course of 2006 including Derbyshire County Council Policy, Transport and Accessibility Departments. CHART, Cycle Liaison Groups. Working relationship with Jacobs Engineering in relation to The Avenue site, south of Chesterfield. |

2.2 Chesterfield Borough Council air quality achievements in 2007

The majority of the achievements of 2007 arose as a consequence of funding obtained from Derbyshire County Council Transport Plan 2 and involved improving the monitoring equipment, mapping and reporting of air quality at Chesterfield. Considerable work was conducted in producing the Detailed Assessment 2007 and improving the profile of air quality within other Council Departments, Stakeholders and the public.

Table 3: Chesterfield Borough Council air quality achievements 2007

| Achievement | Details |
|--|--|
| Annual Report for Defra | Completion of Detailed Assessment 2007. |
| Review of NO ₂ diffusion Tube Network | Annual review of network. A selection of tubes relocated to investigate problem areas. |
| Relocation of AQ Station | Air Quality Station relocated to a background site at Bacons Lane. Location chosen to be indicative of the air quality at residential properties distanced from busy roads. |
| Awarded £30,000 funding | Applied and awarded funding in 2007 from Derbyshire County Council LTP2. Funding used to improve the monitoring regime. |
| Reporting Software | Enview 2000 purchased and installed. Allows communication with air quality stations, download of data and early detection of equipment faults. |
| GIS Mapping Layer | Diffusion tube locations plotted onto GIS map layer available to view through the Council WebPages at www.chesterfield.gov.uk |
| National Diffusion Tube base | Diffusion tube network detailed on the national diffusion tube database, available to view at www.airquality.co.uk |
| Review of Air Quality WebPages | Air quality WebPages further improved. Annual review and rating by Air Quality Bulletin 2007, 22 nd in Country, graded 4/5 for quality and 3/5 for 'findability'. |
| Publications | Air Quality Reports made available to view on the internet and published in a Borough wide council publication called 'Our Town'. |

| | |
|--------------------------|--|
| New AQ Station Enclosure | Enclosure at Whittington Moor damaged. New enclosure purchased to relocate the analysers from the bulky Whittington Moor enclosure to a smaller mobile unit. |
|--------------------------|--|

2.3 Chesterfield Borough Council air quality achievements in 2008

The achievements of 2008 to date have been focused on the proposed AQMA. Considerable work has been employed in relocating the air quality stations and the award of AURN status for both stations.

Table 4: Chesterfield Borough Council Air Quality Achievements 2008

| Achievement | Details |
|--|--|
| Progress Report 2008 | Completion of Progress Report 2008 |
| Review of NO ₂ diffusion Tube Network | The Detailed Assessment 2007 and air quality assessments submitted through Major Developments identified further locations for monitoring. Two additional monitoring sites added to the network. |
| Cessation of SO ₂ Monitoring | Savings obtained from cessation of SO ₂ monitoring invested in expanding and improving monitoring network. |
| Relocation of analysers | Analysers relocated to new enclosure located on Chatsworth Road (A619), adjacent to proposed AQMA. |
| Assimilation into AURN Network | Both the roadside and background air quality stations join the national monitoring network and receive AURN status. |
| Increased air quality monitoring network | New benzene monitoring in Chatsworth Road AQ station, equipment provided by NPL. Defra to install FDMS PM ₁₀ monitoring equipment and additional PM _{2.5} monitoring at both stations. |
| Review of in house QA/QC procedures. | All procedures reviewed to reflect minor changes in AURN systems and new benzene monitoring. Manual available upon request. |
| Wind Speed Anemometer | Purchase of wind speed anemometer installed at Chatsworth road air quality station |
| Completion of local Air Quality Strategy | Local Air Quality Strategy revised and presented to Lead members and Cabinet in April 2008. |
| AQMA Boundary | Proposed AQMA boundary plotted on GIS map layer (over 650 properties effected) available to view in association with AQMA address selector on Council WebPages at www.chesterfield.gov.uk |

| | |
|---|--|
| AQMA Consultation | Marketing material designed and written, target audience and time-line determined. Eight week consultation period commenced 1 st September 2008. Further information regarding this can be found in Section 6: Proposed AQMA Section. |
| AQMA Declaration | Consultation responses to be collated, report presented to Cabinet, anticipated AQMA Declaration winter 2008/2009. AQMA Declaration is a Departmental Service Plan Objective for 2008. |
| Air Quality Seminars Arranged | Members, Public and Stakeholders seminars conducted in October 2008 to discuss the AQMA proposals and the draft Air Quality Strategy, answer questions, invite comments and form Air Quality Partnership. |
| Review of Air Quality WebPages | Air Quality website further reviewed to include information on proposed AQMA. |
| LTP2 Funding | Considerable funding allocated to tackle Chesterfield air quality issues. Air Quality Action Plan to be drafted in 2009 in association with Derbyshire County Council and other relevant parties. |
| Creation of travel plan (TP) supplementary guidance | Guidance to be delivered through CHART 2008/2009 and will be provided as guidance for developers across Derbyshire County excluding Derby City. |
| Development of air quality trigger criteria | Air quality trigger criteria drafted and agreed with neighbouring Local Authorities, one set of criteria will be used for the whole of Northeast Derbyshire. |
| Air Quality National Indicator NI194 | Preliminary collation of baseline data for reporting on NI 194. Submission date for baseline data 31 st July 2009. |
| Improved profile of air quality | Media articles, marketing materials, websites and seminars regarding the proposed AQMA have increased the profile of air quality within the Council and across the Borough. |
| ADMS Urban Software | ADMS Urban to be purchased in 2008. Software to be used to complete the all required assessments in 2009 and improve understanding of air quality within Chesterfield. |

3.0 Air Quality Monitoring Sites

Over the course of 2007, Chesterfield Borough Council monitored Nitrogen Dioxide (NO₂), Sulphur Dioxide (SO₂) and Particulate Matter (PM₁₀) within the Borough. These pollutants were measured using automatic analysers housed in air quality monitoring stations and further NO₂ monitoring was achieved using 36 passive diffusion tubes distributed across the Borough.

3.1 Automatic monitoring sites

There are two mobile automatic monitoring stations in Chesterfield, monitoring NO₂, PM₁₀ and SO₂. Nitrogen Dioxide is monitored using a Monitor Labs chemiluminescence analyser, PM₁₀ using a R&P TEOM analyser and SO₂ using a Monitor Labs UV Fluorescence analyser. The analysers are all housed in secure air-conditioned cabins.

Both stations undergo a routine maintenance service every six months by Casella ETi and are also audited on a six monthly basis by AEA Energy and Environment. The stations are visited every two weeks by a Local Site Operator, who performs calibrations and equipment checks in accordance with the Site Operators Manual AEAT/ENV/R1595. The results are submitted to AEA Energy and Environment for verification after each calibration. Both stations were recently affiliated into the national monitoring network, Automatic Urban and Rural Network (AURN) and additional benzene monitoring is being conducted on behalf of the National Physical Laboratory (NPL).

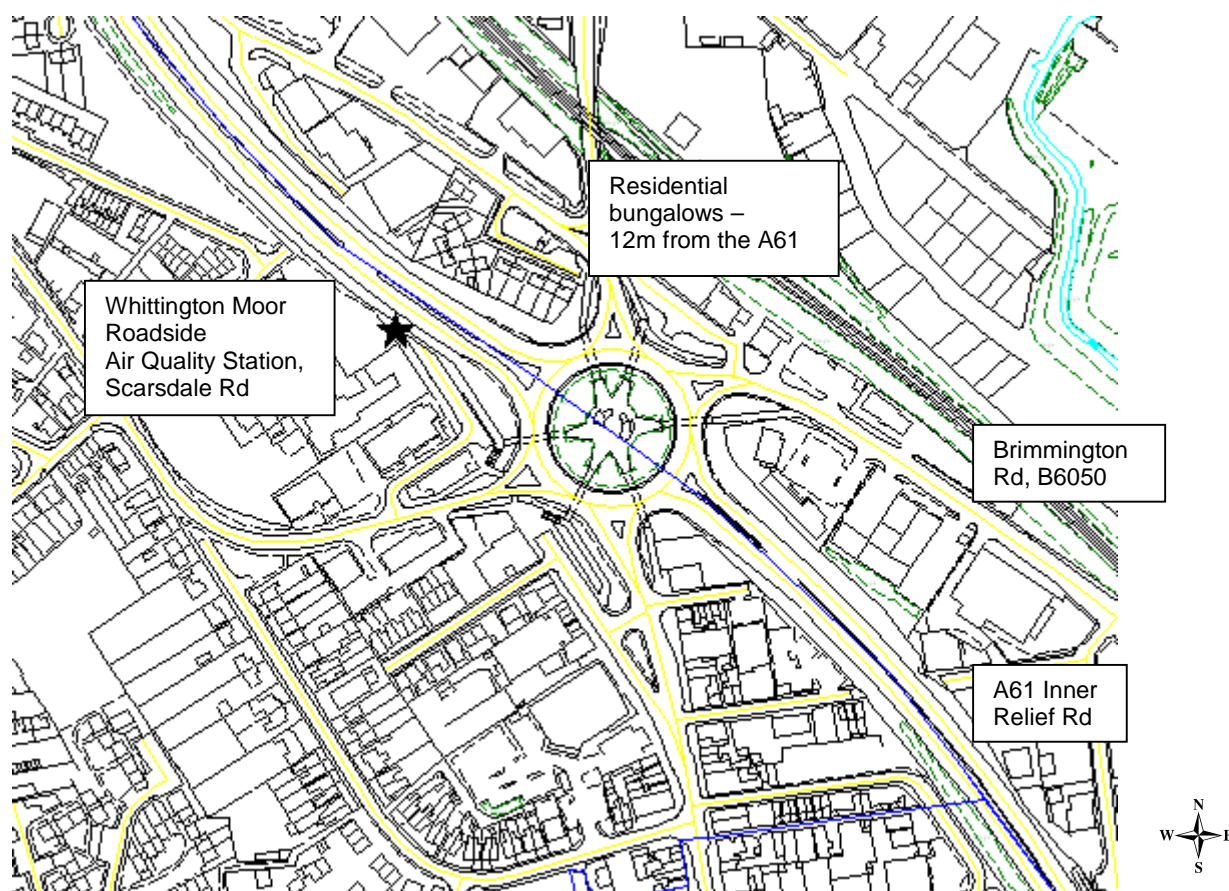
The data is downloaded by GSM modem from both stations every 24 hours directly to a standalone PC in the Environmental Health Department at Chesterfield Borough Council. The data is also downloaded on a daily basis by AEA Energy and Environment, who then validate and ratify the raw data and provide ratified data reports to Chesterfield Borough Council on a monthly basis.

Since both stations received AURN status in 2008, Bureau Veritas also now download the data on a daily basis and check for any faults with the analysers. The data is also available on national websites which greatly improves public access to local air pollution information.

Whittington Moor roadside air Quality station

The air quality station has been located at Whittington Moor since 14th April 2004. This station is a roadside site, located north west of Chesterfield, adjacent to Scarsdale Road and opposite Gilbert Heathcote Primary School. It is also within 50m of the busy roundabout linking the A61, B6050 and the B6057. The location of the Whittington Moor kerbside air quality station and the nearest sensitive receptors to the A61, namely residential bungalows highlighted in the orange box, can be found on Figure 1. The property which is nearest the A61 is approximately 12m from the kerb. Monitoring data obtained at this air quality station is discussed in more detail in proceeding Section Four – New Monitoring Data.

Figure1: Location of Whittington Moor roadside air quality monitoring station (2007).



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Towards the end of 2007, a nearby development meant that the land on which the station was located was no longer tenable and the enclosure itself had rusted and was no longer viable. Therefore a new enclosure was purchased and the equipment that had been housed at Whittington Moor was relocated to a new location on Chatsworth Road, just outside the proposed AQMA. The station was commissioned in March 2008. This air quality station has been affiliated into the national network and so all details and data from this station are now available at www.airquality.co.uk. The new location is equidistant to the road as the residential properties along Chatsworth Road and so should provide invaluable data regarding the levels of pollutants experienced by nearby residents. Further information regarding this new station will be detailed in future reports covering 2008.

Bacons Lane urban background air quality station

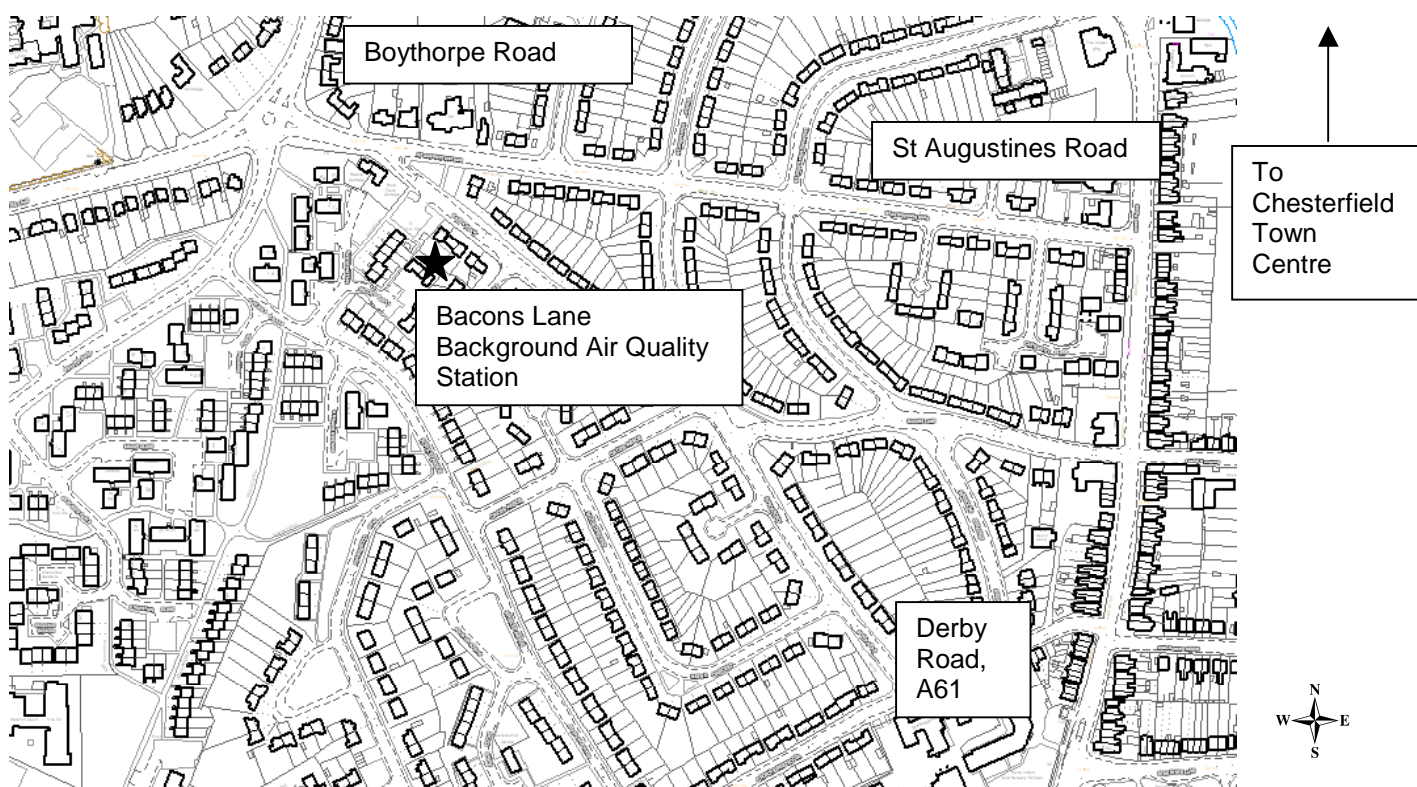
The second mobile air quality station has been relocated to several background locations since 2004. The locations are as follows:

Table 5: Summary of urban background air quality station locations (2004-2007)

| Site Name | Monitoring Start Date | Address | Grid reference |
|--------------------------|-------------------------------|---|--------------------|
| Birdholme Primary School | 30 th October 2004 | Birdholme Infants School, Derby Road, S40 2EU | 438 296 369 383 |
| Bacons Lane | 26 th January 2006 | 55/59 Bacons Lane, St Augustines, S40 2SX | 437 943 369 705 |
| Queens Park Annexe | 13 th March 2008 | Adjacent to Pavilion, Queens Park Annexe | 437 909 370545 |

During 2006, the location at Birdholme Primary School was no longer viable as the school was undergoing redevelopment of the area where the station was located. Therefore the station was moved to an alternative background site at Bacons Lane in 2007. This location was chosen to reflect the air quality at residential locations in Chesterfield, distanced from traffic sources. Figure 2 shows the location of Bacons Lane air quality station in 2007. Monitoring data obtained at this air quality station is discussed in more detail in proceeding Section Four – New Monitoring Data.

Figure 2: Location of Bacons Lane urban background air quality monitoring station.



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In the spring of 2008, the site at Bacons Lane air quality station was no longer tenable as the land was being sold, so the station was moved to an alternative background location at Queens Park Annexe.

3.2 Nitrogen Dioxide diffusion tubes

Over the course of 2007, 36 diffusion tubes were distributed across the Borough, each being exposed for a four-week period. In 2006, new mounts were created for all the diffusion tubes and they were positioned in secure locations on the façade of residential properties. As a consequence the retention rates were improved by 20% between 2004 and 2006, with less than 2% of tubes being lost in 2007. This is a significant improvement in data capture of the diffusion tube network over the past two years.

The diffusion tubes are supplied and analysed by South Yorkshire Laboratories. They purchase the tubes uncoated from Gradko, treat with 50% acetone and 50% triethanolamine, allow to evaporate and then mount into tubes. Analysis of the tubes is by colourimetric determination. South Yorkshire laboratories received UKAS accreditation in 2006 for their in house methods and are members of WASP and the InterLaboratory Field Comparison. They will implement the new harmonised analysis methods from January 1st 2009 as co-ordinated by Netcen.

Travel blanks are not used. South Yorkshire Laboratories retain co-prepared samplers to determine the preparation and storage blank concentrations for each batch prepared and automatically correct results for this blank. This system was adopted due to elevated travel blanks consistently being associated with inappropriate handling of the diffusion tubes and therefore the elevated values were rarely used to correct their associated diffusion tube results. This new system of co-prepared samplers was therefore agreed with all the users of South Yorkshire Laboratories in February 2004.

Diffusion tubes were also collocated in triplicate at both air quality stations so that local background and roadside bias adjustment factors could be calculated. The results of these tube precision and accuracy calculations were submitted to the Air Quality Consultant for inclusion in their national bias adjustment factor database. They have also been included in Appendix One. The results of the diffusion tube precision and accuracy calculations, data capture rates and local bias adjustment factors can be found in proceeding Section Four – New monitoring Data.

The diffusion tube locations and results for 2006 onwards were also inputted onto national diffusion tube database and can be viewed at www.airquality.co.uk. The data is available on national websites greatly improves their accessibility to the public and any other interested parties.

4.0 New Monitoring Data

The following section details the new monitoring data for 2007 from the air quality stations and the diffusion tube network. It also makes projections of future concentrations of PM₁₀ and NO₂ in 2010. Where appropriate, trends in the data are also discussed.

4.1 Nitrogen Dioxide diffusion tubes

According to Local Air Quality Management Technical Guidance (LAQM.TG03) reports revealed that the results from diffusion tube collocation studies varied considerably between the different laboratories responsible for analysing the tubes. It is recommended therefore that this bias should be taken into account when using diffusion tube data.

Ideally each local authority should be able to calculate their own bias correction factor by collocating NO₂ diffusion tubes with a chemiluminescence analyser for a period of at least nine months. However, in the event this not possible, adjustment factors are compiled by the Air Quality Consultants and are available to download on the Air Quality Review & Assessment website at <http://www.uwe.ac.uk/aqm/review>.

Chesterfield Borough Council collocated diffusion tubes in triplicate at both air quality stations over the course of 2007, allowing the precision and accuracy of the tubes to be calculated and a local bias adjustment factor to be produced. This information has been submitted to the Air Quality Consultants and has been included in the national adjustment factors in September 2008. The information has been collated into Table 6.

Table 6: Diffusion tube precision, data capture and bias adjustment factors (2007).

| Data Origin | Tube Precision | Overall Data Capture | Data capture for periods used | Number of months data | Bias Adjustment Factor |
|-----------------------------|---------------------------|----------------------|-------------------------------|-----------------------|------------------------|
| Bacons Lane AQ Station | Good | Good | 94% | 12 | 1.01 |
| Whittington Moor AQ Station | Good | Poor | 92% | 11 | 0.78 |
| AQ Consultants | Collation of nine studies | | | | 0.88 |

Using the collocation data, the local background bias adjustment factor has been used to adjust the background diffusion tube results in Chesterfield. However, due to considerable data loss at Whittington Moor air quality station in October 2007 giving poor data capture, it was thought to be appropriate to use to bias adjustment factor provided by the national database for the roadside locations. This collated bias adjustment factor includes the results from Chesterfield air quality stations.

Table 7 presents the annual mean for each diffusion tube location, the bias adjustment factor used, adjusted annual means and the projected means to 2010. The data capture at each location was excellent over 2007, therefore all tube locations achieved the minimum data capture of three month summer and winter exposure and so require no extrapolation.

Table 7: NO₂ diffusion tube annual mean results for all tube locations in Chesterfield (2007).

| Tube No. | Tube Location | Bias Adj Factor used | NO ₂ Annual Mean (µgm ³) | | |
|----------|--|----------------------|---|---------------------------|----------------------------|
| | | | Raw Annual Mean 2007 | Adjusted Annual Mean 2007 | Projected Annual Mean 2010 |
| 1 | Bradbury Club, 150 Chatsworth Road, (A619) | 0.88 | 38.4 | 33.8 | 30.2 |
| 2 | Markham Road, (A619) | 0.88 | 54.6 | 48.0 | 43.0 |
| 3 | 3, St Augustines Road | 0.88 | 29.1 | 25.6 | 23.0 |
| 4 | Derby Road Development (A61) | 0.88 | 31.0 | 27.3 | 24.4 |
| 5 | 17 South Place | 0.88 | 38.8 | 34.2 | 30.6 |
| 6 | Chest Rd Rndbt | 0.88 | 61.5 | 54.1 | 48.4 |
| 7 | Dukes Street, Staveley | 0.88 | 48.5 | 42.7 | 38.2 |
| 8 | St Augustines Church, 212 Derby Road | 0.88 | 39.8 | 35.0 | 31.3 |
| 9 | Lincoln Street, 287 Derby Road, | 0.88 | 40.6 | 35.7 | 31.9 |
| 10 | 18, Chesterfield Road, Brimington | 0.88 | 36.2 | 31.8 | 28.5 |
| 11 | 42, Whittington Hill (B6052) | 0.88 | 46.8 | 41.1 | 36.8 |
| 12 | 7, Brimington Road | 0.88 | 30.2 | 26.5 | 23.7 |
| 13 | 99, Chesterfield Road, Staveley | 0.88 | 37.9 | 33.4 | 29.9 |
| 14 | 348 Derby Road, Storforth Lane | 0.88 | 44.9 | 39.5 | 35.3 |
| 15 | Whittington Moor | 0.88 | 36.1 | 31.8 | 28.5 |
| | Whittington Moor | 0.88 | 34.5 | 30.4 | 27.2 |
| 17 | Whittington Moor | 0.88 | 35.8 | 31.5 | 28.2 |
| 18 | Bacons Lane | 1.01 | 21.2 | 21.4 | 19.7 |
| 19 | Bacons Lane | 1.01 | 22.2 | 22.4 | 20.6 |
| 20 | Bacons Lane | 1.01 | 21.5 | 25.6 | 20.0 |
| 21 | Staveley Stables | 1.01 | 25.3 | 22.3 | 23.5 |
| 22 | 35, Ringwood Road, Brimington | 0.88 | 40.8 | 35.9 | 32.1 |
| 23 | 1 Beetwell Street | 0.88 | 28.3 | 24.9 | 22.3 |
| 24 | 10, Compton Street, near Saltergate | 0.88 | 44.7 | 39.3 | 35.2 |
| 25 | 501, Chatsworth Road, nr Vincent Crescent | 0.88 | 26.4 | 23.2 | 20.8 |
| 26 | 71, Rutland Road | 0.88 | 27.9 | 24.6 | 22.0 |
| 27 | Old Hall Road | 0.88 | 28.3 | 24.9 | 22.3 |
| 28 | Foljambe Road | 0.88 | 32.0 | 28.2 | 25.2 |
| 29 | Hollywell Cross Rnbt, Old Post Restaurant | 0.88 | 43.3 | 38.1 | 34.1 |
| 30 | 348, Chatsworth Road, Brampton Mile | 0.88 | 38.3 | 33.7 | 30.2 |
| 31 | 24, Derby Road, Jawbones Hill | 0.88 | 32.7 | 28.7 | 25.7 |
| 32 | Hasland By-Pass (A617) | 0.88 | 30.5 | 26.9 | 24.1 |
| 33 | Oak Farm | 0.88 | 33.3 | 29.3 | 26.2 |
| 34 | 451, Chatsworth Rd, opp Chapel Lane West | 0.88 | 33.6 | 29.6 | 26.6 |
| 35 | 632, Chatsworth Road, near Storrs Road | 0.88 | 40.7 | 35.8 | 32.0 |
| 36 | Queens Park | 1.01 | 21.3 | 21.5 | 19.8 |

Table 7 shows that of the 36 diffusion tubes, 4 locations continue to show exceedence of the NO₂ annual mean air quality objective in 2007. These locations are Markham Road, Chesterfield Road Roundabout, Dukes Street Staveley and Whittington Hill (tube numbers 2,6,7 and 11 respectively). The first three locations are within the proposed AQMA however the fourth location, tube 11, is a new diffusion tube location at Whittington Hill and as such is a newly identified area of exceedence. This will therefore require a Detailed Assessment to be completed in 2009 to investigate the air quality at this location further.

There are three locations that monitored NO₂ levels within 10% of the NO₂ annual mean air quality objective in 2007, which although are not currently exceeding the objective, they should be closely monitored over the coming year. These locations are Derby Road near Storforth lane, Compton Street and Holywell Cross roundabout (tube numbers 14, 25 and 29). Derby Road near Storforth Lane lies within the proposed AQMA as this road has been previously identified as a potential area of exceedence However Compton Street and Holywell Cross Roundabout are new diffusion tube locations and as such have not previously been identified as possible exceedence areas. Since the objective was not exceeded at these locations, it will not require a Detailed Assessment at this stage, however they will be monitored carefully and a Detailed Assessment be produced should the levels deteriorate further.

Table 7 also shows the diffusion tube annual means projected to 2010. The concentrations of NO₂ are predicted to reduce further so that only two locations continue to show exceedence of the NO₂ annual mean air quality Objective in 2010. These locations are Markham Road and Chesterfield Road Roundabout, the same locations showing exceedence in 2007 (tube numbers 2 and 6). Both of these locations are within the proposed AQMA and as such indicate that the AQMA may continue at least at these locations in 2010. There are also two locations predicted to be within 10% of the NO₂ annual mean air quality objective, namely Dukes Street, Staveley and Whittington Hill. The former lies within the proposed AQMA and the latter is the location that will require progression to Detailed Assessment in 2009 as outlined above.

Overall, however the predicted widespread reduction in NO₂ in 2010 is encouraging and reflects the national trend for a reduction in NO₂ levels possibly due to improved technologies and fuels. The trends in measured concentrations of NO₂ in Chesterfield will be discussed in more detail in Section Five – Trends in Air Pollution Data. There may be an evidence base forming which may support the reduction in the size of the AQMA at some locations in future years and will be investigated as part of future reporting.

4.2 Automatic Analyser Data: Nitrogen Dioxide

The Nitrogen Dioxide (NO₂) data provided by the Whittington Moor Roadside and Bacons Lane Background air quality stations are both for a full calendar year and can be seen in Table 8.

Table 8: Hourly and annual mean NO₂ concentrations for Chesterfield Borough Council air quality stations (2007).

| Air Quality Station Name | Site Type | Annual Data Capture (%) | Maximum Hourly Mean 2007 (µgm ³) | Annual Mean 2007 (µgm ³) | Projected Annual Mean 2010 (µgm ³) |
|--------------------------|------------|-------------------------|--|--------------------------------------|--|
| Whittington Moor | Roadside | 90 | 178 | 29 | 26.7 |
| Bacons Lane | Background | 94 | 118 | 22 | 20.2 |

- The NO₂ annual mean air quality objective is 40µgm³. The 2007 annual mean for Whittington Moor and Bacons Lane is 29µgm³ and 22µgm³ respectively. Therefore the NO₂ annual mean air quality objective has been met at both locations.
- The NO₂ hourly mean air quality objective is 200µgm³ with 18 exceedences. The maximum hourly mean is 178µgm³ monitored at Whittington Moor air quality station. This is well below the objective and therefore the NO₂ hourly air quality objective has been met at both locations.

4.3 Automatic analyser data: Sulphur Dioxide

The Sulphur Dioxide (SO₂) data provided by the Whittington Moor Roadside and Bacons Lane Background air quality stations are both for a full calendar year and can be seen in Table 9.

Table 9: SO₂ 15-minute, 1-hour and 24-hour mean concentrations for Chesterfield Borough Council air quality stations (2007).

| Air Quality Station Name | Site Type | Annual Data Capture (%) | Maximum 15-min mean (µgm ³) | Maximum 1-hr mean (µgm ³) | Maximum 24-hr mean (µgm ³) |
|--------------------------|------------|-------------------------|---|---------------------------------------|--|
| Whittington Moor | Roadside | 94 | 67 | 43 | 16 |
| Bacons Lane | Background | 95 | 96 | 69 | 37 |

- The SO₂ 15-minute mean air quality objective is 266µgm³ with 35 exceedences. The maximum 15-minute result is 96µgm³ monitored at Bacons Lane which is well below the objective therefore the 15-minute mean air quality objective for SO₂ has been met at both locations.
- The SO₂ 1-hour mean air quality objective is 350µgm³ with 24 exceedences. The maximum recorded 1-hour mean is 69µgm³ monitored at Bacons Lane which is well below the SO₂ objective therefore the SO₂ 1-hour mean air quality objective has been met at both locations.
- The SO₂ 24-hour mean air quality objective is 125µgm³ with 3 exceedences. The maximum 24-hour mean is 37µgm³ monitored at Bacons Lane, which again is well below the objective. Therefore the 24-hour mean air quality objective for SO₂ has been met at both locations.

4.4 Automatic analyser data: Particulate Matter (PM₁₀)

The current EU Limits and UK objectives are based upon measurements carried out using the European Transfer Reference Sampler or equivalent and therefore the results from the Teom need to be adjusted so they can be compared with the UK objectives.

The reason for this is because the Teom instrument houses the filter at a temperature of 50°C in order to minimise errors associated with the evaporation and condensation of water vapour. This can lead to a loss of the more volatile particles (such as ammonium nitrate etc). Whilst there will also be some losses of volatile species from the filter of the Transfer Reference Sampler, it will be less than that from the Teom.

To compensate for this difference there is a default adjustment factor of 1.3 to estimate the gravimetric equivalent concentrations. This adjustment is discussed in more detail in LAQM.TG(03) Box 8.2. The data provided by the Whittington Moor Roadside and Bacons Lane Background air quality stations are both for a full calendar year and can be seen in Table 10.

Table 10: PM₁₀ 24-hour and annual mean concentrations at Whittington Moor Roadside air quality monitoring station (2007).

| Air Quality Station Name | Site Type | Annual Data Capture (%) | Maximum 24-Hr Mean 2007 (µgm ³) | Annual Mean 2007 (µgm ³) | Projected Annual Mean 2010 (µgm ³) |
|--------------------------|------------|-------------------------|---|--------------------------------------|--|
| Whittington Moor | Roadside | 92 | 113 | 33.8 | 32.3 |
| Bacons Lane | Background | 97 | 122 | 21.9 | 21.7 |

- The PM₁₀ 24-hour mean air quality objective is 50µgm³ with 35 exceedences. The maximum 24-hour mean for Bacons Lane is 122µgm³ and over the course of 2007 there were 7 exceedences of the objective recorded. However this remains compliant with the objective as it allows 35 exceedences in one year. Therefore the PM₁₀ 24-hour mean air quality objective has been met at Bacons Lane.
- The maximum 24-hour mean for Whittington Moor is 122µgm³ and over the course of 2007, 44 exceedences of the objective were recorded. Therefore the 24-hour mean air quality objective was exceeded at Whittington Moor requiring progression to a Detailed Assessment 2009 for PM₁₀ at this location.
 - Elevated levels of daily PM₁₀ were observed at this air quality station over the course of 2007. However although a breach of the air quality objective occurred there may be mitigating circumstances. At the end of July 2007, demolition work was conducted within 90m of the air quality station. These works continued for a 6-week period over the summer and ended in September 2007. Following this, construction of an 18-apartment block building commenced and lasted for a period of eight months, with the development being completed at Easter 2008. The close proximity to this construction site may well have led to breaches in the 24-hour mean and this will be investigated more thoroughly as part of the Detailed Assessment 2009.
- The PM₁₀ annual mean air quality objective is 40µgm³. Therefore the PM₁₀ annual mean air quality objective has been met at both locations.
- The projected annual mean for 2010 has been predicted to be below the annual air quality objective for both locations.

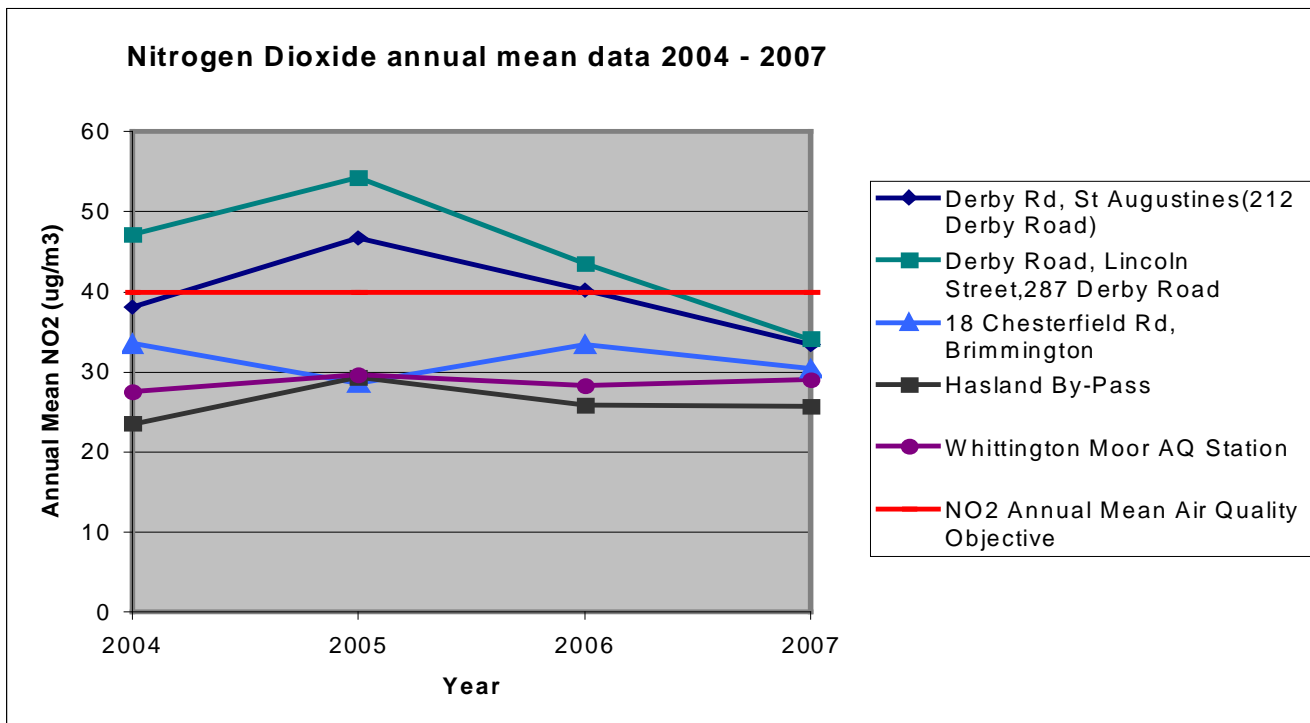
5.0 Trends in Air Pollution Data

5.1 Nitrogen Dioxide data

Air quality data has been collated for those locations where data is available from 2004 to 2007 and are shown in Figure Three. According to LAQM.PRG(03), trends should only be considered when there is five years of data is available. Unfortunately, only four years of data is available, however it remains a useful exercise in looking at the data as it can provide indications of the changing air quality in the area.

Two locations appear to have a downward trend from 2005 to 2007; these are locations on Derby Road and the Hasland By-pass. Chesterfield Road, Brimington appears to have no clear trend and the levels of NO₂ at the Whittington Moor air quality station seem to be fairly level over the past four years.

Figure 3: Trends in NO₂ annual mean monitored data (2004–2007)



Unfortunately no further data is available to assess trends and four years of data is insufficient to say with certainty whether the data is indeed showing a downward trend or whether 2006/2007 experienced lower than average levels of NO₂ in Chesterfield. The monitoring at these locations will continue over the coming years and trends will be investigated further in future reports.

The remaining monitoring locations within Chesterfield have three years or less of annual mean data and so cannot be used for trends. However of the 32 tubes that have two years of data, 94% show a decrease in NO₂ between 2006 and 2007. This decrease could be due to improved vehicle technologies and changes in the flow of traffic along these roads in Chesterfield although further data would be required to establish trends. However, over the past two years, Derbyshire County Council have completed considerable work on road layouts, junctions and roundabouts in Chesterfield delivered through the Local Transport Plan 2, which may have influenced the air quality along the main arterial routes in Chesterfield. This downward trend in levels of NO₂ is also being mirrored at neighbouring Local Authorities and reflects the predictions of national air quality strategy produced in 2006. Further information regarding the traffic measures completed by Derbyshire

County Council as part of the Local Transport Plan 2 can be found in proceeding Section Nine: Local Transport Plan 2 Policy and Measures.

5.2 PM₁₀ monitoring at Whittington Moor air quality station

Real-time monitoring of PM₁₀ at Whittington Moor has been conducted from 2004 to 2007. The results of this monitoring is shown in Figure 4.

Figure 4: Trends in PM10 annual mean monitored data at Whittington Moor roadside air quality monitoring station (2004-2007)

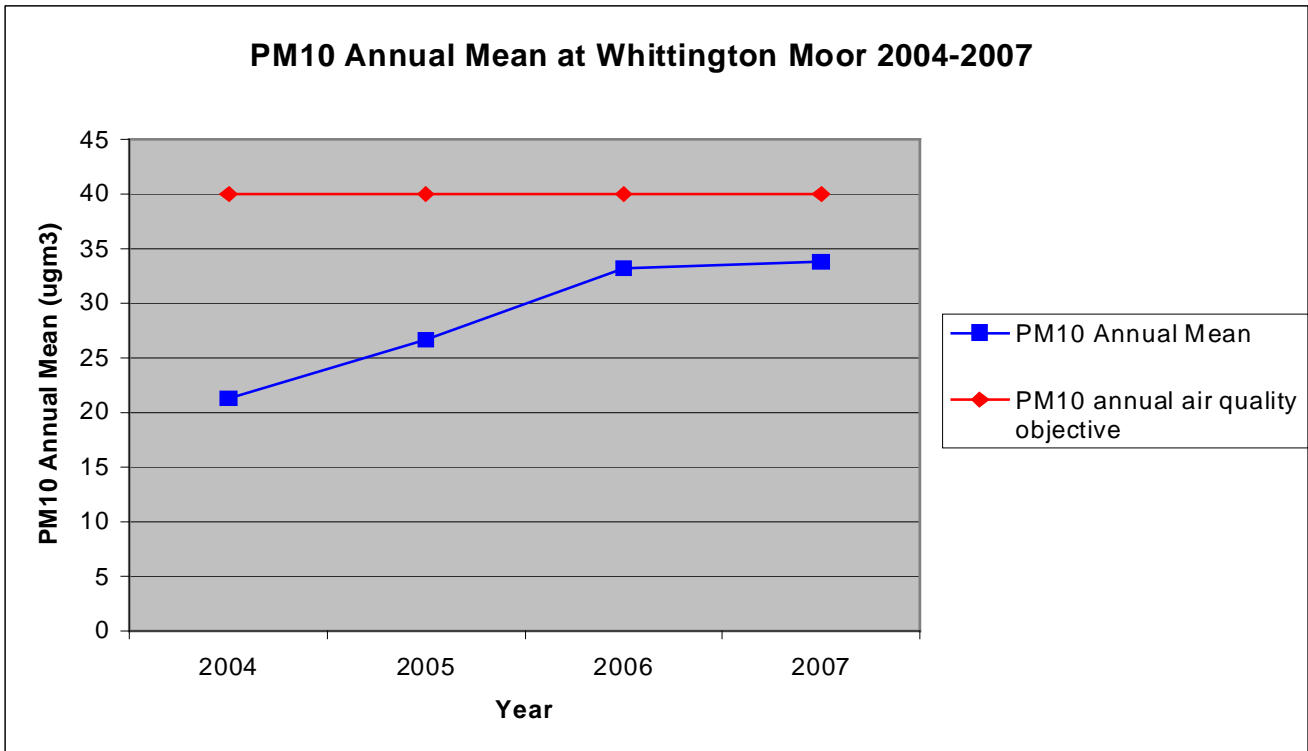


Figure 4 shows the results for the annual mean at that location since 2004. As can be seen on the graph, 2004 to 2006 showed a steady increase in PM₁₀ that appears to have levelled out in 2007. Although the PM₁₀ annual mean air quality objective has not been breached at this location, the levels should be checked to ensure they do not deteriorate further. A Detailed Assessment for the PM₁₀ 24 hour annual mean will be conducted in 2009 at this location, which could also be a useful opportunity to report on the annual mean and any deterioration in reported levels. There is no further PM₁₀ monitoring data of more than one year available within Chesterfield.

The urban background air quality station only provides a single year annual mean at each location and so there is insufficient data to assess trends in the background data.

5.3 SO₂ monitoring

Real-time monitoring of SO₂ has been conducted within the Borough since the first round of Review and Assessment completed in 2000. Table 11 lists the SO₂ monitoring results for 2004 to 2007 and also depicts the percentage of the air quality objective that was monitored.

The results in Table 11 show that all the air quality objectives for SO₂ have been met consistently every year. In addition, the results show that the maximum reported value was only 56% of the air quality objective and so clearly these objectives are not at risk of exceedence within Chesterfield. These findings are also corroborated by the Update & Screening Assessment conducted in 2006, which assessed all the sources of SO₂ in Chesterfield. This report considered industrial sources, neighbouring authorities, areas of domestic coal burning, boilers, shipping and railway locomotives

and concluded that none of these possible sources were likely to cause an exceedence within the Chesterfield area. In addition, the whole of Chesterfield Borough Councils administrative area has been covered by a number of Smoke Control Areas, which are monitored and regulated effectively and consistently.

Table 11: SO₂ annual mean monitoring results at Chesterfield Borough Councils air quality stations (2004–2007).

| Air Quality Station Name | Year | Max 15-min mean (μgm^3) | % of AQO (266 μgm^3 with 35 exc) | Max 1-hr mean (μgm^3) | % of AQO (350 μgm^3 with 35 exc) | Max 24-hr mean (μgm^3) | % of AQO (125 μgm^3 with 35 exc) |
|--------------------------|------|--|---|------------------------------------|---|-------------------------------------|---|
| Roadside AQ Station | 2004 | 56 | 21% | 32 | 9% | 15 | 12% |
| | 2005 | 61 | 30% | 53 | 15% | 19 | 15% |
| | 2006 | 109 | 41% | 101 | 29% | 57 | 46% |
| | 2007 | 67 | 25% | 43 | 12% | 16 | 13% |
| Background AQ Station | 2004 | Background AQ Station not in operation in 2004 | | | | | |
| | 2005 | 146 | 55% | 120 | 34% | 30 | 24% |
| | 2006 | 136 | 51% | 136 | 39% | 70 | 56% |
| | 2007 | 96 | 36% | 69 | 20% | 37 | 30% |

The consistent compliance with the SO₂ air quality objectives in association with the lack of contributing sources were considered and it was concluded that the real-time monitoring of SO₂ was no longer necessary. It was felt that the cost of maintaining the analysers and conducting routine calibration and data collection could be used more constructively assessing the pollutants causing greater concern within the Borough, namely NO₂ and PM₁₀. Therefore, coinciding with the relocation of the air quality stations within Chesterfield, monitoring of SO₂ was discontinued in March 2008.

5.4 Dispersion modelling

In order to complete the Further Assessment and Detailed Assessment 2009 and to gain a better understanding of the air quality within Chesterfield, dispersion modelling software ADMS Urban will be purchased from CERC. This software will be used to confirm the conclusions of the Detailed Assessment 2007, apportion the source contributions and estimate the reductions in emissions required to achieve the objective. It will also be used to model the locations identified for the Detailed Assessment 2009, namely Whittington Moor and Whittington Hill. The software can be used to model other locations within the Borough, such as those areas showing NO₂ concentrations within 10% of the annual air quality objective. The software could also be used to model various traffic impacts/scenarios across the Borough to assess their impact on air quality, which could further inform the action planning process. Discussions have already taken place with DCC transport department to obtain improved traffic flow data along some roads and diffusion tubes have been placed in locations which have been chosen to be able to verify the model outputs.

6.0 Proposed AQMA

6.1 Introduction

The dispersion modelling completed in the Detailed Assessment 2007 identified three roads in Chesterfield at risk of exceeding the NO₂ annual mean air quality objective. In these circumstances, Government Guidance requires Chesterfield Borough Council to declare an Air Quality Management Area (AQMA) under section 83(1) of the Environment Act 1995.

The AQMA must include sensitive receptors located in areas predicted to be exceeding the NO₂ annual air quality objective. This is the minimum criteria after which there are no hard or fast rules on where the AQMA boundary should be plotted. There are currently 225 Local Authorities in the UK that have declared AQMA's. The sizes and shapes vary widely between different Local Authorities, some Authorities have declared several small AQMA's, others one large AQMA and some have declared their entire areas as AQMA's. Therefore when deciding the boundary of the AQMA, it is important to ensure the following:

- All available information is used in the decision making process
- A logical and consistent approach is adopted
- All data and model outputs are utilised and properly understood
- All comments and responses from consultees are fully considered
- The purpose of AQMA declaration is clearly understood

There are various sources of guidance available which should be referenced in coming to a decision and the following sources were also used when depicting the boundary of the AQMA within Chesterfield:

- Part IV of the Environment Act 1995, Local Air Quality Management, Technical Guidance LAQM.TG(03)
- Guidance on Local Authority Air Quality Management Section 9 – Defining an Air Quality Management Area, Volume 2, January 2000, EMAQ
- Review and Assessment Helpdesk - FAQ's; <http://www.uwe.ac.uk/aqm/review>
- Air Quality Management Areas: A Review of Procedures and Practice for Local Authorities, NSCA (Environmental Protection UK)

An AQMA boundary has now been drafted and is described in more detail in section 6.2 below. A consultation program regarding the Detailed Assessment 2007, the draft AQMA boundary and the draft Air Quality Strategy 2008 started on 1st September 2008 and will continue until the 31st October 2008. Further information regarding the consultation strategy can be found in section 6.

6.2 Chesterfield Borough Council AQMA boundary

In summary, the recommendation for the AQMA boundary is as follows:

The AQMA should be a ribbon AQMA adopting the exceedence area approach as described by EMAQ in that it should include areas where there are no sensitive receptors. Where practical and appropriate, the boundary should closely follow the model contour depicting NO₂ levels of 40ug/m³. This recommendation is based on the following reasoning:

- The properties along the road are at varying distances from the carriageway and do not extend along the full length of the road, therefore a receptor only approach would create a series of small, unconnected AQMA's of varying sizes and there may be objections to singling out individual residences.
- A ribbon AQMA considers the road as a whole and since preliminary investigations imply that road traffic is the source of the elevated NO₂ levels, the traffic along the length of these roads needs to be considered. Declaring a ribbon AQMA will encourage actions along its entire

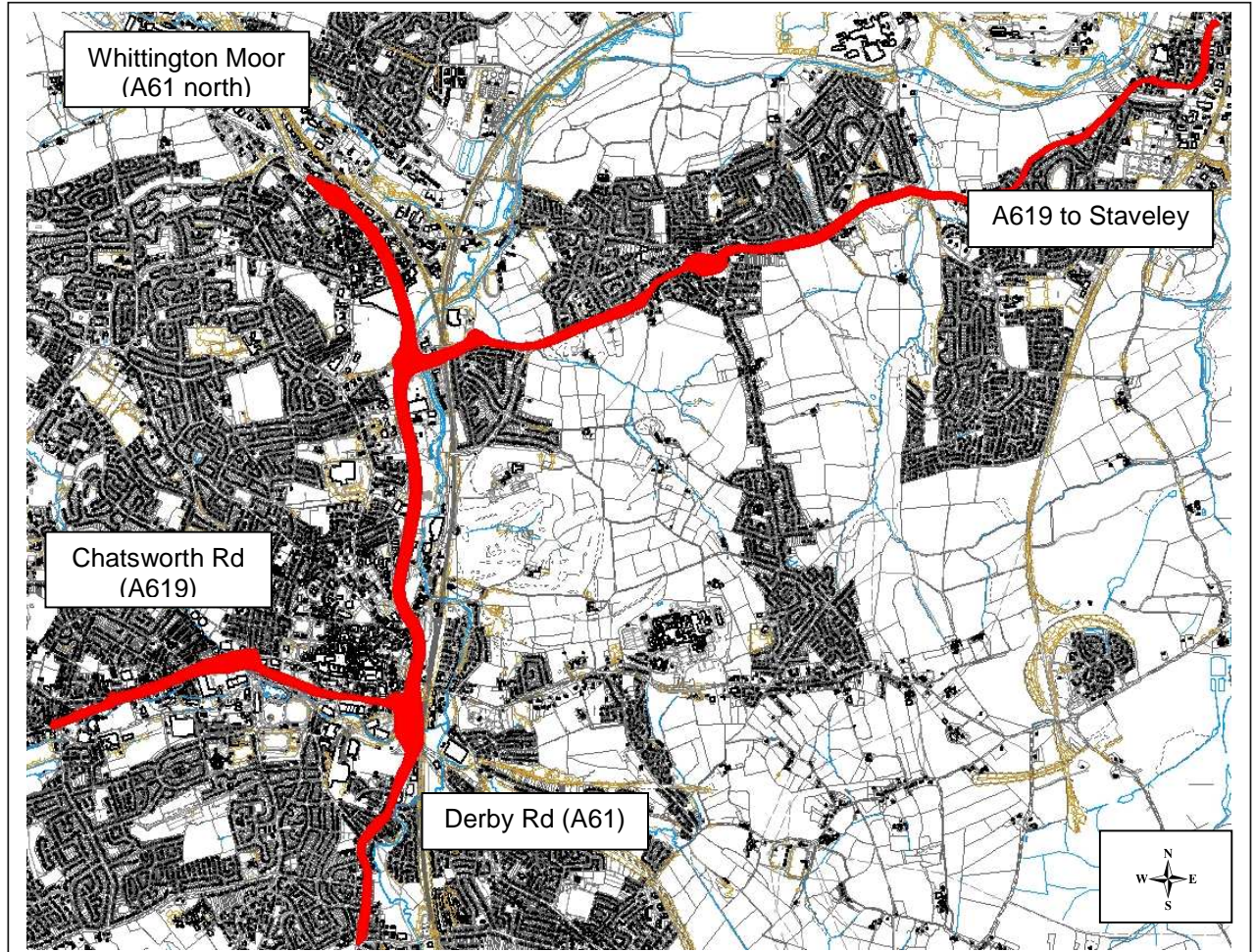
length and encourages Chesterfield Borough Council and Derbyshire County Council to work together which will result in a more cost-effective solution.

- This approach also considers future development in Chesterfield. Highlighting the areas of predicted exceedence will be a useful tool in advising Development Control of the areas of Chesterfield currently experiencing issues with elevated levels of NO₂ and may assist in the design and allocation of future development in Chesterfield. This is particularly pertinent for Chesterfield since such large areas of the town are undergoing redevelopment.
- Air pollution by its very nature is not static and can be affected by annual and meteorological variations, changes in traffic flows and composition, congestion through road works etc. Therefore declaring a ribbon AQMA takes into consideration the possibility of air pollution moving along the length of the road dependent on the conditions experienced in any one year.
- The ribbon AQMA also considers the practicality of boundary designation, consideration of diffusion tube and model error and the inherent uncertainty associated with model contours.
- Declaration of those areas predicted to be exceeding 40ug/m³ is in line with guidance provided by LAQM.PG(03) Section 2.02. It adopts a slightly precautionary approach as the boundary has been depicted -1SDM according to the NSCA guidance outlined above.
- Data that is being collated for more recent years, 2006, 2007 and to date in 2008 seem to show a downward trend in levels of NO₂, although further data and modelling is required to confirm this. However, this data should be considered when determining the AQMA boundary. It is advisable therefore when determining the boundary to ensure that a precautionary approach at the same time is not overly onerous. Therefore it was felt that depicting the boundary at 40ug/m³ fulfilled both these ideals.

A map of Chesterfield Borough Councils proposed AQMA can be found in Figure 5 overleaf.

Figure 5 is a map of Chesterfield Borough Councils proposed AQMA. It follows the main arterial routes in the town; the A61, Derby Road north to Whittington Moor and the A619 West from Chatsworth Road eastwards to Staveley.

Figure 5: Map showing Chesterfield Borough Councils proposed AQMA



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6.3 Consultation Strategy

A comprehensive consultation strategy started on 1st September 2008 lasting for eight weeks. Consultation included the Detailed Assessment 2007, the AQMA proposals and the draft Air Quality Strategy. The list of actions below details all the initiatives that were implemented as part of the Consultation process. Appendix two includes a copy of the leaflet, questionnaires and posters which were distributed as part of the consultation strategy. Information is also available on Chesterfield Borough Council WebPages.

September 2008

1. Consultation leaflet and questionnaire delivered to every property falling within proposed AQMA and to all members of the Citizens Panel. Over 1500 households contacted.
2. Leaflets and posters provided to all schools and libraries in Chesterfield area.
3. Consultation information sent to all community forums regarding proposed AQMA, including invitation to attend public meeting.
4. Air quality article published in 'Our Town', a Council publication distributed to every house in the Borough and available at all libraries and Council buildings
5. Air quality article published in Borough Bulletin, which is a council newsletter sent to all Council employees
6. Article in Staveley Neighbourhood Management – Buzz newsletter, a publication sent out to all residents in the Staveley area.
7. Air Quality WebPages expanded to include all information on air quality, proposed AQMA, Detailed Assessment 2007 and draft Air Quality Strategy 2008. WebPages provides all access to AQMA maps, reports, publicity material, questionnaires.
8. Exhibition on proposed AQMA held at Town Hall providing hard copies of all the information available on the website. All air quality reports provided in all libraries within the Borough.

October 2008

1. Consultation emails sent to all Councils Members, Heads of Service and Service Managers, Parish and Town Councils. Email included invitation to consultation seminars.
2. Consultation emails and letters sent to all stakeholders including Derbyshire County Council, Boroughs Own Passenger Transport Consultative Committee, Cycle Liaison Group and Chesterfield Cycle Campaign, Disability Advisory Groups, Primary Care Trust and Environment Agency. Email included invitation to consultation seminars.
3. Lunchtime seminar arranged for all Council Members, conducted on 3rd October 2008.
4. Public meeting held on 7th October from 17:30-19:00. Public meeting involved presentations on proposals, questions and answer sessions, workshop and invitation to join air quality partnership.
5. Air Quality Seminar arranged for all interested parties and stakeholders conducted on 9th October 2008 from 14:00-16:00. Seminar included presentation, questions and answer session and invitation to join air quality partnership to develop air quality action plan over the next 12 months.

6.4 Declaration Timeline

The Consultation period is due to close 31st October 2008. All responses from the questionnaires will be collated. All consultation questions shall be answered and any comments collated into a final report.

A final version of the AQMA shall be drafted taking into account any comments received during the consultation period. A Declaration Order shall also be drafted and both will be presented to Lead Members and full cabinet in winter 2008/2009. Immediately following this, formal Declaration is anticipated in winter 2008.

7.0 Land Use Planning Policies

Air quality should be integrated into land-use planning decisions at the earliest opportunity in the planning process in order for potential air quality impacts of a development to be identified and the appropriate reduction or mitigation measures be agreed and implemented. This addresses the potential of a development to affect local air quality in the future and should form a key role in the long-term development strategy of an area. This requires Land-Use Planning Department to liaise closely with Environmental Health in the consideration of relevant planning applications and to also work together to develop the appropriate policies and strategies to address air quality issues within the Local Development Plan.

7.1 Chesterfield Borough Local Plan

Chesterfield Borough Council has incorporated air quality issues within the Replacement Chesterfield Borough Local Plan adopted in June 2006. The policy which has been agreed with Environmental Health and which relates specifically to local air quality is as follows:

EVR 23 Pollution and other adverse environmental impacts

- 1) Planning permission will not be granted for developments which would materially increase existing levels of air, noise, water or light pollution or result in significant adverse environmental impacts unless these are outweighed by the social or economic benefits to the wider community or the wider environmental benefits. In such circumstances planning permission will only be granted provided a) no practicable alternative and better site readily available OR b) all reasonable mitigation measures are implemented

- 2) Planning permission will not be granted for development which would be adversely affected by existing sources of air, noise, water, light pollution or result in significant adverse environmental impacts unless it can be demonstrated that the adverse impacts can be reduced to an acceptable level by mitigation measures at the sources, or within the development site.

In addition to this specific air quality policy, the Borough Local Plan also details policies aimed at tackling the impact of traffic generated by a development which will influence transport generated air pollution in the area. These policies require developers to carry out traffic impact assessments when submitting their application and increasing emphasis is now being given to requiring the overall transportation impact of major new developments to be assessed. There are policies aimed at mitigating the effects of development proposals on highway safety and congestion and the revised plan also includes policies to increase sustainable transport choices by negotiating with developers to include in planning agreements:

- Development and monitoring of travel plans for the company's workforce
- Making of financial contributions to improve transport facilities generally
- Funding any improvements to the highways network which are required as a result of their proposal

Within the Transport Section of the replacement Borough Local Plan, policies TRS1 and TRS 7 – 13 all relate to sustainable transport choices and encouraging initiatives such as park & ride, provision for buses, improving access to the railway station and provision for pedestrians and cyclists. A copy of the replacement Chesterfield Borough Local Plan can be downloaded from the Planning Department's WebPages on Chesterfield Borough Council's website. These policies should all provide mechanisms with which Chesterfield Borough Council can ensure air quality is a material consideration in the land-use planning process.

7.2 Major Development Sites Group

Since the closure of the coal pits and the demise of the associated heavy industry there has been a legacy of large areas of derelict land within Chesterfield. However over recent years there has been considerable re-development of this land which obviously has air quality implications with regards both the end-use of these developments and new transport movements in the area.

As a consequence, in 2005, a Major Sites Officer was appointed by Chesterfield Borough Council to be responsible for all the major developments within Chesterfield. Regular liaison between the Air Quality Officer and the Major Sites Officer allows air quality implications of a development to be discussed at pre-application stage. This has resulted in all applications for major developments to include an air quality assessment, the format of which is agreed with the applicant prior to conducting the assessment. A complete list of major development within Chesterfield is listed in Section 8; New Local Developments. It has also been agreed that a guidance document should be produced for applicants regarding air quality assessments and implications of development in order to provide clear advice and a consistent approach when dealing with air quality.

In addition, a formal arrangement has been developed between Environmental Health and the Land-use Planning Department in that a list of planning applications is circulated on a weekly basis. This allows developments with potential air quality impacts to be highlighted at an early stage and appropriate comments made.

8.0 New Local Developments

This section details all the developments within Chesterfield Borough Council that may have an impact on local air quality in the Borough in 2005. These developments are divided into new major developments being processed within the Planning Department at Chesterfield Borough Council and any new or revoked industrial processes located within the Borough.

8.1 Planning and Development Control

Table 12 lists all the Major Developments within Chesterfield, which are all required to submit an air quality assessment as part of their application. It also details their planning status, the results of their assessment and any mitigation methods that form a condition of their planning consent.

Table 12: Chesterfield Borough Council Major Developments

| Development Name | Development Type | AQ Assessment Results | Mitigation Methods | Planning Status |
|-----------------------------|---|--|--|---|
| A61 Waterside | Mixed Use 16.24 Ha. Use classes A1, A3, A4, B1, B2, B8, C3, D1, D2 | Pending | TBC | Pre-application |
| Wheatbridge Medical Centre | Medical Centre: 8000 patients, 400 vehicle movements per day | Submitted | Submission of a Travel Plan | Planning permission granted Spring 2007 |
| Chatsworth Road Development | Mixed Use 2.5Ha, wider regeneration area ~10Ha | Pending | TBC | Pre-application. Application on hold |
| Chesterfield College | Re-development of existing college, including a CHP unit | Pending | TBC | Pre-application. Application on hold |
| Dema Glass | Mixed Use 11.9Ha including new football stadium. A1, A3, B1, C1, D2 | Report submitted and accepted | Traffic management measures, improvements to pedestrian & cycle ways, travel plans, provision of public transport, park & ride | Planning Permission granted Summer 2008 |
| Dunston Rugby Club | New sports ground and car parking | Pending | TBC | Pre-application |
| Ecodome | Leisure complex including mixed use development 114Ha | Report submitted. Questions submitted to applicant | Transport issues, green travel plan, cycle routes and public transport links all agreed under previous application in 2005 | Reserved Matters Planning Consent Granted Summer 2008 |
| EFW Sheepbridge | Gasification scheme with associated recycling plant | Report submitted. Questions submitted to applicant | TBC | Application |
| Football Club on Saltergate | Redevelopment to residential developments | Pending | TBC | Pre-application |

8.2 Industrial Processes

The following section details industrial processes that have been newly permitted or revoked in 2007 by Chesterfield Borough Council or the Environment Agency. It also considers industrial processes in neighbouring authorities that may influence the air quality within Chesterfield.

Chesterfield Borough Council Permitted Installations

The changes to Chesterfield Borough Councils permitted installations in 2007 are listed in Table 13 below. The processes will be considered in the next round of Update and Screening scheduled for 2009. There have been no new petrol stations authorised in 2007.

Table 12: Changes in Chesterfield Borough Council Permitted Installations (2007)

| Installation Details | Type of Installation | Process Type | Date Permitted | Date Revoked |
|--------------------------------|-----------------------|--------------|----------------|--------------|
| Chesterfield Valet Services | Dry Cleaners | Part B | 29/10/06 | |
| Frontlines | Waste Oil Burner | Part B | 23/08/07 | |
| Thorworld Industries Limited | Metal Coating Process | Part B | 10/12/07 | |
| Castle Container Services Ltd. | Metal Coating Process | Part B | 10/12/07 | |
| Flogas UK Limited | Zinc Blasting | Part B | 04/10/07 | |
| Sainsbury's Dry Cleaners | Dry Cleaners | Part B | 03/04/07 | |
| Morrison's Dry Cleaning | Dry Cleaning | Part B | 04/01/07 | |
| HEM Dry cleaners | Dry Cleaning | Part B | 04/01/07 | |
| Vesuvius KSR Ltd | Bitumen/Tar | Part B | | 01/08/08 |

Environment Agency Permitted Installations

There are no new processes regulated by the Environment Agency within Chesterfield that could have an adverse impact on air quality within the Chesterfield Borough Council Area.

Neighbouring Authorities Permitted Installations

There are no industrial processes regulated by neighbouring authorities that could have an adverse impact on air quality within Chesterfield Borough Council.

9.0 Local Transport Plan Policy and Measures

9.1 Local Transport Plan 2001-2006

Chesterfield Borough Council has continued to work with Derbyshire County Council and neighbouring Local Authorities on local transport issues including the implementation of the Local Transport Plan (LTP) 2001 – 2006. The Delivery report is now available to download from the Derbyshire County Councils WebPages at: http://www.derbyshire.gov.uk/transport_roads/transport_planning

The LTP identified six broad objectives for 2001 – 2006. These included:

- Better Travel Choices
- Safer, healthier communities
- Successful local communities
- A better managed road network
- Low impact leisure
- Protected rural areas

The key achievements for each of these objectives are listed in the Delivery Report and apply to achievements across the whole of Derbyshire. Those actions implemented which would have influenced local air quality within the Chesterfield area are listed below:

Road Infrastructure

- Road widening and improvements to cut congestion on dual carriageway between Hornsbridge roundabout and Lordsmill Street, Chesterfield
- Measures to cut congestion on the A619/A61

Public Transport

- Provision of new bus services, the orbital 33 lining Chesterfield with local hospitals
- £2 million redevelopment of Chesterfield railway station
- Five bus quality corridors
- Increased bus patronage on routes 51 and 54 in Chesterfield
- A package of improvements at Chesterfield Bus station Increase in 2.7% in passenger numbers since improved facilities at Chesterfield station was opened in 2005.
- Chesterfield Christmas Service – operates on Saturdays in November and December and carries an estimated 2750 passengers
- Train station has been rebuilt, including an integral bus interchange, with regular buses linking the station to the town centre, together with expanded taxi ranks, new cycle storage, a link and cycle route and better footway links into the town. Passenger numbers have increased by over 100000 since the new facilities were opened in 2005.
- Bus gates in Brimington, instituted a policy of removing bus lay-bys in order to allow buses to regain the traffic flow more easily. Church Way in Chesterfield is bus/pedestrian only street
- Provision of an 'add on' day rover ticket that allows London rail passengers arriving at Derby, Chesterfield or Sheffield the freedom of the Derbyshire bus and train network for a day E.g. a day trip from London to Chatsworth House (the most popular tourist destination in the Peak District is now possible by public transport).
- Improvements for disabled people at train stations
- Investments in improving passenger facilities such as new shelters, customer information, screen/notice boards, signing, footways, car parking and cycle storage.

Walking and Cycling

- Chesterfield spur of Trans Pennine trail in Chesterfield improved. Used by 60,000 pedestrians and 30,000 cyclists of which 10% of the journeys are for commuting or shopping
- Cycle training programmes in Chesterfield for children
- Travel Fest 2003 – a travel awareness campaign
- A range of actions to increase cycling and walking across the whole of Derbyshire including improvements to the cycle and greenways network

Travel Planning

- Business travel plans targeted at major employers or trip generators including Sheepbridge industrial estate, Chesterfield Royal Hospital and Royal Mail Chesterfield

9.2 Local Transport Plan 2 2006-2011

The Local Transport Plan 2, 2006-2011 has now been published and is available to view at http://www.derbyshire.gov.uk/transport_roads/transport_planning

Section 7 of the LTP2 deals with air quality and the Environment and makes specific reference to the emerging air quality issues in Chesterfield. Within this section, there are four main objectives:

- 1) Pursue initiatives identified in the Air Quality Action Plans
- 2) Take full account of air quality issues in decision-making on transport interventions
- 3) Reduce the adverse impacts of road freight
- 4) Address transport issues relating to the natural and built environment

The capital spend which has been allocated to air quality and environment over the coming years is in the region of £400,000 per year. This money will be targeted as follows:

- on introducing air quality improvement measures particularly in Chesterfield
- Addressing identified Strategic Environmental Assessment mitigation measures
- Investigating the procurement of 'greener' fuelled vehicles for County Council use and for contract services
- Investing in the environmental improvement measures outlined in Derby/Derbyshire Freight Strategy
- Improving methods of 'environmental maintenance' especially targets aimed at enhancing the biodiversity of roadside verges.

The programmed spend, together with elements of other Strategy areas (e.g. Travel Planning) should lead to improved air quality amongst other improvements. Indeed air quality is a key outcome indicator with LTP8 specifically referring to air quality (local transport issues relating to AQMA's).

Chesterfield Borough Council will work closely with Derbyshire County Council in developing an Air Quality Action Plan, which will then be incorporated into the LTP2 Annual Progress Reports.

10.0 Local Air Quality Strategy

The air quality strategy has now been reviewed and updated since the previous one was completed in 2003. This was presented to members in April 2008 and forms part of the public consultation being held regarding the proposed AQMA. Once the consultation is complete, all responses will be collated and a final report will be taken to full council during the winter of 2008/2009. It is envisaged that the AQMA Declaration will coincide with the formal adoption of the Local Air Quality Strategy. The complete Strategy can be found in Appendix Three. The draft Strategy is available to download from Chesterfield Borough Council WebPages, all local libraries and copies are available at the Town Hall.

The Strategy follows the format recommended by the Local Air Quality Management Policy Guidance LAQM.PG(03) produced by DEFRA. The Strategy comprises eleven aims: these endeavour to involve and co-ordinate various Council Departments within Chesterfield Borough Council and Derbyshire County Council, local businesses and industries, public transport, freight, fleet and taxi operatives as well as the local community who all have an important role to play in reducing levels and exposure to local air pollution.

Within each Strategy Aim, various projects are listed which provide potential practical means of implementing these Aims. The approximate timescales for the implementation of each of project is also listed. For ease these have been depicted as short-term (within 12 months), medium-term (within 5 years), long-term (more than 5 years) and ongoing.

The Strategy does not indicate which projects have priority nor the department responsible for each project. This information will be developed in producing the Air Quality Action Plan (AQAP) over 2009/2010 and is not a requirement of an Air Quality Strategy. It is envisaged the Strategy will form the basis from which the Action Plan will be developed.

Since Nitrogen Dioxide is currently the pollutant of concern in the Chesterfield Borough Council's area, the Strategy focuses on means of reducing/mitigating the sources of NO₂ across the Borough, focusing on road transport and power generation. It must be noted however that any reduction in road transport and power generation achieved will also attain a reduction in the other air pollutants listed in Table 1 since, for the majority, they all share similar sources. This is especially significant when it is considered that Chesterfield Borough Council have signed the Nottingham Declaration showing a commitment to tackling Climate Change. Since many of the sources that produce NO₂ are the same as those that produce CO₂, the air quality strategy could be pivotal in reducing various sources of CO₂ across the Borough.

It proposed that the Air Quality Officer and the Officers responsible for developing the Climate Change Strategy for Chesterfield Borough Council work together in producing a joint Strategy for tackling both forms of air pollution. Therefore this Strategy may be revised within 12 months to incorporate initiatives to reduce sources of both NO₂ and CO₂.

The Air Quality Strategy Aims and associated actions can be found in Appendix Three. A summary of the Aims are listed below:

Local Air Quality Management

AQ1: Chesterfield Borough Council will continue to implement the Local Air Quality Management Process and complete all appropriate assessments by the relevant deadlines.

Local Air Quality Monitoring

AQ2: Chesterfield Borough Council will continue to improve and expand the current ambient air quality monitoring network. All available opportunities to obtain funding to replace older equipment and invest in new software and technologies will be explored. The Council will also continue to evolve the current monitoring network to maximise efficiency of the monitoring programme and associated expenditure.

Partnership Working

AQ3: Chesterfield Borough Council will aim to secure partnerships with other Departments, neighbouring Authorities and organisations which have an interest and contribution to the local air quality in Chesterfield.

Land Use and Transport Planning

AQ4: Chesterfield Borough Council will continue to use the local Planning Process, The Local Plan, Local Transport Plan and Development Control as a means to ensure that local developments and transport measures consider and where possible aim to mitigate their impact on local air quality in Chesterfield.

Transport Initiatives

AQ5. Chesterfield Borough Council will work with Derbyshire County Council Transport Department to investigate various transport initiatives that aim to understand and mitigate the impact of road traffic on local air quality in Chesterfield.

Commercial Transport Emissions

AQ6: Chesterfield Borough Council will work with Derbyshire County Council, local freight and fleet operators and taxi firms to encourage the use of methods and technologies which will mitigate their impact on local air quality in Chesterfield.

Public Transport

AQ7. Chesterfield Borough Council will work with Derbyshire County Council and local bus operators to encourage increased uptake of public transport in Chesterfield.

Sustainable Transport

AQ8. Chesterfield Borough Council will work with Derbyshire County Council to encourage the use of sustainable transport options in order to reduce car usage across the Borough.

Awareness Raising

AQ9. Chesterfield Borough Council will continue to raise awareness of local air quality issues in Chesterfield by utilising all available opportunities to raise the profile of air quality amongst the residents and businesses of Chesterfield.

Local Business Emissions

AQ10. Chesterfield Borough Council will work with Derbyshire County Council, the Environment Agency, local industries and businesses to encourage the use of methods and technologies that aim to improve local air quality.

Local Domestic Emissions

AQ11. Chesterfield Borough Council will work with Derbyshire County Council and the local community to encourage and aim to reduce emissions from domestic properties across the Borough.

11.0 Conclusions and Recommendations

The conclusions drawn from this report and the recommended actions over the coming year are detailed as follows:

11.1 Conclusions

- Four diffusion tubes showed exceedence of the NO₂ annual mean air quality objective for 2007. Three of these are located within the proposed AQMA, however the fourth diffusion tube is a newly identified area of exceedence at Whittington Hill. A Detailed Assessment of the NO₂ annual mean air quality objective shall be progressed for Whittington Hill, Chesterfield.
- Two new locations, Compton Street and Holywell Cross Roundabout are within 10% of the NO₂ annual mean air quality objective. Results from these diffusion tubes shall be closely monitored over 2008.
- The NO₂ hourly and annual mean concentrations for 2007 and 2010 for Whittington Moor and Bacons Lane air quality stations did not show any risk of exceedence of the air quality objectives.
- The PM₁₀ 24-hour mean air quality objective was exceeded at Whittington Moor air quality station in 2007. A Detailed Assessment of the PM₁₀ 24-hour mean air quality objective shall be progressed for Whittington Moor.
- The 1-hour, 24-hour and 15-minute mean air quality objectives for SO₂ do not show any risk of exceedence. Consistent compliance with all the SO₂ air quality objectives has been shown at both air quality stations since 2000. SO₂ monitoring in Chesterfield discontinued in March 2008 due to consistent compliance with objectives and lack of sources in Chesterfield that could lead to exceedences in the future.
- Monitoring at current diffusion tube locations to continue in order to provide trend data. Monitoring at the air quality stations at Chatsworth Road and Queens Park Annexe will continue for the foreseeable future.
- In order to complete two Detailed Assessments 2009 and a Further Assessment in 2009, dispersion modelling software ADMS Urban as provided by CERC shall be purchased. This will be used to confirm the conclusions of the Detailed Assessment 2007, apportion the source contributions and estimate the reductions in emissions required to achieve the objective. It will also be used to model all the roads within the study area of the Detailed Assessments 2009 and to gain an improved understanding of the air quality within Chesterfield.
- Proposed AQMA and draft Air Quality Strategy consultation will close 31st October 2008. All consultation responses will be collated with formal Declaration anticipated winter 2008/2009.
- Consultation responses regarding the draft Air Quality Strategy shall be reviewed, any amendments made. Formal adoption of the Strategy is anticipated for winter 2008/2009.
- Environmental Services to continue working with Planning and Development Control regarding air quality impacts of development within Chesterfield, emphasis on liaison at the pre-application stage of any planning application.

- Industrial processes within Chesterfield to be screened as part of the Update and Screening assessment 2009.
- Chesterfield Borough Council to continue to contribute to the Derbyshire County Council Local Transport Plan 2.

11.2 Recommendations

- Cessation of the SO₂ monitoring network
- A Detailed Assessment of NO₂ annual mean air quality objective to be produced for Whittington Hill, Chesterfield.
- A Detailed Assessment of PM₁₀ 24-hour mean air quality objective shall be progressed for Whittington Moor.
- Further Assessment 2009 required to confirm the conclusions of the Detailed Assessment 2007, apportion the source contributions and estimate the reductions in emissions required to achieve the objective.
- Maintain monitoring at all current locations, expanding the network where necessary to identify new hotspot locations within Chesterfield and to provide further data for future model verification work.
- Purchase dispersion modelling ADMS Urban software and complete training in house in order to complete Detailed Assessments and Further Assessment 2009.
- Investigate the possibility of obtaining a further roadside monitoring, to be sited in areas currently showing elevated levels of NO₂.
- Formal Declaration of Air Quality Management Area and adoption of Air Quality Strategy in winter 2008/2009.
- Formation of an Air Quality Partnership with relevant parties and commence work on the Air Quality Action Plan.

12.0 References

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