



2010 Air Quality Progress Report

Chesterfield Borough Council

In fulfillment of Part IV of the Environment Act 1995
Local Air Quality Management

Date April 2010 (revised October 2010)

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Executive Summary

In accordance with the requirements of the Environment Act 1995, local authorities are required to conduct periodic reviews and Assessments of air quality within the Borough on a regular basis. These reviews and assessments involve an examination of the levels of those pollutants for which air quality objectives have been set. In conducting such local air quality reviews and assessments the current levels of these pollutants as well as their expected future levels has to be estimated to ensure that the objectives are not being exceeded at present and that they are unlikely to be exceeded in future.

The review and assessment process has been undertaken for several years, the first of which was in 2003. That first round was a screening assessment and indicated that two of the seven air pollutants, namely Nitrogen Dioxide and PM₁₀, were at risk of exceeding the objectives. Several rounds of reviews and assessments have since been undertaken, some of which were detailed assessments and some were screening and updating assessments. The last few assessments have pointed to the possible exceedance of the air quality objectives for NO₂ in a number of areas within the Borough; initially, along the most trafficked routes of the A61 and A619, but in 2008, the possibility of an additional area exceeding the NO₂ objectives also came to light. None of the other pollutants were exceeded, though historically, a close watch has been kept on PM₁₀.

Based on these findings it was proposed to declare a ribbon Air Quality Management Area (AQMA) covering Derby Road (A61), Chatsworth Road (A619) and Chesterfield Road, Staveley (A619), but consideration was also being given to the additional areas as reported in the 2009 Updating and Screening assessment. A further detailed assessment was therefore commissioned with the aim of assessing all of the hot spots within the Borough. This was done by conducting detailed modelling of all of the principal routes within the Borough together with a detailed examination of the monitoring data up to and including 2009.

This report is Chesterfield Borough Council's 2010 Progress report and summarises the findings of the most recent review and assessment of air quality within the Borough. It includes the most recent monitoring data (up to the end of 2009). It also draws on some of the findings of the detailed assessment commissioned in April 2010, and subsequently completed in August, shortly after receiving comments from DEFRA on this report. This report is, therefore, a revised and updated version of the one drafted in April 2010.

In summary, the main finding is that having reviewed the 2009 data it is clear that none of the air quality objectives are currently being exceeded. This is confirmed by the detailed dispersion modelling study that was undertaken during the detailed assessment. Based on these findings, the Council cannot now justify the declaration of an AQMA, but efforts will continue to monitor air quality at all of the hot spots previously identified. In addition, the Council is reviewing the monitoring locations to ensure that a comprehensive monitoring data set is obtained and can be used to assess air quality within the Borough with confidence.

Chesterfield Borough Council will therefore not be declaring an AQMA but will continue to monitor air quality within the Borough. A further Progress Report will be prepared in 2011.

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1 Introduction

1.1 Description of Local Authority Area

Chesterfield is a small market town situated in North Derbyshire. It is a compact, urban authority with a population of approximately 90,000 inhabitants. The borough of Chesterfield is surrounded by the semi-rural boroughs of North East Derbyshire to the north, south and west, and Bolsover District to the east. The borough of Chesterfield consists of a semi-pedestrianised town centre which lies in the south-west of the borough. The town centre is bypassed by the A61 ring road which diverts traffic to the south and away from the town. The immediate suburbs of this compact market town house much of the town's population, and many people still reside in the town centre itself. The borough has few rural or semi-rural areas, but is surrounded with open countryside to the north and west. The M1 Motorway skirts the eastern fringes of the borough, and busy motorway junctions (including junctions 30, 29 and 29a) lie immediately to the east of the densely populated areas of Staveley, Duckmanton and Poolsbrook. The main source of pollution in the borough comes from road transport, but some traditional heavy industry still remain including brick manufacturers, steel works and open cast sites.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to Local Air Quality Management (LAQM) in **England** are set out in the Air Quality (England) Regulations 2000 (SI 928), and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (for carbon monoxide the units used are milligrammes per cubic metre, mg/m^3). Table 1.1. includes the number of permitted exceedences in any given year (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	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	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM₁₀) (gravimetric)	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	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

The second phase of review & assessment was initiated in 2003 with an Update & Screening report. The findings for Chesterfield were that two of the seven air pollutants, namely Nitrogen Dioxide and PM₁₀, were at risk of exceeding the health-based objectives. This led to a Detailed Assessment of these pollutants being conducted in 2004. The results of this assessment revealed that although these pollutants should remain under close review, due to the marginality of the results and the large confidence error associated with the data, it was recommended that no immediate action be taken. Instead it was advised that improvements in air quality monitoring across the Borough should be implemented and to then review these pollutants in subsequent reports.

A Progress Report was submitted in 2005 detailing all new monitoring data. The results showed that there was little risk of exceedance of the Air Quality Objectives at Whittington Moor as had been previously predicted and that there was only a predicted marginal exceedance of the provisional 2010 PM₁₀ objective. However, diffusion tube monitoring over the course of 2004 highlighted a new potential hotspot area, Derby Road, which was showing elevated levels of NO₂. Unfortunately over the course of 2005 the data capture was not of sufficient accuracy for immediate action to be taken. As a consequence the Progress Report highlighted recommendations to improve the air quality monitoring strategy in Chesterfield which were actioned over the course of 2005.

The third phase of review and assessment began in 2006 with the completion of the Update & Screening report which reviewed all the air pollutants listed in the Air Quality Regulations 2000. It was found that the majority of the pollutants were not at risk of exceedance of the Air Quality Objectives. It also confirmed that the prediction of Whittington Moor exceeding the 2010 PM₁₀ Air Quality Objective remained valid, but since this is only a Provisional Objective, a Detailed Assessment was not required. However three of the locations monitored showed exceedance of the annual Nitrogen Dioxide Air Quality Objective, namely Chatsworth Road (A619) and Derby Road (A61 South) and Chesterfield Road, Staveley (A619).

Both the A619 and A61 are major arterial routes into Chesterfield. They experience high levels of traffic and frequently experience congestion and standing traffic especially at rush hour. Residential properties are positioned within 5-10m of the kerb at numerous points along the length of both roads. In addition there are major developments occurring adjacent to both the A61 and A619, which may increase the traffic flows on these roads and introduce new sensitive receptors to an area of elevated Nitrogen Dioxide.

It was therefore decided to proceed to a Detailed Assessment for Nitrogen Dioxide on Derby Road (A61), Chatsworth Road (A619) and Chesterfield Road, Staveley (A619). The report was completed in May 2007, and the modelled data confirmed that these areas of the town showed exceedances of the annual Nitrogen Dioxide Air Quality Objective.

Based on the findings of the report, a proposal was made to declare a ribbon AQMA covering Derby Road (A61), Chatsworth Road (A619) and Chesterfield Road, Staveley (A619). The proposed boundary was based on a contour produced by the ADMS model, and incorporated areas of the borough predicted as having average annual NO₂ levels in excess of 36 µg/m³. (see figure 1.1)

The proposals were taken to public consultation in October 2008, but due to a significant change in the staffing and managing of the Environmental Health department in the months which followed the consultation, the proposals were never finalised. In August 2009 a nominated member of staff was given responsibility for the air quality review and assessment work, and subsequently the declaration report was finalised with the intention to present the report to Cabinet for approval in April 2010. The advantage of delaying the report submission until April 2010 was that the most up-to-date monitoring data from the 2009 diffusion tubes could be presented to support the report submission.

The proposal for the ribbon AQMA was presented to Lead Member on 23rd March with a view to it going to Cabinet on the 6th April. However, since the proposals for the AQMA were taken to public consultation in October 2008, the Update and Screening assessment 2009 was completed on the basis of new monitoring data from 2008. The report highlighted two further areas within the borough (both lying outside of the current boundary for the proposed AQMA) which showed elevated levels of Nitrogen Dioxide and possible exceedance of the annual Nitrogen Dioxide Air Quality Objective. These areas were Whittington Hill and Compton Street. (See figures 1.2 and 1.3 for maps of Whittington Hill and Compton Street diffusion tubes)

Compton Street is very close to the town centre, lying only about half a mile north of the main pedestrianised areas of the town. It carries commuter traffic from the suburbs into the town centre and is a known 'dodge' route for vehicles heading out of town on Chatsworth Road, Derby Road and Sheffield Road.

Whittington Hill lies approximately four miles from the town centre and carries considerable commuter traffic to and from the suburbs and townships to the east and north of the town. The road is on a hill (as the name suggests) and has terraced houses close to the kerb side. Whittington Hill is a bus route and also carries heavy distribution vehicles serving the various industrial estates in that region.

In December 2009, Chesterfield Borough Council commissioned a consultant to complete a Detailed Assessment for both areas. Given that we had a complete set of ratified monitoring data for 2009, it made sense for the Consultant to re-model all the principal roads within the borough in order to get a thorough and comprehensive analysis of the current levels of pollutants and any likely exceedances of the annual Nitrogen Dioxide Air Quality Objective.

Preliminary model outputs for Compton Street and Whittington Hill concluded that NO₂ is well below the annual Air Quality Objective, and that the principal roads previously included within the boundary of the proposed AQMA are no longer breaching the specified limits as they previously were. In light of the latest monitoring data and the conclusions of the preliminary model outputs, the Council cannot now justify the declaration of an AQMA.

This decision will be continually reviewed as new monitoring data emerges, and the Council will take direction from DEFRA and act with expedience if future levels of air pollutants are shown to deteriorate. Any future exceedances of the Air Quality Objectives would require the completion of a Detailed Assessment and the completion of further detailed dispersion modelling for the areas highlighted. The findings would most likely justify an additional consultation both with the public, statutory bodies and other interested organisations.

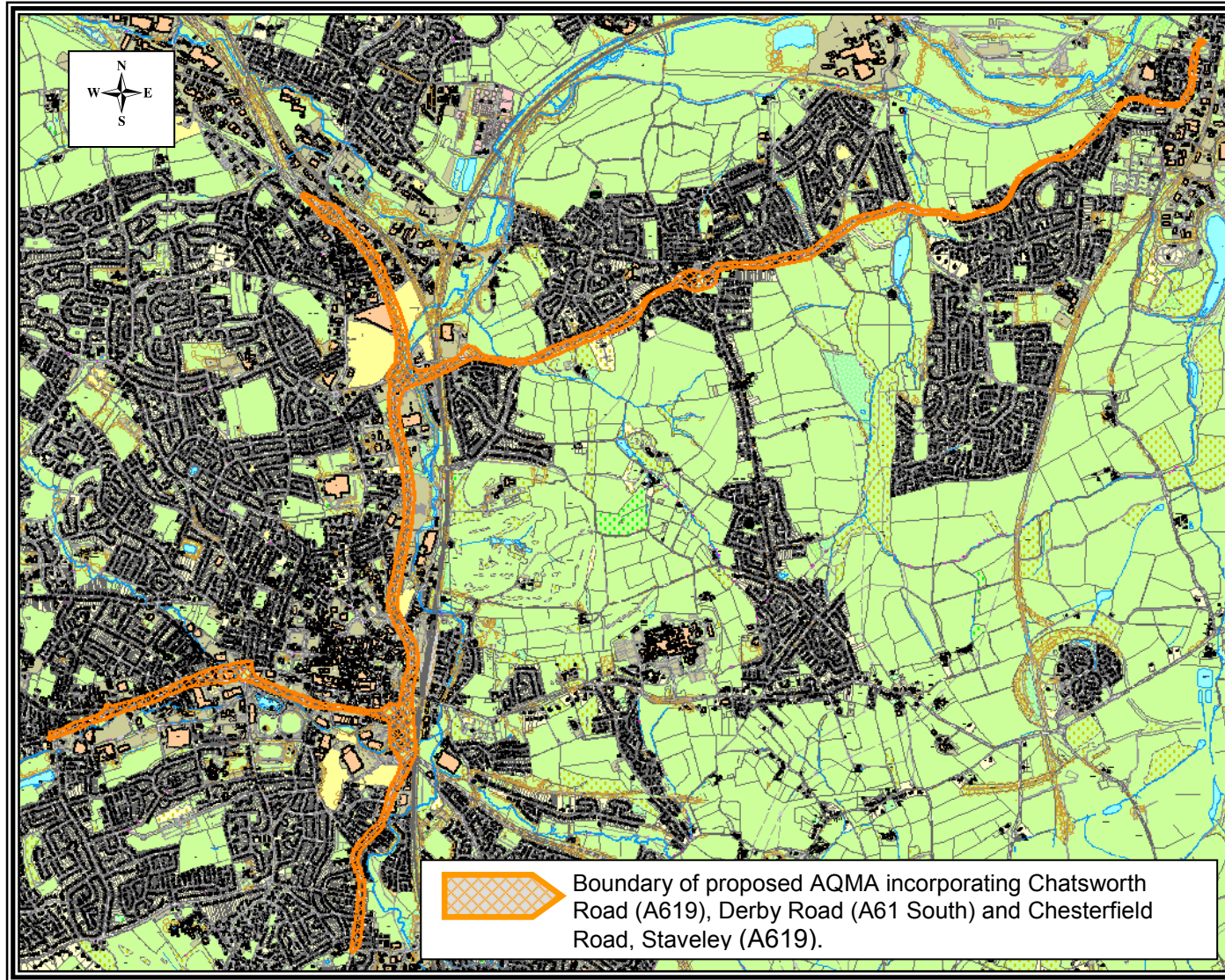
Table 1.2 below shows a summary of all previous review and assessment reports in a quick reference table.

Table 1.2 Summary of Previous Review and Assessments (Quick-Reference table)

Date	Report Title	Conclusions and recommendations
2003	Update & Screening Assessment	Nitrogen Dioxide and PM ₁₀ were at risk of exceeding the health-based objectives. This led to a Detailed Assessment of these pollutants being conducted in 2004
2004	Detailed Assessment	No immediate action necessary, but Nitrogen Dioxide and PM ₁₀ should remain under close review. Improvements in air quality monitoring across the borough was also recommended
2005	Progress Report	Monitoring data highlighted a risk of exceedance of the Air Quality Nitrogen Dioxide Objectives on Derby Road. However, the data capture was not of sufficient accuracy for immediate action to be taken. Recommendations were made to improve the air quality monitoring strategy.
2006	Update & Screening Assessment	Monitoring data highlighted three locations showing exceedance of the annual Nitrogen Dioxide Air Quality Objective. These were Chatsworth Road (A619) and Derby Road (A61 South) and Chesterfield Road, Staveley (A619). Recommendation was made to complete a Detailed Assessment for these areas
2007	Detailed Assessment	Modelled data confirmed that Chatsworth Road (A619) and Derby Road (A61 South) and Chesterfield Road, Staveley (A619). showed exceedance of the annual Nitrogen Dioxide Air Quality Objective. Proposal was made to declare a ribbon AQMA, the proposed boundary of which would be based on a contour produced by the ADMS model, and incorporated areas of the borough predicted as having average annual NO ₂ levels in excess of 36 µg/m ³ . (see figure 1.1)
2008	Progress Report	Recommendation to improve data capture, relocation of background monitoring site and relocation of some diffusion tubes to increase accuracy of results. Better working with planning department on major developments and improving the councils air quality web pages.
2009	Update & Screening Assessment	Monitoring data highlighted two further areas (both lying outside of the current boundary for the proposed AQMA) showing elevated levels of Nitrogen Dioxide and possible exceedance of the annual Nitrogen Dioxide Air Quality

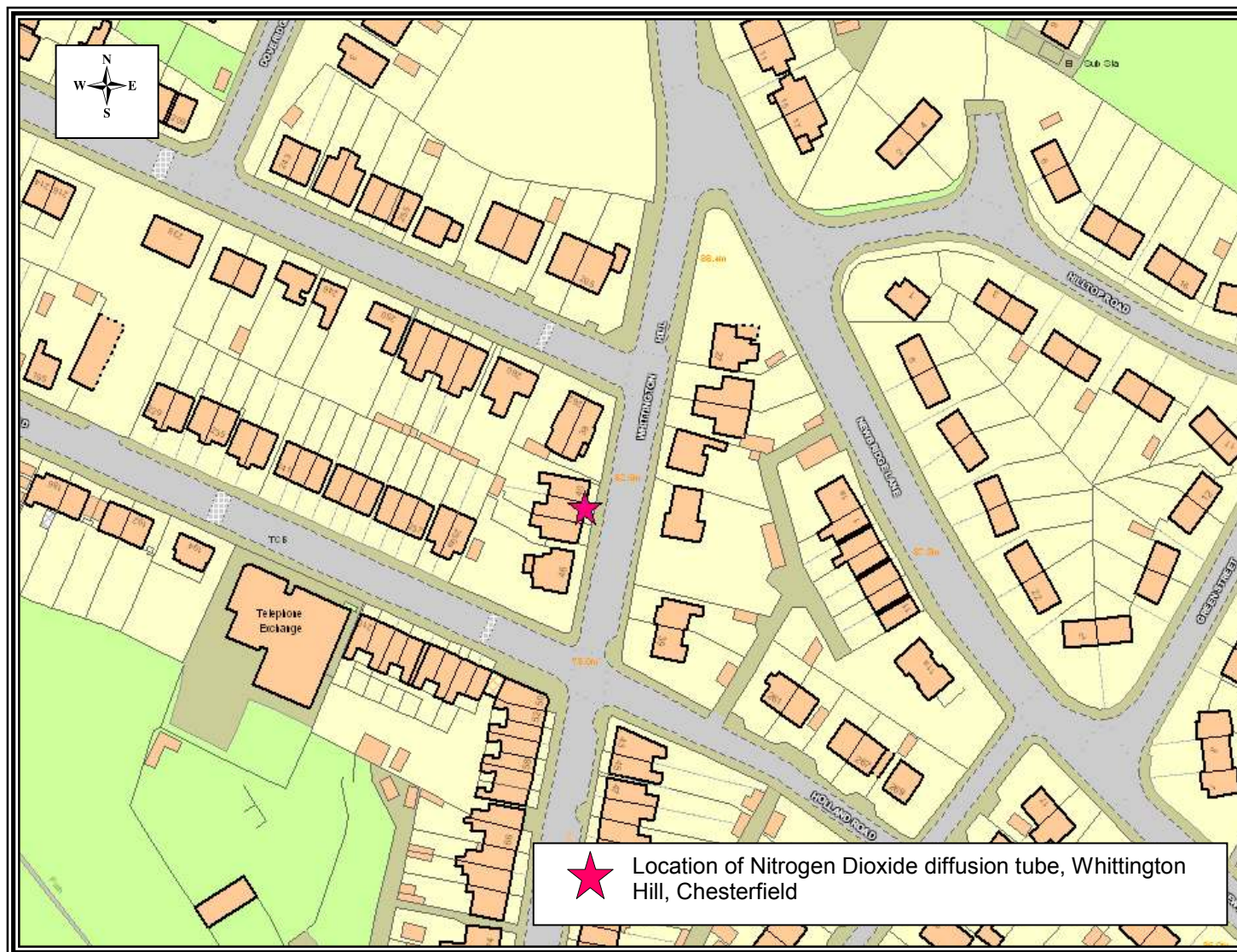
		Objective. These areas were Whittington Hill and Compton Street. Recommendation to produce detailed assessments for both areas.
2010	Detailed Assessment	Dr Shyam Singh of Enstec Environmental Services was commissioned by Chesterfield Borough Council in December 2009 to complete detailed assessment for Whittington Hill and Compton Street, and to re-model all parts of the borough previously modelled in the 2007 Detailed Assessment. The modelling work is currently ongoing and the Detailed Assessment will follow shortly.

Figure 1.1 Map of Proposed AQMA Boundary



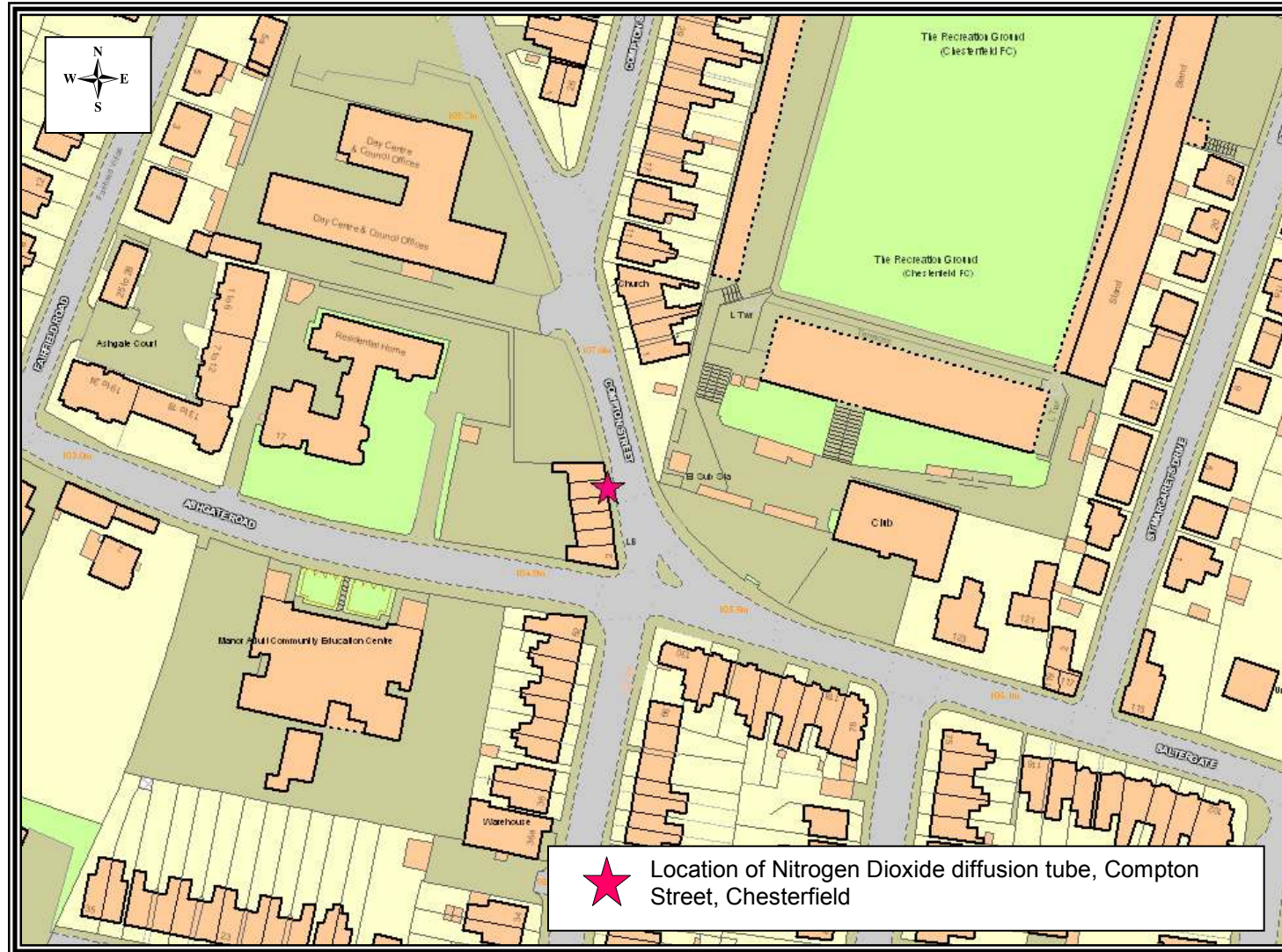
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Figure 1.2 Map of Whittington Hill Diffusion Tube



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Figure 1.3 Map of Compton Street Diffusion Tube



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2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Over the course of 2009, Chesterfield Borough Council (CBC) monitored Nitrogen Dioxide (NO₂), Particulate Matter (PM₁₀ and PM_{2.5}) within the Borough. These pollutants were measured using automatic analysers housed in two secure, air-conditioned cabins. NO₂ is monitored using a Monitor Labs chemiluminescence analyser and PM₁₀ and PM_{2.5} are monitored using R&P TEOM analysers with an AURN FDMS system.

The chemiluminescence analysers at both stations undergo a routine maintenance service every six months. In August 2009, the service contract was not renewed with Casella ETi, and a new contract was taken with Supporting U. Supporting U are contracted to provide the service and maintenance for both stations until August 2011. The TEOM's and FDMS's are serviced and maintained on behalf of DEFRA (AURN) by Air Monitors; these stations are also audited on a six monthly basis by AEA Energy and Environment (AEA).

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 and Bureau Veritas (BV) for verification after each calibration. The data is downloaded by GSM modem from both stations every 24 hours directly to a standalone PC in the Environmental Health Department at CBC. The data is also downloaded on a daily basis by AEA, who then validate and ratify the raw data and provide ratified data reports to CBC on a monthly basis. Since both stations received AURN status in 2008, BV also now download the data on a daily basis and check for any faults with the analysers. The data is available on the Air Quality Archive website which greatly improves public access to local air pollution information.

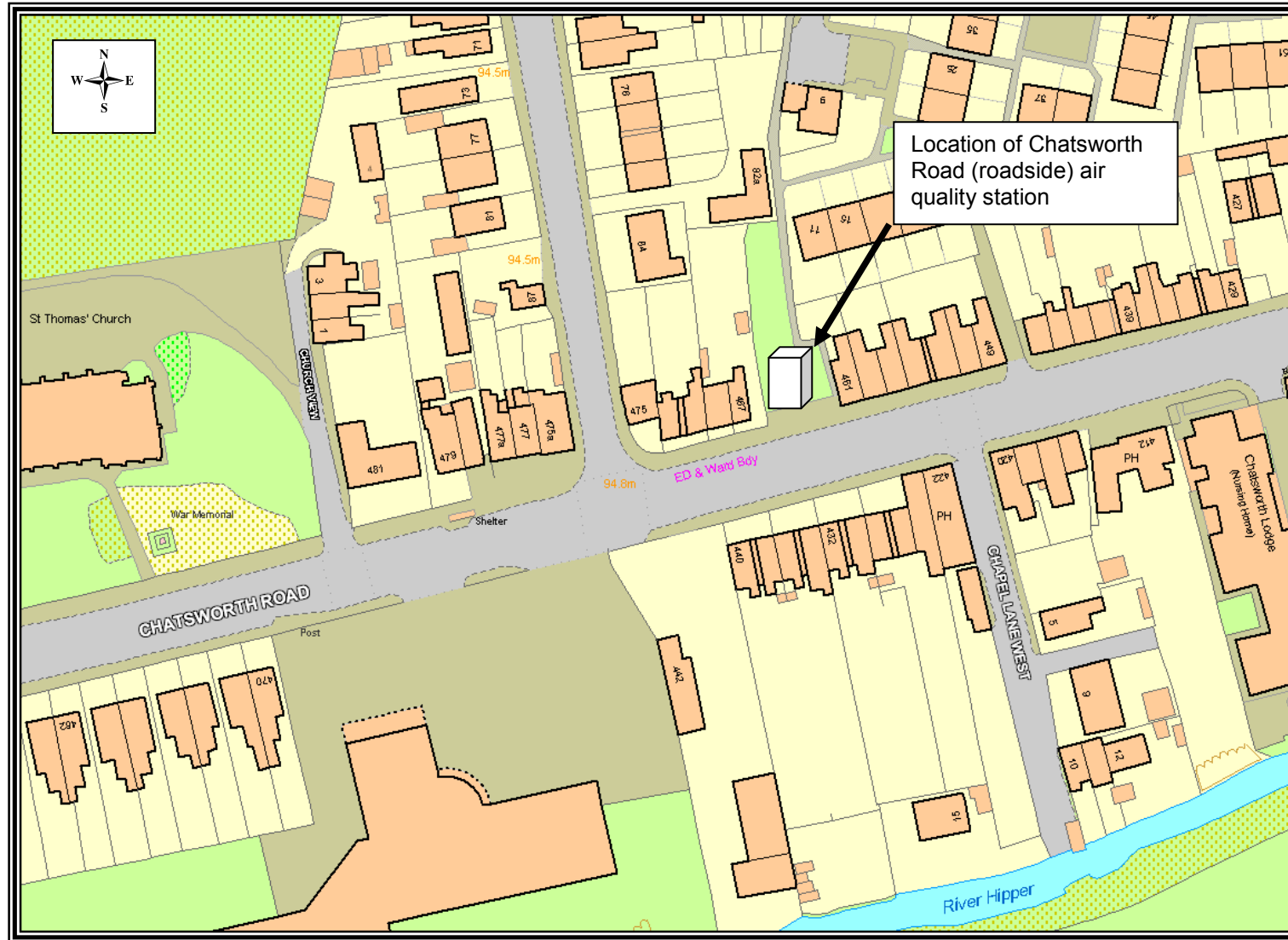
Chatsworth Road Air Quality Station (Roadside)

This roadside air quality station was commissioned in March 2008. Prior to this, it was located at Whittington Moor. Chatsworth Road roadside site is located adjacent to 461 Chatsworth Road, Chesterfield (OS coordinates, 436349E, 370657N), within 4m of the busy A619 Chatsworth Road, just outside the proposed AQMA. 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. (see Figure 2.1 for map of Chatsworth Road Air Quality Monitoring Station).

Queens Park Annexe Air Quality Station (Urban Background)

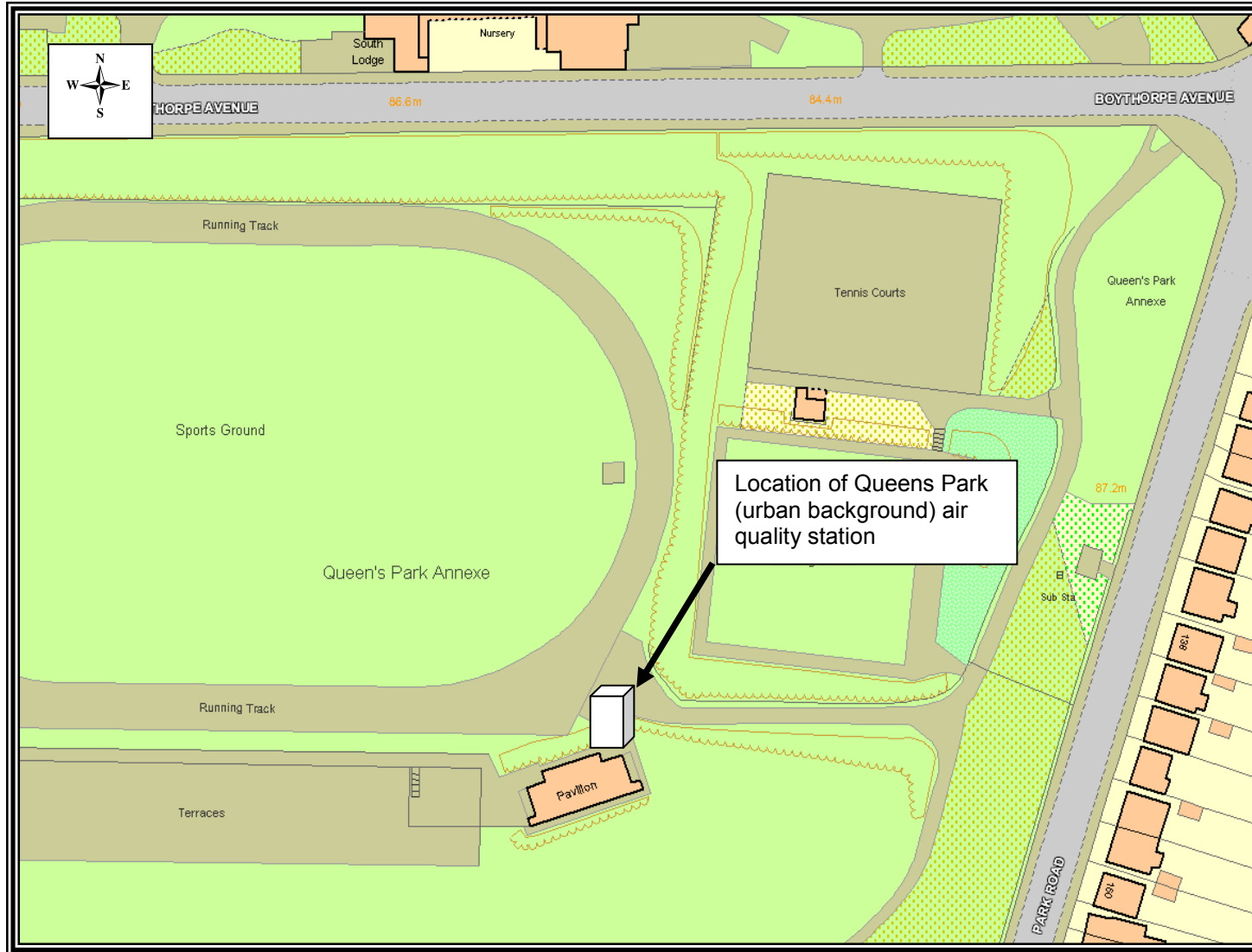
This urban background air quality station was commissioned at Queens Park Annex in March 2008. Prior to this, it was located at Birdhome Infants School and Bacons Lane, St. Augustines. The new location in Queens Park (OS coordinates 437909E, 370545N) is distanced from any road or industrial sources and so is indicative of the air quality experienced by the majority of Chesterfield residents. (See Figure 2.2 for map of Queens Park Air Quality Monitoring Station).

Figure 2.1 Map of Chatsworth Road Automatic Monitoring Site (Roadside)



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Figure 2.2 Map of Queens Park Annexe Automatic Monitoring Site (Background)



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2.1.2 Non-Automatic Monitoring (Nitrogen Dioxide diffusion tubes)

Over the course of 2009, 38 diffusion tubes were distributed across the Borough, each being exposed for a four-week period. Details of all non-automatic monitoring sites can be found below in table 2.1. Until December 2009, the diffusion tubes were supplied and analysed by South Yorkshire Laboratories (SYL). SYL purchase the tubes uncoated from Gradko, treat them with 50% acetone and 50% triethanolamine, allow them to evaporate and then mount into tubes. Analysis of the tubes is by colorimetric determination. South Yorkshire laboratories received UKAS accreditation in 2006 for their in house methods and are members of WASP and the Inter Laboratory Field Comparison. Unfortunately the laboratory closed down at the end of 2009.

The laboratory services were re-launched by Mr Andy Hawkins in January 2010 under the new name of South Yorkshire Air Quality Samplers (SYAQS). Mr Hawkins submitted a proposal to continue processing the diffusion tubes with the same methodologies as were previously employed by SYL. Unfortunately SYAQS did not have UKAS accreditation for the works and TG (09) specifically recommends and encourages sampling labs to be accredited. Mr Hawkins' proposal was to continue with the high standards employed by SYL and to gather the necessary information over a number of months to satisfy the UKAS assessor.

Chesterfield Borough Council contacted DEFRA's Review and Assessment helpdesk in November 2009 and received confirmation that it would be acceptable for them to proceed with SYAQS (regardless of the lack of UKAS accreditation) for a further 12 months of sampling.

SYAQS participate in the Workplace Analysis Scheme for Proficiency (WASP). The scheme is an independent analytical performance testing scheme operated by the Health and Safety Laboratory (HSL). WASP is an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). At quarterly intervals HSL supplies the labs with 4 samplers doped with unknown amounts of nitrite. It then assesses and calculates a performance index from the results. Although SYAQS does not have any data to present under the WASP scheme, SYL scored a 'good' rating under the criteria and Mr Hawkins will be employing the same methods previously used by SYL.

SYAQS employ the use of travel blanks as recommended TG (09).

Chesterfield Borough Council collocated diffusion tubes in triplicate at Chesterfield roadside air quality station over the course of 2009, allowing the precision and accuracy of the tubes to be calculated and a local bias adjustment factor to be produced. The results of the tube precision and accuracy calculations for 2009 have not yet been submitted to the national database for inclusion in the national bias adjustment factor database. Nonetheless, the National Air Quality Website's spreadsheet tool for calculating the bias factors has been used to calculate the bias factor from the roadside station and the results are presented below in table 2.2. This shows that the bias factor is 0.7 and that the data can be used with confidence.

Table 2.1 Details of Non- Automatic Monitoring Sites

Site No.	Site type	Grid Reference	Site Name	Pollutant	Distance to kerb of nearest road	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Monitoring Start Date
1	Urban roadside	437 224 370 958	Bradbury Club, 150 Chatsworth Road, (A619)	NO ₂	1m	Y (Building Façade)	01/01/2007
2	Urban roadside	438 427 370 832	Markham Road, (A619)	NO ₂	1m	Y (Building Façade)	01/01/2006
3	Urban roadside	438 306 369 739	3, St Augustines Road	NO ₂	3m	Y (Building Façade)	01/01/2007
4	Urban roadside	438 517 370 229	Derby Road Development (A61)	NO ₂	3m	Y (Building Façade)	01/01/2007
5	Urban roadside	438 293 370 870	17 South Place	NO ₂	5m	Y (Building Façade)	01/01/2007
6	Urban roadside	440 445 373 514	Chest Rd Rndbt	NO ₂	1m	Y (Building Façade)	28/06/2006
7	Urban roadside	443 457 374 807	Dukes Street, Staveley	NO ₂	1m	Y (Building Façade)	01/08/2006
8	Urban roadside	438 395 369 776	St Augustines Church, 212 Derby Road	NO ₂	3m	Y (Building Façade)	01/01/2007
9	Urban roadside	438 385 369 573	Lincoln Street, 287 Derby Road,	NO ₂	2m	Y (Building Façade)	01/01/2007
10	Urban roadside	440 149 373 384	18, Chesterfield Road, Brimington	NO ₂	1m	Y (Building Façade)	02/07/2008
11	Urban roadside	438 307 374 563	42, Whittington Hill (B6052)	NO ₂	2m	Y (Building Façade)	01/01/2006
12	Urban roadside	438 280 373 334	460, Sheffield Road	NO ₂	2m	Y (Building Façade)	01/01/2008
13	Urban roadside	442 759 374 270	99, Chesterfield Road, Staveley	NO ₂	2m	Y (Building Façade)	01/01/2006
14	Urban roadside	438 357 369 411	348 Derby Road, Storforth Lane	NO ₂	2m	Y (Building Façade)	01/01/2006
15	Urban roadside	436 349 370 657	Chatsworth Road	NO ₂	4m	Y (1m)	02/07/2008

16	Urban roadside	436 349 370 657	Chatsworth Road	NO ₂	4m	Y (1m)	02/07/2008
17	Urban roadside	436 349 370 657	Chatsworth Road	NO ₂	4m	Y (1m)	02/07/2008
18	Urban background	437 909 370 545	Queens Park Annex (AQ station)	NO ₂	N/A	N/A	31/01/2006
19	Urban background	437 909 370 545	Queens Park Annex (AQ station)	NO ₂	N/A	N/A	31/01/2006
20	Urban background	437 909 370 545	Queens Park Annex (AQ station)	NO ₂	N/A	N/A	31/01/2006
21	Urban background	443 417 374 911	Staveley Stables	NO ₂	N/A	N/A	02/07/2008
22	Urban roadside	440 689 373 569	35, Ringwood Road, Brimington	NO ₂	1m	Y (Building Façade)	01/01/2007
23	Urban roadside	438 112 370 980	1 Beetwell Street	NO ₂	2m	Y (Building Façade)	01/08/2006
24	Urban roadside	437 687 371 433	10, Compton Street, near Saltergate	NO ₂	4m	Y (Building Façade)	01/01/2007
25	Urban roadside	435 988 370 601	501, Chatsworth Road, near Vincent Crescent	NO ₂	3m	Y (Building Façade)	01/01/2007
26	Urban roadside	437 795 371 368	114, Saltergate	NO ₂	3m	Y (Building Façade)	01/01/2008
27	Urban roadside	443 885 374 907	Lowgates	NO ₂	3m	Y (Building Façade)	01/01/2008
28	Urban roadside	438 740 370 946	45 Hollis Lane	NO ₂	2m	Y (Building Façade)	01/01/2008
29	Urban roadside	438 425 371 346	Hollywell Cross Roundabout, Old Post Restaurant	NO ₂	1m	Y (Building Façade)	01/01/2007
30	Urban roadside	436 704 370 763	348, Chatsworth Road, Brampton Mile	NO ₂	2m	Y (Building Façade)	01/01/2007
31	Urban roadside	438 359 369 978	24, Derby Road, Jawbones Hill	NO ₂	2m	Y (Building Façade)	01/01/2007
32	Urban roadside	439244 370153	Hasland By-Pass (A617)	NO ₂	4m	N	02/07/2008

33	Urban roadside	444 702 372 482	Oak Farm	NO ₂	N/A	Y (Building Façade)	28/06/2006
34	Urban roadside	436 377 370 663	451, Chatsworth Road, opp Chapel Lane West	NO ₂	2m	Y (Building Façade)	01/01/2007
35	Urban roadside	435 654 370 538	632, Chatsworth Road, near Storrs Road	NO ₂	3m	Y (Building Façade)	01/01/2007
36	Urban background	437 935 370 866	Queens Park	NO ₂	N/A	N/A	01/01/2006
37	Urban roadside	438 921 372 055	15, Muirfield Road	NO ₂	4m	Y (Building Façade)	02/07/2008
38	Urban roadside	438 517 373 513	93 Eastside Road	NO ₂	4m	Y (Building Façade)	02/07/2008

Table 2.2 Results of co-location study to calculate bias adjustment factor

Checking Precision and Accuracy of Triplicate Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm ⁻³	Tube 2 µgm ⁻³	Tube 3 µgm ⁻³	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1			37	34	39	37	2.5	7	6.3
2			34	35	36	35	1.0	3	2.5
3			28	30	30	29	1.2	4	2.9
4			25	33	34	31	4.9	16	12.3
5			24	25	23	24	1.0	4	2.5
6			25	23	24	24	1.0	4	2.5
7			24	24	25	24	0.6	2	1.4
8			20	20	19	20	0.6	3	1.4
9			27	25	26	26	1.0	4	2.5
10			33	33	31	32	1.2	4	2.9
11			35	34	36	35	1.0	3	2.5
12			36	39	35	37	2.1	6	5.2
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
33.81	99.33	Good	Good
27.74	98.66	Good	Good
16.38	99.46	Good	Good
19.29	97.78	Good	Good
14.16	90.73	Good	Good
17.15	96.53	Good	Good
12.73	95.83	Good	Good
13.65	96.91	Good	Good
14.80	95.28	Good	Good
23.46	99.46	Good	Good
21.66	98.89	Good	Good
32.28	94.09	Good	Good

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

Overall survey -->

Good precision	Good Overall DC
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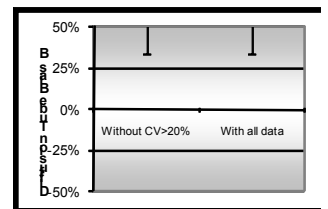
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: _____

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

Accuracy (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.7 (0.63 - 0.79)
Bias B	43% (26% - 60%)
Diffusion Tubes Mean:	29 µgm ⁻³
Mean CV (Precision):	5
Automatic Mean:	21 µgm ⁻³
Data Capture for periods used:	97%
Adjusted Tubes Mean:	21 (19 - 23) µgm ⁻³

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.7 (0.63 - 0.79)
Bias B	43% (26% - 60%)
Diffusion Tubes Mean:	29 µgm ⁻³
Mean CV (Precision):	5
Automatic Mean:	21 µgm ⁻³
Data Capture for periods used:	97%
Adjusted Tubes Mean:	21 (19 - 23) µgm ⁻³



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2.2 Comparison of Monitoring Results with Air Quality

Objectives

2.2.1 Nitrogen Dioxide

NO₂ Annual Mean Objective

The NO₂ annual mean air quality objective is 40µgm³. The 2009 data provided by Chatsworth Road and Queens Park Annexe air quality stations is for 12 months and has been fully ratified as part of the AURN Network. The 2009 annual mean for Chatsworth Road and Queens Park Annexe is 21 and 19 respectively. Therefore the NO₂ annual mean air quality objective has been met at both locations. Table 2.3 below shows the results of automatic monitoring for Nitrogen Dioxide and comparison with the Annual Mean Objective.

NO₂ Hourly mean Objective

The NO₂ hourly mean air quality objective is 200µgm³ with 18 exceedances. The 2009 maximum hourly mean for Chatsworth Road and Queens Park Annexe is 113 with no exceedances and 97 with zero exceedances respectively. This is well below the objective and therefore the NO₂ hourly air quality objective has been met at both locations. Table 2.4 below shows the results of automatic monitoring for Nitrogen Dioxide and comparison with hourly mean Objective.

NO₂ Diffusion tubes

The Nitrogen Dioxide (NO₂) diffusion tube data has been collected and bias adjusted using a locally arrived at bias adjustment factor of 0.88 for 2008 and 0.69 for 2009. The data shows five sites in 2008 and zero sites in 2009 which exceed (or fall marginally below) the Nitrogen Dioxide Annual Mean Objective. Table 2.5 below shows the diffusion tube data with appropriate bias adjustment for 2008 and 2009.

Table 2.3 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site Name	Location	Data capture for full calendar year (%)		Annual mean concentrations (µg/m ³)	
		2008	2009	2008	2009
Chatsworth Road (Roadside AQ Station)	Adjacent to 461 Chatsworth Road	94.1	94.1	21.9	20.6
Queens Park Annexe (Background AQ Station)	Queens Park Annex (near pavilion)	94.2	94.4	17.8	19.0

Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site Name	Location	Data capture for full calendar year (%)		Maximum 24-Hr Mean ($\mu\text{g}/\text{m}^3$) and number of exceedances of hourly mean ($200 \mu\text{g}/\text{m}^3$)	
		2008	2009	2008	2009
Chatsworth Road (Roadside AQ Station)	Adjacent to 461 Chatsworth Road	94.1	94.1	117 with zero exceedances	113 with zero exceedances
Queens Park Annexe (Background AQ Station)	Queens Park Annex (near pavilion)	94.2	94.4	82 with zero exceedances	97 with zero exceedances

Table 2.5 Results of diffusion tube data with appropriate bias adjustment.

Site ID	Location / Address	Data Capture for calendar year (%)		Bias Adjusted annual mean concentrations ($\mu\text{g}/\text{m}^3$)	
		2008 (%)	2009 (%)	2008 (0.88 Bias)	2009 (0.69 Bias)
1	Bradbury Club, 150 Chatsworth Road, (A619)	100	100	32.3	25.3
2	Markham Road, (A619)	92	92	48.8	35.9
3	3, St Augustines Road	92	83	23.1	19.3
4	Derby Road Development (A61)	100	100	23.7	19.6
5	17 South Place	100	100	33.0	26.3
6	Chest Rd Rndbt	66	100	45.1	38.4

7	Dukes Street, Staveley	92	92	39.1	35.7
8	St Augustines Church, 212 Derby Road	100	100	35.9	30.2
9	Lincoln Street, 287 Derby Road,	100	75	36.2	28.0
10	18, Chesterfield Road, Brimington	100	92	32.1	23.6
11	42, Whittington Hill (B6052)	100	100	39.6	32.8
12	460, Sheffield Road	100	100	31.2	27.4
13	99, Chesterfield Road, Staveley	100	92	32.8	27.5
14	348 Derby Road, Storforth Lane	100	92	37.3	31.2
15	Chatsworth Road	100	100	25.0	20.0
16	Chatsworth Road	100	100	23.8	20.4
17	Chatsworth Road	100	100	24.7	20.6
18	Queens Park Annex (AQ station)	100	100	19.1	21.4
19	Queens Park Annex (AQ station)	100	100	18.9	21.3
20	Queens Park Annex (AQ station)	92	100	17.4	20.7
21	Staveley Stables	92	64	25.3	26.3
22	35, Ringwood Road, Brimington	100	92	34.5	26.9
23	1 Beetwell Street	100	92	25.2	22.8

24	10, Compton Street, near Saltergate	100	92	40.7	33.2
25	501, Chatsworth Road, near Vincent Crescent	100	100	20.2	17.4
26	114, Saltergate	100	83	31.5	25.0
27	Lowgates	92	100	34.7	29.1
28	45 Hollis Lane	92	100	30.6	27.3
29	Hollywell Cross Roundabout, Old Post Restaurant	100	100	35.2	30.0
30	348, Chatsworth Road, Brampton Mile	100	100	34.1	26.2
31	24, Derby Road, Jawbones Hill	100	92	25.9	23.8
32	Hasland By-Pass (A617)	83	92	24.3	21.6
33	Oak Farm	100	100	27.6	22.7
34	451, Chatsworth Road, opp Chapel Lane West	100	92	27.4	23.8
35	632, Chatsworth Road, near Storrs Road	100	100	34.6	27.1
36	Queens Park	100	92	22.4	22.8
37	15, Muirfield Road	100	100	22.3	18.5
38	93 Eastside Road	100	92	28.2	25.2
Total data capture rate (%)		97.2 %	94.8 %		

2.2.1 PM₁₀

PM₁₀ Annual Mean Objective

The PM₁₀ annual mean air quality objective is 40µg/m³ with no more than 35 exceedances of 50 µg/m³ in a year. The 2009 data provided by Chatsworth Road and Queens Park Annexe show PM₁₀ annual mean of 16µg/m³ and 17.6µg/m³ respectively. The 24-hour PM₁₀ mean objective of 50 µg/m³ from Chatsworth Road and Queens Park Annexe showed 6 exceedances and 1 exceedance respectively. Therefore the PM₁₀ annual mean air quality objective has been met at both locations. Tables 2.6 and 2.7 below show the results of automatic monitoring for PM10 and comparison with the Annual Mean Objective.

Table 2.6 Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

Site Name	Location	Data capture for full calendar year (%)	Annual mean concentrations (µg/m ³)	
		2009	2008	2009
Chatsworth Road (Roadside AQ Station)	Adjacent to 461 Chatsworth Road	93.9	26.7	16.0
Queens Park Annexe (Background AQ Station)	Queens Park Annex (near pavilion)	94.3	19.6	17.6

Table 2.7 Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

Site Name	Location	Number of Exceedances of daily mean objective in year (50 µg/m ³)	
		2008	2009
Chatsworth Road (Roadside AQ Station)	Adjacent to 461 Chatsworth Road	3 exceedances	1 exceedances
Queens Park Annexe (Background AQ Station)	Queens Park Annex (near pavilion)	1 exceedance	6 exceedances

2.2.2 Sulphur Dioxide

The annual 1-hour mean air quality objective for SO₂ is 350µgm³ with 24 exceedances during the year. The 24-hour mean air quality objective for SO₂ is 125µgm³ with 3 exceedances during the year. The 15-minute mean air quality objective for SO₂ is 266µgm³ with 35 exceedances during the year.

The last SO₂ monitoring Chesterfield Borough Council did was in 2004 and the results of the monitoring supported previous projections that the borough was *'highly unlikely'* to exceed the annual 1-hour mean air quality objective, the 24-hour mean air quality objective or the 15 minute air quality objective.

3 New Local Developments

Chesterfield Borough Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

3.1 Road Traffic Sources

There are no new road traffic sources that have not been adequately considered in previous rounds of Review and Assessments.

3.2 Other Transport Sources

No other transport sources which have not been previously considered have been identified.

3.3 Industrial Sources

There are no new industrial sources which will impact on air quality within the Borough.

3.4 Commercial and Domestic Sources

There are no new commercial and domestic sources which will impact on air quality within the Borough or which have not been previously included in the assessments..

3.5 New Developments with Fugitive or Uncontrolled Sources

There are no new developments with fugitive or uncontrolled emission sources.

4 Local / Regional Air Quality Strategy

DEFRA has recently published new guidance to local authorities on air quality and climate change. The opportunity is therefore being taken to review and revise the draft of the non-mandatory Air Quality Strategy to take account of this latest guidance. The revised Strategy will be presented to lead member with a view to it being presented to full cabinet in the near future. Instead of focussing only on air quality within any proposed AQMA, the draft strategy relates to the borough as a whole and the ongoing merits of improving air quality for residents right across the borough.

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

The monitoring data from 2009 has shown no exceedances or likely exceedances of the air quality objectives. Therefore no further statutory action is required at this time. A draft of a non-mandatory air quality strategy will be presented to lead members in the near future.

5.2 Conclusions relating to New Local Developments

A planning application for a significant mixed use development site was granted outline permission in early 2010. The 'Waterside Development' is a site with the potential to have impacts on air quality in the coming years. An Environmental Impact Assessment (EIA) for the site was submitted and reviewed by Chesterfield Borough Council in 2009. Work on the first stages of the development site are imminent.