2012 Air Quality Updating and Screening Assessment for Chesterfield Borough Council

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

May, 2012

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Executive Summary

In accordance with the requirements of the Environment Act 1995, local authorities are required to conduct periodic updating of the possible sources of air within the Borough on a three yearly cycle. These updating appraisals involve an examination of the impact of changes and proposed changes which have taken place, or been subject to a planning appraisal, in the intervening three years since the last screening exercise. In conducting such screening exercises, the current levels of these pollutants as well as their expected future levels have to be estimated to ensure that the objectives are not being exceeded at present and that they are unlikely to be exceeded in future.

This report is Chesterfield Borough Council's 2012 Updated Screening and Assessment report and summarises the findings of the most recent screening of air quality within the Borough. It has been undertaken in accordance with the Technical Guidance LAQM.TG (09) and associated tools (as updated in 2010) and includes the most recent monitoring data (up to the end of 2011).

The 2012 USA has confirmed that road traffic pollution "hot-spots" are a cause for concern in Chesterfield, due to the possible breach of the Air Quality Objective for Nitrogen Dioxide. Four Detailed Assessments are currently being carried out as a result of the revised 2011 Progress Report, the results of this assessment will be reported later this year. Current data indicates that only one of the detailed assessment locations is still found to be in breach of the Air Quality Objective.

Two major developments are planned or in the early stages of construction. These are the Markham Vale Industrial Park, located adjacent to the M1 at the eastern extremity of the Borough, and the Waterside development, to the east of the town centre. These have been extensively assessed as part of the planning application process, and are expected to be of minimal adverse effect on air quality within the borough.

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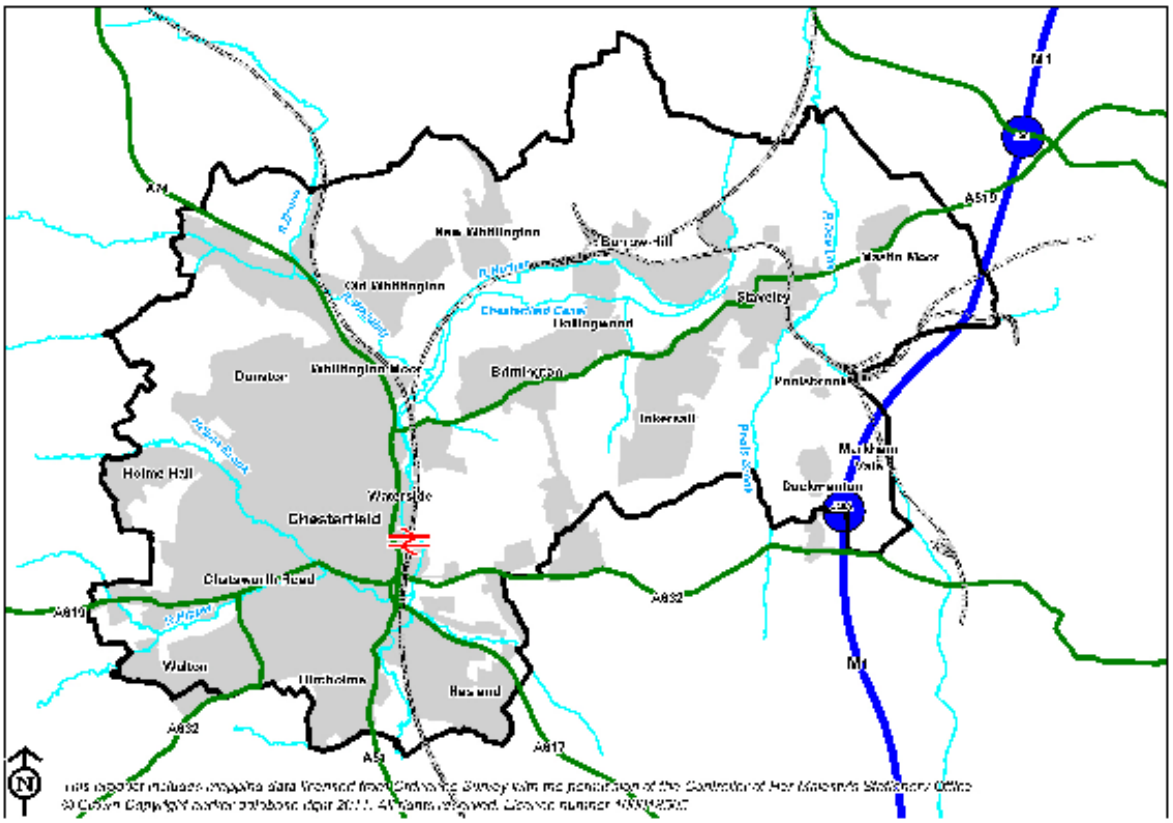
1 Introduction

1.1 Description of Local Authority Area

Chesterfield is a market town situated in North Derbyshire. The population is approximately 99,000. The borough is surrounded by the boroughs of North East Derbyshire to the north, south and west, and Bolsover District to the east. The Borough of Chesterfield consists mainly of the town centre, which has a mix of small retail and service sector activities, and immediate suburbs of Chesterfield, to the south, west, and north-west of the town centre. To the east is the small town of Staveley, with ribbon and estate housing developments connecting the two centres. Chesterfield town is surrounded by rural areas, those to the north, west and south are outside the borough area. Part of the area between Chesterfield town and Staveley is rural farmland, but there are vacant former industrial sites in this area, a legacy of the closure of much of the heavy industry which had driven the growth of the borough. Smaller self-contained former mining villages are located in the east of the borough area. The M1 Motorway skirts the eastern fringes of the borough, and the town centre is bypassed by the A61 ring road, built on the line of one of the former railways which converged on the town. The main source of pollution in the borough comes from road transport, but there is also some remaining traditional heavy industry still located in the borough, predominantly following the railway line north of the town centre, and in an industrial estate in the north western corner of the borough.

Figure 1.1: An indicative map of Chesterfield showing the major trunk roads and areas of the borough



1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

1.3 Air Quality Objectives

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

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene			
	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/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 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/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 previous work carried out in fulfilment of the requirements of Air Quality Review and Assessment are summarised in Table 1.2, below:

Table 1.2 Summary of Previous Review and Assessments

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 exceedence 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 exceedence 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 exceedence 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 $\mu g/m^3$.
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 Authority's air quality web pages.
2009	Update & Screening Assessment	Monitoring data highlighted two further areas (both lying outside of the boundary for the proposed AQMA) showing elevated levels of Nitrogen Dioxide and possible exceedence 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	Progress Report	None of the air quality objectives were exceeded in 2009 and it was decided to withdraw the proposals for the declaration of an AQMA. It was recommended to 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.
2010	Detailed Assessment and Source apportionment	Detailed assessment based on dispersion modelling of the most heavily trafficked areas within the Borough including Whittington Hill and Compton Street. Both monitoring and modelling indicated no exceedences of any of the objectives in 2009. Elevated levels were however found at a few locations and recommendations were made to continue to monitor trends throughout the Borough and especially at these locations.
2011	Progress Report	Monitoring data highlighted four areas showing elevated levels of Nitrogen Dioxide and possible exceedence of the annual Nitrogen Dioxide Air Quality Objective. These areas were Whittington Hill; Sheffield Road; Duke Street, Staveley; and Church Street, Brimington and Compton Street. Recommendation to produce Detailed Assessments for these areas.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Chesterfield Borough Council operates two automatic monitoring sites, affiliated to the national AURN network. The details of the sites and the monitoring being undertaken at each location are given below in Tables 2.1a and 2.1.b:

Table 2.1a Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique
Chatsworth Road	Roadside (but reclassified as an Urban background)	436349 E	370657 N	NOx PM_{10} $PM_{2.5}$ Benzene	Chemi-luminescent FDMS FDMS Pumped Tubes
Queens Park Annex	Urban background	437909 E	370545 N	NOx PM_{10} $PM_{2.5}$	Chemi-luminescent FDMS FDMS

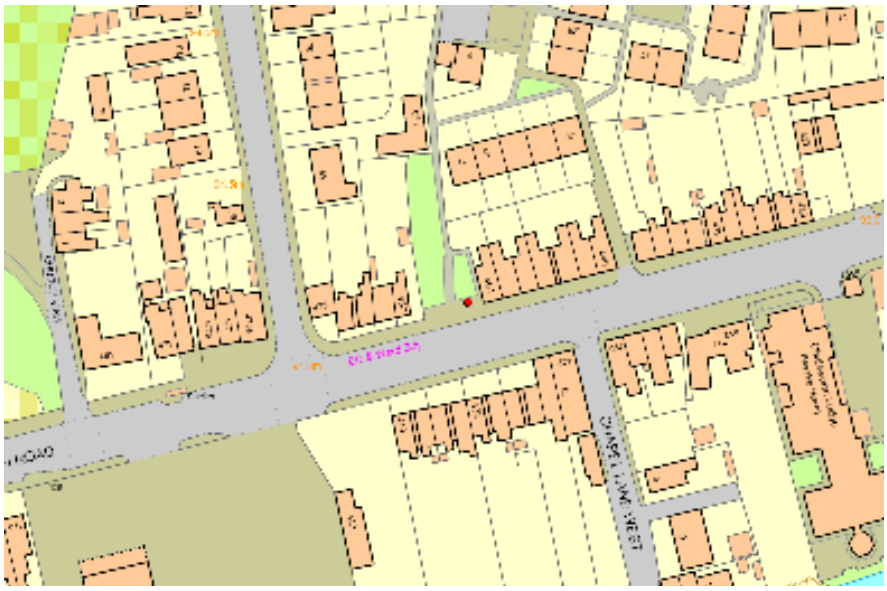
Table 2.1b Details of Automatic Monitoring Sites

Site Name	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Chatsworth Road	N	Y (1m)	4.5m	Yes
Queens Park Annex	N	N (75m)	85m	No

Chesterfield Borough Council also sought to source, install and operate a NOx monitor in the vicinity of Sheffield Road, where a possible breach of the Air Quality Objective may be found to be occurring (this is discussed in section 2.2.1.2). We have been unable to source a suitable monitor, or to get the approval of the landowner where such a monitor would be located. The result of this is that monitoring is being carried out solely by the use of NOx monitoring tubes, and will be addressed later in this report.

The maps, below, show the locations of the two automatic monitoring stations operated by Chesterfield Borough Council.

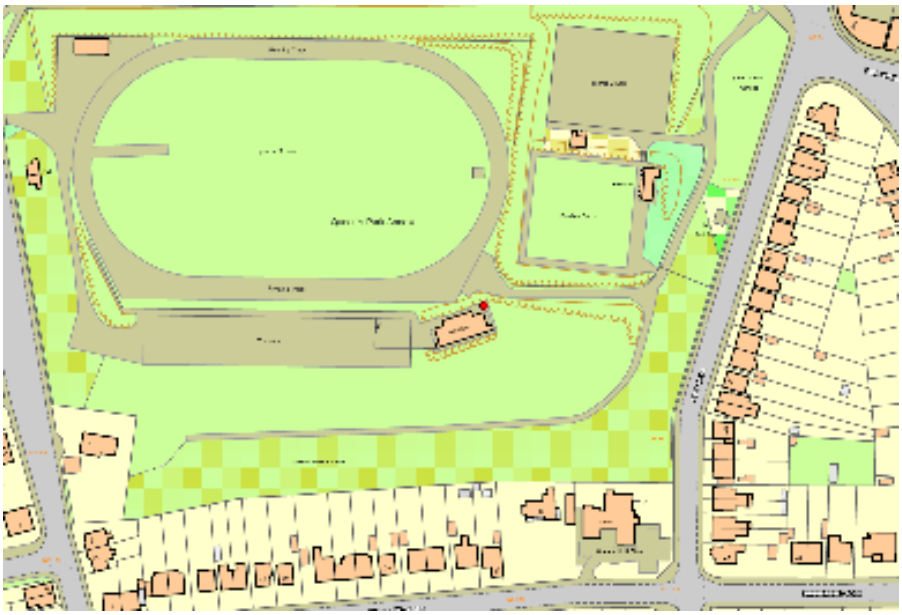
Figure 2.1 Location of Chatsworth Road Automatic Monitoring Site



Note: For data handling and data download purposes, this site is referred to as Chesterfield Roadside, by both Bureau Veritas and DEFRA

This site, formerly classified as a Roadside site, has been reclassified as an Urban Background site due to the distance between the sample inlet and the nearest kerbside. This site is indicative of public exposure for dwellings in urban locations

Figure 2.2: Location of Queens Park Annex Automatic Monitoring Site



Note: For data handling and data download purposes, this site is referred to as Chesterfield, by both Bureau Veritas and DEFRA.

This site is classified as an Urban Background site, and is indicative of the diffusion tubes in locations set away from main roads (Note: Please see the section 2.1.2 below and Appendix B regarding the relocation of some tubes to facilitate the ongoing Detailed Assessments)

2.1.2 Non-Automatic Monitoring

NO_2 diffusion tubes are used across the Borough, in order to assess the wider exposure to NO_2. During 2011, the location of the diffusion tubes was rationalised in order to provide a more targeted programme of monitoring, in support of the ongoing Detailed Assessments. This involved removing the sites where the NO_2 level is routinely well below the target level (ie less than 30 $\mu g/m^3$), and relocating the tubes to the sites where the existing tubes show results at the target level. The co-located tubes on the Automatic Site at Queens Park Annex have not been moved.

Appendices B and C show the locations of the NOx diffusion tube monitoring across the Borough. The red dots show the locations of the tubes which have not been altered. The green dots are the revised locations allowing the ongoing Detailed Assessments to be undertaken. The blue dots show the locations of the tubes where monitoring has ceased.

The original locations are detailed in Table 2.2, overleaf:

Table 2.2 Original Locations of NOx tubes

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

16	Chatsworth Road	Urban roadside	436 349 370 657	4m	Y (1m)
17	Chatsworth Road	Urban roadside	436 349 370 657	4m	Y (1m)
18	Queens Park Annex (AQ station)	Urban background	437 909 370 545	N/A	N/A
19	Queens Park Annex (AQ station)	Urban background	437 909 370 545	N/A	N/A
20	Queens Park Annex (AQ station)	Urban background	437 909 370 545	N/A	N/A
21	Staveley Stables	Urban background	443 417 374 911	N/A	N/A
22	35, Ringwood Road, Brimington	Urban roadside	440 689 373 569	1m	Y (Building Façade)
23	1 Beetwell Street	Urban roadside	438 112 370 980	2m	Y (Building Façade)
24	10, Compton Street, near Saltergate	Urban roadside	437 687 371 433	4m	Y (Building Façade)
25	501, Chatsworth Road, near Vincent Crescent	Urban roadside	435 988 370 601	3m	Y (Building Façade)
26	114, Saltergate	Urban roadside	437 795 371 368	3m	Y (Building Façade)
27	Lowgates	Urban roadside	443 885 374 907	3m	Y (Building Façade)
28	45 Hollis Lane	Urban roadside	438 740 370 946	2m	Y (Building Façade)
29	Hollywell Cross Roundabout, Old Post Restaurant	Urban roadside	438 425 371 346	1m	Y (Building Façade)
30	348, Chatsworth Road, Brampton Mile	Urban roadside	436 704 370 763	2m	Y (Building Façade)
31	24, Derby Road, Jawbones Hill	Urban roadside	438 359 369 978	2m	Y (Building Façade)
32	Hasland By-Pass (A617)	Urban roadside	439244 370153	4m	N

33	Oak Farm	Urban roadside	444 702 372 482	N/A	Y (Building Façade)
34	451, Chatsworth Road, opp Chapel Lane West	Urban roadside	436 377 370 663	2m	Y (Building Façade)
35	632, Chatsworth Road, near Storrs Road	Urban roadside	435 654 370 538	3m	Y (Building Façade)
36	Queens Park	Urban background	437 935 370 866	N/A	N/A
37	15, Muirfield Road	Urban roadside	438 921 372 055	4m	Y (Building Façade)
38	93 Eastside Road	Urban roadside	438 517 373 513	4m	Y (Building Façade)

The revised locations are detailed in Table 2.3, overleaf

Table 2.3 Revised locations of NOx tubes

Tube Number	Site Name	Site Type	O/S Grid Reference	Distance to kerb of nearest road	Relevant Exposure
1	150 Chatsworth Rd	Urban roadside	437222 370956	1m	Façade
2	Not currently exposed, site demolished	-	-		-
3	376 Sheffield Road	Urban roadside	438291 373006	1m	Façade
4	390 Sheffield Road	Urban roadside	438284 373057	1m	Façade
5	17, South Place	Urban roadside	438293 370863	1m	Façade
6	6 Church Street, Brimington	Urban roadside	440440 373514	1m	Façade
7	63/65 Duke Street	Urban roadside	443454 374781	1m	Façade
8	St Augustines, 212 Derby Road	Urban roadside	438395 369776	3m	Façade
9	Lincoln Street, 287 Derby Road	Urban roadside	438385 369574	2m	Façade
10	7 High Street, Brimington	Urban roadside	440531 373484	1m	Façade
11	42, Whittington Hill (B6052)	Urban roadside	438307 374560	2m	Façade
12	460, Sheffield Road	Urban roadside	438279 373336	2m	Façade
13	14a Church Street, Staveley	Urban roadside	443450 374817	1m	Façade
14	348 Derby Road, Storforth Lane	Urban roadside	438357 369410	2m	Façade
15	Chatsworth Road AQ. Site	Urban roadside	436349 370658	4m	Co-location
16	Chatsworth Road AQ. Site	Urban roadside	436349 370658	4m	Co-location
17	Chatsworth Road AQ. Site	Urban roadside	436349 370658	4m	Co-location
18	Queens Park Annexe AQ Site	Urban background	437909 370544	85m	Co-location
19	Queens Park Annexe AQ Site	Urban background	437909 370544	85m	Co-location
20	Queens Park Annexe AQ Site	Urban background	437909 370544	85m	Co-location
21	39 Duke Street, Staveley	Urban roadside	443447 374711	1m	Façade
22	25/27 Ringwood Road, Brimington	Urban roadside	440669 373711	1m	Façade
23	78 Whittington Hill	Urban roadside	438285 374446	2m	Façade
24	10, Compton Street, Saltergate	Urban roadside	437686 371433	1m	Façade
25	62 Whittington Hill	Urban roadside	438294 374497	3m	Façade

26	37 Whittington Hill	Urban roadside	438323 374540	6m	Façade
27	Lowgates, Staveley	Urban roadside	443897 374912	3m	Façade
28	Fingertips, Patrick Hinds House, Church St, Brimington	Urban roadside	440323 373482	1m	Façade
29	Hollywell Cross R/T, Old Post Restaurant	Urban roadside	438417 371357	1m	Façade
30	348, Chatsworth Rd, Brampton Mile	Urban roadside	436702 370761	2m	Façade
31	386 Sheffield Road	Urban roadside	438289 373028	1m	Façade
32	Warner Street, Hasland	Urban roadside	438976 370356	4m	Roadside
33	55 Duke Street, Staveley	Urban roadside	443452 374762	1m	Façade
35	632, Chatsworth Road, Storrs Road	Urban roadside	435654 370537	3m	Façade
36	65 Whittington Hill	Urban background	438304 374457	2m	Façade
37	50 Church Street, Brimington	Urban roadside	440361 373513	1m	Façade
38	14 Church Street, Brimington	Urban roadside	440421 373515	1m	Façade
39	43 Sheffield Road	Urban roadside	438343 371908	1m	Façade
40	380 Sheffield Road	Urban roadside	438290 373014	1m	Façade
41	James Street / Lockoford Lane	Urban roadside	438407 372798	1m	Roadside

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

2.2.1.1 Automatic Monitoring Data

The Air Quality Objective has not been exceeded at either AURN sites within the Borough, for either the annual mean (40 µg/m^3 annual mean NO_2), or the 1-hour mean exceedences (18 exceedences of the 200 µg/m^3 1-hour mean). Power supply problems at the Chatsworth Road site has lead to a lower data capture. This has resulted in the 99.8th percentile value being quoted in the second table:

Table 2.4a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2011 %	Annual mean concentrations (µg/m^3)		
				2009	2010	2011
Chesterfield	Queens Park	N	95.5	19.0	19.5	14.8
Chesterfield Roadside	Chatsworth Road	N	87.1	20.6	22.9	23.2

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

Site ID	Location	Within AQMA?	Data Capture 2011 %	Number of Exceedences of hourly mean (200 µg/m^3) Where the period of valid data is less than 90% of a full year, include the 99.8th percentile of hourly means in brackets.		
				2009	2010	2011
Chesterfield	Queens Park	N	95.5	0	0	0
Chesterfield Roadside	Chatsworth Road	N	87.1	0	0	0 (94)

2.2.1.2 Diffusion Tube Monitoring Data

Of the 27 NOx monitoring tubes which where sited continuously throughout 2011, **two indicate levels which exceed the Air Quality Objective for NO_2**. However of these two sites the following must be noted:

One site was located to give results representative of a terrace of houses adjacent to a main trunk road through Chesterfield. These houses have now been demolished as part of a proposed commercial redevelopment. As there is now no valid exposure, the site has been discontinued. The remaining site is one of the original tubes locations which indicated the need for Detailed Assessments, and have been added to as part of the ongoing Detail Assessments (Three further sites which indicated the need for a Detailed Assessment are now below the Air Quality Objective, but the current Detailed Assessments are still being carried out). This site is Site 40: 380 Sheffield Road.

The tubes which have been exposed throughout during 2011, and the results obtained, are listed in Table 2.5a below:

Table 2.5a Results of Nitrogen Dioxide Diffusion Tubes

Tube No	Site	2009	2010	2011
1	150 Chatsworth Rd (A619)	25.3	34.3	29.8
2	Markham Road, A619	35.9	**53**	**49.6**
5	17, South Place	26.3	33.2	29.4
6	6 Church St, Brimington	38.4	**46.3**	37.6
7	Duke Street, Staveley	35.7	**44.4**	31.7
8	St Augustines, 212 Derby Road	30.2	37.4	33.1
9	Lincoln Street, 287 Derby Road	28	38.2	29.4
11	42, Whittington Hill (B6052)	32.8	**45**	37.1
12	460, Sheffield Road	27.4	34.1	28.7
14	348 Derby Road, Storforth Lane	31.2	**42.7**	37.1
15	Chatsworth Road AQ. Site	20	24.4	22.2
16	Chatsworth Road AQ. Site	20.4	25.1	22.1
17	Chatsworth Road AQ. Site	20.6	24.5	22.6
18	Queens Park Annexe	21.4	21.3	15.6
19	Queens Park Annexe	21.3	20.2	15.9
20	Queens Park Annexe	20.7	23.4	16.2
22	35, Ringwood Road, Brimington	26.9	36.2	35.6
24	10, Compton Street, Saltergate	33.2	**44**	39.0
27	Lowgates	29.1	**40.7**	34.2
29	Hollywell Cross R/T, Old Post Restaurant	30	39.4	33.6
30	348, Chatsworth Rd, Brampton Mile	26.2	34.4	31.0
32	Hasland By-Pass (A617)	21.6	29.9	31.9
34	451, Chatsworth Rd, Chapel Lane West	23.8	29.4	26.9
35	632, Chatsworth Road, Storrs Road	27.1	38.5	33.7
39	43 Sheffield Road	-	29	29.2
40	380 Sheffield Road	-	**45.2**	**42.3**
41	James Street / Lockoford Lane	-	31.4	30.0

The tubes which have been relocated to facilitate the current Detailed Assessments, and were only exposed for part of the year, are shown in Table 2.5b, below:

Table 2.5b Results of Nitrogen Dioxide Diffusion Tubes

Tube No	Site	2009	2010	2011
3	3, St Augustines Road	19.3	24	19.2
4	Derby Road Development (A61)	19.6	25.1	21.9
10	18, Chesterfield Road, Brimington	23.6	24.4	34.9
13	99, Chesterfield Road, Staveley	27.5	33.1	30.1
21	Staveley Stables	26.3	27.8	14.3
23	1, Beetwell Street	22.8	30.7	22.7
25	501, Chatsworth Rd, Vincent Cres	17.4	22.7	17.6
26	114, Saltergate	25	24.8	28.5
28	44 Hollis Lane	27.3	35.1	37.4
31	24, Derby Road, Jawbones Hill	23.8	28.6	20.8
36	Queens Park	22.8	24.8	16.7
37	Muirfield Road	18.5	24.1	22.5
38	Eastside Road	25.2	30.1	27.1

As can be readily seen, all sites are well below the Air Quality Objective with the exception of one. Site 28 (44 Hollis Lane) demonstrated levels which approach the Air Quality Objective, and with an increasing trend. A second site (Site 10 – 18 Chesterfield Road, Brimington) similarly shows elevated levels, but to a lesser extent. In light of this, once the current Detailed Assessments have been completed, the tube locations will be reviewed to allow these two monitoring locations to be reactivated.

Given that the data is well below the Air Quality Objective, no annualising of the data for 2011 has been carried out.

2.2.2 PM_{10}

PM_{10} is measured at two locations in Chesterfield at the AURN sites. **The levels are consistently below the Air Quality Objectives**, as they have been for a long period. The monitoring results for 2011 and two previous years (to demonstrate the recent trend) are shown in the tables below:

Table 2.6a Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2011 %	Annual mean concentrations ($\mu g/m^3$)		
				2009	2010	2011
Chesterfield	Queens Park	N	87%	19.0	19.5	21.6
Chesterfield Roadside	Chesterfield Road	N	67%	20.6	22.9	17.8

Table 2.6b Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2011 %	Number of Exceedences of daily mean objective (50 $\mu g/m^3$) Where data capture < 90%, include the 90th percentile of daily means in brackets.		
				2009	2010	2011
Chesterfield	Queens Park	N	87%	0	0	0 (38.4)
Chesterfield Roadside	Chesterfield Road	N	67%	0	0	0 (27.6)

2.2.3 Sulphur Dioxide

Sulphur Dioxide is not a pollutant of concern and is not monitored in the Chesterfield BC area.

2.2.4 Benzene

Benzene is not a pollutant of concern and is not monitored by Chesterfield BC. The AURN monitoring site at Chatsworth Road (Chesterfield Roadside) includes Benzene monitoring, on behalf of DEFRA, but these results are not made available to Chesterfield BC.

2.2.5 Other pollutants monitored

The AURN monitoring site at Chatsworth Road (Chesterfield Roadside) is proposed to be included in the DEFRA backed Aldehyde monitoring programme, but this had not yet been instigated.

Chesterfield BC has measured concentrations of Nitrogen Dioxide above the annual mean objective at relevant locations and **is currently carrying out Detailed Assessments**, at the following locations:

i) **Sheffield Road, Whittington Moor**
ii) **Whittington Hill, Old Whittington**
iii) **Church Street, Brimington**
iv) **Duke Street, Staveley**

This work is being carried out as a result of the monitoring submitted as part of the 2010 Progress Report, which resulted in annual mean NO_2 levels which are higher than the current results.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Concentrations are often higher where traffic is slow moving with stop/start driving, and where buildings on either side reduce dispersion. The assessment need only consider nitrogen dioxide. The criteria for this assessment are as follows:

Relevant exposure within 5m of the kerb
Flow greater than 5,000 vehicles per day
Roads where the average speed is 50kph or less
Roads where carriageway width is less than 10m

Chesterfield is a traditional market town and as such is particularly vulnerable to the street canyon effect influencing the air quality on some of its roads. All roads in Chesterfield which meet any of these criteria have been assessed in previous reports. There are only two roads that fulfil this criteria, namely Chatsworth Road and Derby Road and these have been assessed at length in previous reports. Therefore no further assessment is required.

Chesterfield BC confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1 hour or More Close to Traffic

There will be some locations where individuals may regularly spend 1 hour or more, for example streets with many shops and streets with outdoor cafes and cars. People occupationally exposed in such locations should not be included, as they are not covered by the regulations. The assessment only needs to consider nitrogen dioxide. The criteria for this assessment are as follows:

Flow greater than 10,000 vehicles per day
Relevant exposure within 5m of the kerb for 1 hour or more.

Since the main town centre shopping area in Chesterfield is pedestrianised there are no roads that fall into this category, therefore no further assessment is required. All such areas have been considered in during earlier rounds, therefore there is no need to proceed further.

Chesterfield BC confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

There will be some locations where traffic flows are not necessarily high (fewer than 20,000 vehicles per day) but there is an unusually high proportion of buses or lorries (classified together as High Density Vehicles, HDVs). The assessment needs to consider both nitrogen dioxide and PM_{10}. The criteria for this assessment are as follows:

Roads where HDV's comprise more than 25% of traffic flow.
Relevant exposure within 10m of these roads
The flow of HDV's is greater than 2,500 vehicles per day

There is one road in Chesterfield that partially fulfils these criteria, namely New Beetwell Street. It runs through the centre of the town, parallel to Markham Road. The majority of cars and HDV's which pass through Chesterfield use the adjacent Markham Road, leaving New Beetwell Street to be used predominantly by buses. It also hosts the highest concentration of bus stops in Chesterfield Town Centre. As such it is used somewhat as a bus station and the vehicle flow would undoubtedly comprise more than 25% HDV's although exact traffic proportion data is currently unavailable. There are two residential properties within 10m of New Beetwell Street. However the number of bus movements on this road per day is approximately 700 which is below the 2500 trigger criteria as outlined above.

Continuous monitoring using a mobile Air Quality Station was conducted adjacent to the residential property on New Beetwell Street from 1st April to 1st September 2002 and was reported in the Update & Screening 2003. The extrapolated annual mean for 2003 was calculated to be 37.4μgm^{-3}, which projected to 2005, is 34.0μgm^{-3}. This is below the annual mean Air Quality Objective of 40μgm^{-3}. The number of bus routes via New Beetwell Street remains comparable to those in 2003 and as such the Air Quality Objective at this location should not be at risk of exceedence. Nevertheless, as part of the diffusion tube re-assessment in 2005, a new diffusion tube location (23) was mounted near the residential development on New Beetwell Street to ensure the levels continue to remain below the objective. This has shown consistently to be below the nitrogen dioxide air quality objective over the past three years, and has now been removed as part of the relocation of existing NOx tubes which are well below the Air Quality Objective.

Taking into consideration the low number of bus movements along this road coupled with the consistently low level of NO_2 at this location, there is no need for further assessment.

Chesterfield BC confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

The new B2net Stadium football ground, on Sheffield Road was opened in 2010 and forms part of a larger redevelopment of the site previously occupied by Dema Glass. Although the football stadium was viewed as being the major development on the site, its impact has been overshadowed by the opening of a Tesco supermarket on an adjacent plot. Traffic modelling, submitted as part of the planning application process, indicated that the increased traffic levels would not have a sufficiently adverse effect to breach the Air Quality Objective at the most directly affected dwellings on Sheffield Road and the Lockoford Lane/James Street junction. This assessment, which found that the development would have a minimal adverse effect, was approved by external contractors employed by the authority. However, the modelling was carried out using emission factors which are now regarded as not sufficiently accurate and monitoring has indicated that breaches of the Air Quality Objective may in fact be occurring, at properties on Sheffield Road. This has led to a Detailed Assessment being carried out at this location.

A programme of diffusion tube monitoring was begun (in March 2010) to examine NO_2 in this area, this monitoring demonstrated a possible breach of the Air Quality Objective, and has been revised as part of the Detailed Assessment currently underway.

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Figure 3.1 below shows the location of the two sites, and the location of nearby NOx tube monitoring. The red line is the façade of a row of terraced houses where a detailed assessment is being carried out. The red dot, below the football stadium is the location of a single NOx tube which is consistently well below the Air Quality Objective (Site 41 James Street / Lockoford Lane). It is believed that the housing façade is affected by the positioning of traffic lights and a pedestrian crossing in the highway directly to the front, whereas a similar means of traffic management in the second location (the single NOx tube to the south) is displaced across a wider combined verge and pavement, substantially reducing the ambient exposure.

Figure 3.1 The New Football Stadium and Supermarket and Immediate Environs

Picture courtesy of Google Maps

Figure 3.2: Oblique View of the Stadium and Supermarket

Picture courtesy of Rob McGann, Robinson Steel Structures

A new hotel development and conferencing centre is situated on Lockoford Lane (on the opposite side of the road from the new supermarket and can be seen in the lower left in the Figure 3.2, above), on a prominent site alongside the A61 and has resulted in a very modest increase in traffic along these routes, and can be disregarded.

A new motor dealership was also recently opened just off the A61, to the north east of the new football stadium (on the open ground shown in Figure 3.1, above). This has resulted in very modest increases in traffic along the A61, and can be disregarded.

The impact of the additional traffic along these routes will be fully reported in the Detailed Assessment, later this year.

Chesterfield Borough Council has assessed new/newly identified junctions meeting the criteria in Section A.4 of Box 5.3 in TG(09), and concluded that **it was necessary to proceed to a Detailed Assessment for Nitrogen Dioxide, which is currently ongoing.**

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

This approach to considering new roads will depend on whether or not an assessment was carried out in advance of building the new roads.

3.5.1 The Waterside Development Project

The redevelopment of the former Trebor Bassett sweet factory site, and the neighbouring vacant lots has been proposed. This is a large mixed office/retail and residential scheme (known as the Waterside Development), bordering on the A-61 trunk road skirting the centre of Chesterfield.

Figure 3.2 Location of the Waterside Development, and Immediate Environs

As part of the planning application process, a major assessment has been carried out into the possible increase in pollution levels at the site, and the impact of traffic on the trunk road in the site itself. The finding of the assessment of the site is that vehicles within the development site will have a minimal effect both in the site and at receptors nearby (an existing row of terraced housing). The traffic on the existing trunk road will have a minimal effect on the sensitive receptors on the site, due to the separation distance involved.

Figure 3.3 Artist Impression of the Completed Waterside Development

Picture Courtesy of Chesterfield Waterside Ltd

3.5.2 Markham Vale Development Project

The Markham Employment Growth Zone (now known as Markham Vale Industrial Park) development on the former Markham Colliery site and surrounding land to the east of the borough has begun, with the construction of the road infrastructure required to ease access to and from the proposed industrial estate. During the initial stages of the planning application relating to this major development concerns were raised regarding the possible impact on receptors around the development area (both within the Borough's area and in the neighbouring Authority). However, the applicant raised doubts over the accuracy of the modelling, using DMRB, and ongoing monitoring has not demonstrated a breach of the Air Quality Objective. The roads highlighted in the application are included in the regular monitoring being undertaken by Chesterfield Borough Council. The projected increase in traffic on the existing trunk road will have a minimal effect on the sensitive receptors near to the development site (a row of semi-detached houses), due to the separation distance involved.

Figure 3.4 Projected Layout of the Completed Markham Vale Development, viewed from the South

Picture Courtesy of Henry Boot Developments Ltd

Chesterfield Borough Council has assessed new/proposed roads, and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.6 Roads with Significantly Changed Traffic Flows

The increase in traffic which is thought to be linked to the opening of a new supermarket has been referred to in section 3.4 above

Chesterfield Borough Council has assessed new/newly identified roads with significantly changed traffic flows, and concluded that **it was necessary to proceed to a Detailed Assessment for Nitrogen Dioxide, which is currently ongoing.**

3.7 Bus and Coach Stations

As part of the screening process bus stations that are not enclosed must be identified and an assessment should be made as to their impact on any relevant receptors. There is one coach station in Chesterfield, built in 2004, which is located on Beckingham Way and is not enclosed. However there is no relevant exposure within 10m of the coach station and the flow of buses is less than 1000 per day, therefore no further assessment is required.

Chesterfield BC confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Aircraft are potentially significant sources of nitrogen oxide emissions, especially during takeoff. However emissions from aircraft once they are above 200m will make a negligible contribution to ground level concentrations, therefore the criteria to screen for impact from airports is relevant exposure within 1000m of the airport boundary. The nearest airport to Chesterfield, Sheffield Airport approximately 24km to the North, is now closed.

Chesterfield Borough Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

Stationary locomotives, both diesel and coal fired, can give rise to high levels of sulphur dioxide close to the point of emission. Recent evidence suggests that moving diesel locomotives, in sufficient numbers, can also give rise to high nitrogen dioxide concentrations close to the track. These two potentially significant sources are considered separately below. People occupationally exposed to these sources should not be included, as they are not covered by the regulations.

In order to identify these locations the following criteria should be used.

> Locations where diesel or steam locomotives are regularly stationary for periods >15 minutes or more
> Regular outdoor exposure within 15m of the stationary locomotives.

There are no locations within Chesterfield that meet these criteria therefore no further assessment is required.

4.2.1 Stationary Trains

Chesterfield Borough Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

Chesterfield Borough Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

Large ships generally burn oils with a high sulphur content in their main engines (bunker oils). If there are sufficient movements in a port they can give rise to sufficient number of 15 minute periods above 255ug/m3 to exceed the 15 minute objective. Chesterfield is a landlocked authority, distanced from any ports therefore no further assessment is required.

Chesterfield Borough Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

No new industrial sources have been assessed since the last USA report in 2009. No applications for development have been received.

Chesterfield BC confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

The current economic climate has had the effect of depressing the manufacturing base, and the house building activity, in the Borough area, as such there has been no increase in emissions or new relevant exposure.

Chesterfield BC confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

The have been no new or significantly changed installations since the last USA report in 2009.

Chesterfield BC confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There is some evidence that major petrol fuel depots could emit sufficient benzene to put the 2010 objective at risk of being exceeded, especially if combined with higher levels from nearby busy roads.

There are no major fuel storage depots in Chesterfield therefore no further assessment is required.

Chesterfield Borough Council confirms that there are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

There is some evidence that petrol stations could emit sufficient benzene to put the 2010 objective at risk of being exceeded, especially if combined either higher levels from nearby busy roads. To identify these roads, the following criteria are used:

Annual throughput of more than 2000m^3
Relevant exposure within 10m of the pumps.

No petrol stations were identified in the previous rounds of Review and Assessment as fulfilling these criteria and there are no new sources, therefore no further assessment is required.

Chesterfield Borough Council confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

There is evidence that large scale intensive poultry and egg farms have the potential to cause an exposure to PM10. In order to identify the potential for such operations to give rise to problems the following screening criteria are used:

Total number of birds –
Greater than 400,000 if mechanically ventilated
Greater than 200,000 if normally ventilated
Greater than 100,000 if raising turkeys

Relevant exposure within 100m

The single poultry farm in question is of a smaller size than the screening criteria, as such no further assessment is required.

Chesterfield Borough Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

No biomass combustion plants are located within the Chesterfield borough area. However, part of the Markham Vale Industrial Park Development (included in section 3.5) includes the aspirational proposal to include short rotation coppicing of trees on the parkland area, to the east of the site, to provide fuel to heat many of the buildings across the site.

Chesterfield Borough Council confirms that there are no biomass combustion plants in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

No biomass combustion plants are located within the Chesterfield borough area

Chesterfield Borough Council confirms that there are no biomass combustion plants in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

Areas of domestic coal burning could be a significant local source of SO_2. Areas of significance are deemed to be approximately 500m x 500m with more than 100 houses burning solid fuel as their primary source of heating. Previous rounds of Review & Assessment did not identify any areas of domestic coal burning fulfilling these criteria and so were not likely to give rise to exceedence of the Air Quality Objective for SO_2. There are no new sources or any areas of new exposure, therefore no further assessment is required.

Chesterfield Borough Council confirms that there are no areas of significant domestic solid-fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

There may also be a number of sources, not already listed, in an area that are significant for PM_{10} as they generate fugitive dust. These sources include quarries/landfill sites/opencast coal and handling of dusty cargoes at ports etc. The only sources within Chesterfield Borough Council's area are two landfill sites; one is the Hall Road Landfill Site, Staveley and the other is the nearby Erin Void landfill site, at Poolsbrook. Both the DEFRA modelled, and AURN monitored background levels of PM_{10} across the Chesterfield Borough Council area are less than $26\mu gm^{-3}$, and there is no relevant exposure within 200m of either landfill site, therefore no further assessment is required.

Chesterfield Borough Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The current monitoring results confirm that traffic pollution hotspots continue to be an issue to concern within Chesterfield Borough Council's area. **A single exceedence of the Nitrogen Dioxide Air Quality Objective has been identified, and this is at a location where an ongoing Detailed Assessment is taking place**. This appears to be linked to the opening of a large supermarket, the modelling for which did not indicate that a breach would occur. **Three other locations which had been identified as exceeding the Nitrogen Dioxide Air Quality Objective, are now below the target level**. Data acquisition supporting the Detailed Assessments is still being carried out, and the findings of the Detailed Assessments will be reported once 12 month's valid data has been gathered.

8.2 Conclusions from Assessment of Sources

No new sources have been identified, nor any significant changes to the currently identified sources in the Borough

An ongoing Detailed Assessment has lead to a revision of the locations of NOx diffusion tubes to reflect the findings in the revised 2011 Progress report.

Two proposed developments have been extensively modelled as part of the planning application process, and are expected to have a minimal effect on the levels of traffic pollution, and in both cases the residential premises which would be affected are sufficiently set back from the highway that normal atmospheric dispersion is expected to reduce any possible impact to well below the Air Quality Objective

8.3 Proposed Actions

1) The monitoring being undertaken as part of the Detailed Assessment is still ongoing.

2) The findings of the Detailed Assessment will be reported following the completion of 12 months on-site monitoring later this year.

3) Following submission of the Detailed Assessment reports, the existing locations of passive diffusion tube monitoring will be reviewed, to ensure that the monitoring locations can best reflect the traffic hotspots across the borough.

9 References

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Markham Employment Growth Zone Planning Application Supporting Documents, Volumes One and Two, MEGZ Ltd, May 2002

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