



# 2013 Air Quality Progress Report for

## **Canterbury City Council**

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

November 2013

<b>Local Authority Officer</b>	Stuart Steed
<b>Department</b>	Neighbourhood Services
<b>Address</b>	Canterbury City Council, Military Road, Canterbury, Kent, CT1 1YW
<b>Telephone</b>	01227 862228
<b>e-mail</b>	stuart.steed@canterbury.gov.uk
<b>Report Reference number</b>	
<b>Date</b>	November 2013

## Executive Summary

Part IV of the Environment Act 1995 places a statutory duty on local authorities to review and assess the air quality within their area and take account of Government guidance when undertaking such work.

This report has assessed new monitoring data for 2012, and any changes that may have occurred which would affect air quality in the district.

Diffusion tube monitoring for 2012 demonstrates a need to retain the current Air Quality Management Monitoring Area. One diffusion tube site outside of the AQMA, at Herne Street, indicates an exceedence of the nitrogen dioxide annual mean objective during 2012. However, the location of the monitoring site is thought to be contributing to higher recorded concentrations of nitrogen dioxide in this location. New monitoring carried out during 2012 appears to support this hypothesis. This report concludes that additional diffusion tube monitoring is required in Herne Street, to more thoroughly investigate the levels of nitrogen dioxide there.

The biomass boiler located at the Canterbury City Council, which was identified during the 2012 Updating and Screening Assessment, has been assessed using the Defra review and assessment tool for biomass combustion. The calculated emissions rates from the stack of nitrogen dioxide and PM<sub>10</sub> are both below the target emissions rates produced by the calculator tool, therefore a Detailed Assessment is not required.

The conclusion of this report is that the council will not be proceeding with a Detailed Assessment for any regulated pollutants.

# Table of Contents

<b>1</b>	<b>Introduction</b>	<b>5</b>
1.1	Description of Local Authority Area	5
1.2	Purpose of Progress Report	5
1.3	Air Quality Objectives	6
1.4	Summary of Previous Review and Assessments	8
<b>2</b>	<b>New Monitoring Data</b>	<b>12</b>
2.1	Summary of Monitoring Undertaken	12
2.2	Comparison of Monitoring Results with Air Quality Objectives	34
<b>3</b>	<b>New Local Developments</b>	<b>49</b>
3.1	Commercial and Domestic Sources	49
<b>4</b>	<b>Implementation of Action Plans</b>	<b>51</b>
<b>5</b>	<b>Conclusions and Proposed Actions</b>	<b>70</b>
5.1	Conclusions from New Monitoring Data	70
5.2	Conclusions relating to New Local Developments	70
5.3	Other Conclusions	70
5.4	Proposed Actions	71

## List of Tables

1.1	Air Quality Objectives included in Regulations for the purpose of LAQM in England
2.1	Details of Automatic Monitoring Sites
2.2	Details of Non-Automatic Monitoring Sites
2.3	Results of Automatic Monitoring for NO <sub>2</sub> : Comparison with Annual Mean Objective
2.4	Results of Automatic Monitoring for NO <sub>2</sub> : Comparison with 1-hour Mean Objective
2.5	Results of NO <sub>2</sub> Diffusion Tubes 2012
2.6	Results of Automatic Monitoring for PM <sub>10</sub> : Comparison with Annual Mean Objective
2.7	Results of Automatic Monitoring for PM <sub>10</sub> : Comparison with 24-hour Mean Objective
3.1	Canterbury City Council Biomass Boiler: Comparison of Target and Stack Emission Rates

- 4.1 Annual Freedom Pass Numbers for Kent
- 4.2 Annual Freedom Pass Journey Numbers for Kent
- 4.3 Action Plan Progress

**List of Figures**

- 1.1 Map of AQMA No<sub>2</sub>
- 2.1 Maps of Automatic Monitoring Sites
- 2.2 Maps of Non-Automatic Monitoring Sites
- 2.3 Trends in Annual Mean NO<sub>2</sub> Concentrations Measured at Automatic Monitoring Sites
- 2.4 Trends in Annual Mean PM<sub>10</sub> Concentrations

**Appendices**

Appendix A

Unadjusted nitrogen dioxide diffusion tube data

Appendix B

Defra biomass calculator tool results

# 1 Introduction

## 1.1 Description of Local Authority Area

The Canterbury district is diverse in character, and has the historic city of Canterbury as its administrative centre, which encompasses a third of the district's population. To the north are the coastal towns of Whitstable and Herne Bay, which are also significant centres of population. The remaining part of the district is rural in character comprising of a number of small villages.

The main source of air pollution in the district is road traffic emissions from major roads, notably the A2, A28 and A290. An Air Quality Management Area (AQMA) was declared in April 2006 along parts of the A28 in Broad Street/Military Road, in Canterbury city centre, where exceedences of the annual mean objective for nitrogen dioxide (NO<sub>2</sub>) were predicted. This AQMA was then incorporated into an expanded area in 2011 (AQMA No2 Canterbury City Centre), which also included two small areas of Broad Street and Wincheap where there were predicted exceedences of the nitrogen dioxide one hour mean objective ~~objective~~.

The city of Canterbury depends on a large net inflow of commuters as well as an influx of secondary school children, shoppers, University students and tourists.

The city centre suffers from significant congestion, especially on the A28 corridor. Other pollution sources, including commercial, industrial and domestic sources make a contribution to background pollution concentrations.

## 1.2 Purpose of Progress 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.

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 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  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  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 LAQM in England**

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m <sup>3</sup>	Running annual mean	31.12.2003
	5.00 µg/m <sup>3</sup>	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m <sup>3</sup>	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m <sup>3</sup>	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m <sup>3</sup>	Annual mean	31.12.2004
	0.25 µg/m <sup>3</sup>	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m <sup>3</sup>	Annual mean	31.12.2005
Particulate Matter (PM <sub>10</sub> ) (gravimetric)	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m <sup>3</sup>	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005



## 1.4 Summary of Previous Review and Assessments

Between 1998 and 2002, Canterbury City Council undertook its first round of review and assessment of air quality. The first round assessments concluded that UK Air Quality Objectives would be achieved for all pollutants and no further action was required at that time.

The first phase of the second round of review and assessment, the Updating and Screening Assessment, was completed in May 2003 and concluded that there were no exceedences of the Air Quality Objectives identified within the local authority area.

The Progress Report for 2004 considered monitoring data for 2003, which showed significant increases in previous monitored results due to unusually stable meteorological conditions. The conclusions of the 2004 Progress Report were that the annual mean nitrogen dioxide objective might not be met at two pollution hotspots: Broad Street and Sturry Road.

A Detailed Assessment was undertaken for these locations in 2005 with the conclusion that there were predicted exceedences of the annual mean nitrogen dioxide objective at relevant receptor locations along Broad Street and the adjacent Military Road in Canterbury. The Council declared an Air Quality Management Area (AQMA) in April 2006 and has drawn up an Action Plan to improve air quality in the area.

The first phase of the third round of review and assessment, the Updating and Screening Assessment, was completed in July 2006. This concluded that there were no exceedences of the Air Quality Objectives identified within the district, outside of the AQMA.

The Progress Report for 2007 considered monitoring data for 2006. The conclusions were that the annual mean nitrogen dioxide objective might not be met at two pollution hotspots where new monitoring sites had been installed: North Lane and Rheims Way, and a Detailed Assessment of air quality was undertaken in 2008 at these two locations.

The 2008 Detailed Assessment confirmed exceedences in North Lane and Rheims Way and recommended the declaration of an AQMA along these roads, where exceedences were predicted at relevant receptors. Recommendations for additional

monitoring were also made including continuous monitoring in the North Lane/Rheims Way area and diffusion tube monitoring in St Peter's Place.

The fourth round of review and assessment commenced with the Updating and Screening Assessment, completed in June 2009. Monitoring data for 2008 confirmed the exceedences within the North Lane/Rheims Way areas and the need for an AQMA in this area. Additional 'hot spot' areas were also identified, including Sturry Road, Wincheap and St Dunstan's Street. It was recommended that a Detailed Assessment also be undertaken for these areas. Given the number of 'hot spot' areas being identified in the Canterbury city centre area, the Council expanded the assessment area to incorporate the entire Canterbury city centre ring route. This took the form of a combined Detailed and Further Assessment. The report confirmed the need to amend the current AQMA to incorporate the wider nitrogen dioxide exceedence areas, in addition to the nitrogen dioxide 1-hour mean objective.

Following consultation, a new AQMA (AQMA No.2), greatly extending the previous AQMA, and encompassing the Canterbury city centre ring route, was declared in November 2011.

The fourth round of Review and Assessment included the Council's 2011 Air Quality Progress Report (Canterbury City Council, 2011). This did not highlight any exceedences of the objectives outside of the new expanded AQMA, therefore it was not necessary to proceed to a Detailed Assessment.

In 2012 the council completed its latest Updating and Screening Assessment, which concluded that a Detailed Assessment was not required in 2013. Monitoring data from 2011 identified a number of exceedences of the nitrogen dioxide annual mean objective in Canterbury. Most of these exceedences are within the existing AQMA, confirming the need for this AQMA. There were three monitoring sites where the nitrogen dioxide annual mean objective was exceeded. The three locations were St. Martins Hill, Canterbury; Mill Road, Sturry and Herne Street, Herne. The 2011 annual mean concentrations recorded at St. Martins Hill and Mill Road were marginally above the objective. So in order to be more certain of the need for a Detailed Assessment, it was decided to carry out further diffusion tube monitoring in these areas for another year. Nitrogen dioxide levels can vary year to year, so more data is needed to determine the longer term trend for these locations. Although the

monitoring at Herne Street indicates an exceedence of the nitrogen dioxide annual mean objective, the diffusion tube is situated in a very sheltered corner of two buildings, so may be recording higher concentrations than would be expected at the façade of the buildings. Again it was decided to carry out further monitoring in this area, which was to include an additional diffusion tube site.

Three biomass combustion sources were identified in the USA, situated at Sainsbury supermarket, Kingsmead Road; the Canterbury Innovation Centre and at Canterbury City Council offices, Military Road. The biomass boilers at Sainsbury and Canterbury Innovation Centre were assessed and it was concluded there was no need to proceed to a Detailed Assessment. The boiler at Canterbury City Council was not operational at the time of the 2012 USA, so the conclusion was that it would be reassessed, and reported when it is operational again. The boiler only operates during the winter months when there is demand.

Figure 1.1 Map of AQMA No2



## **2 New Monitoring Data**

### **2.1 Summary of Monitoring Undertaken**

#### **2.1.1 Automatic Monitoring Sites**

In 2012 the Council operated automatic air quality monitoring stations at 5 locations in Canterbury.

- Chaucer Technology School
- St.Dunstan's Street
- Military Road
- North Lane
- St.Peter's Place

The Chaucer Technology School NO<sub>x</sub> analyser is affiliated to the Automatic Urban and Rural Network (AURN). Monitoring is also carried out for particles (PM<sub>10</sub>) at this site. The PM<sub>10</sub> analyser was formally part of the AURN, however it was de-affiliated from the network in October 2007. Data for both these analysers is also reported via the Kent and Medway Air Quality Monitoring Network (KMAQMN).

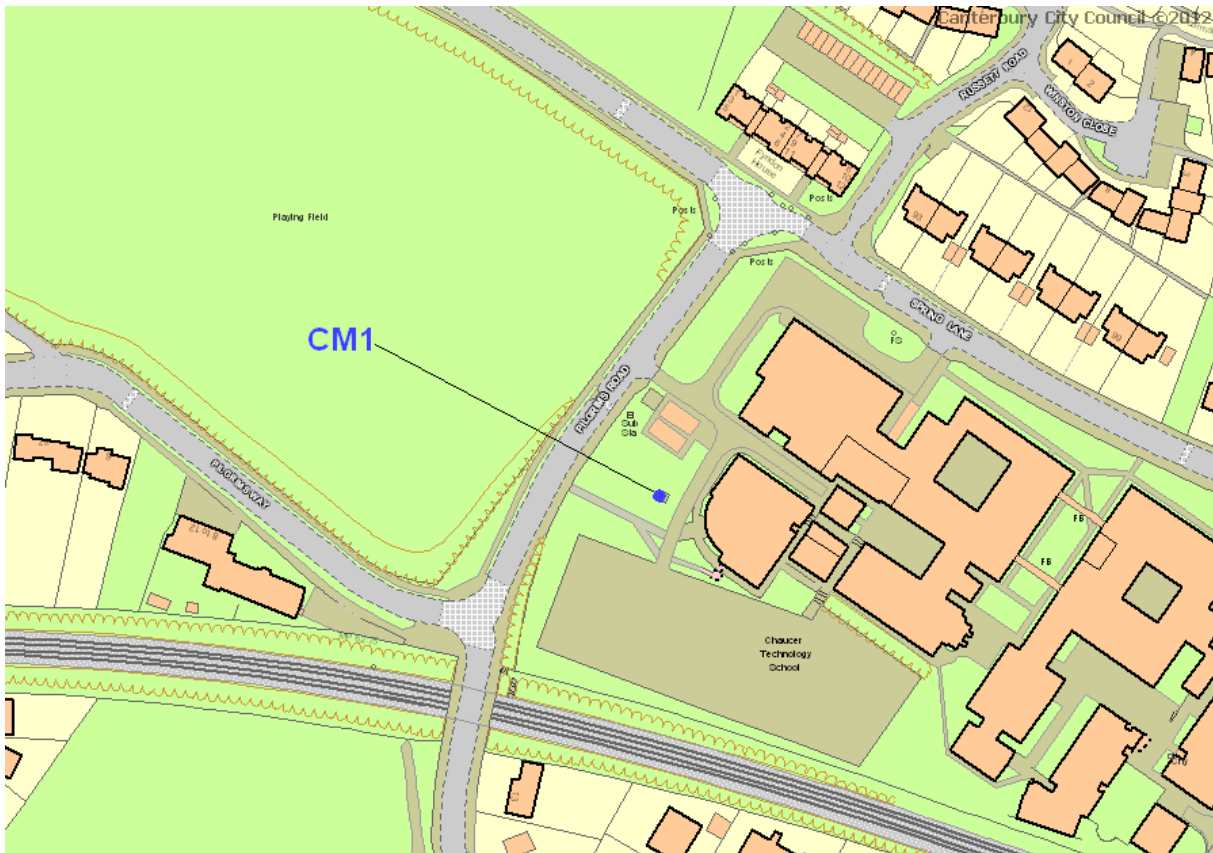
The St.Dunstan's Street, Military Road and St Peter's Place monitoring sites are affiliated to the K&MAQMN, managed by Ricardo-AEA, who carry out the data management and ratification for the network sites. The Quality Assurance/Quality Control (QA/QC) procedures for the KMAQMN are equivalent to those of the AURN.

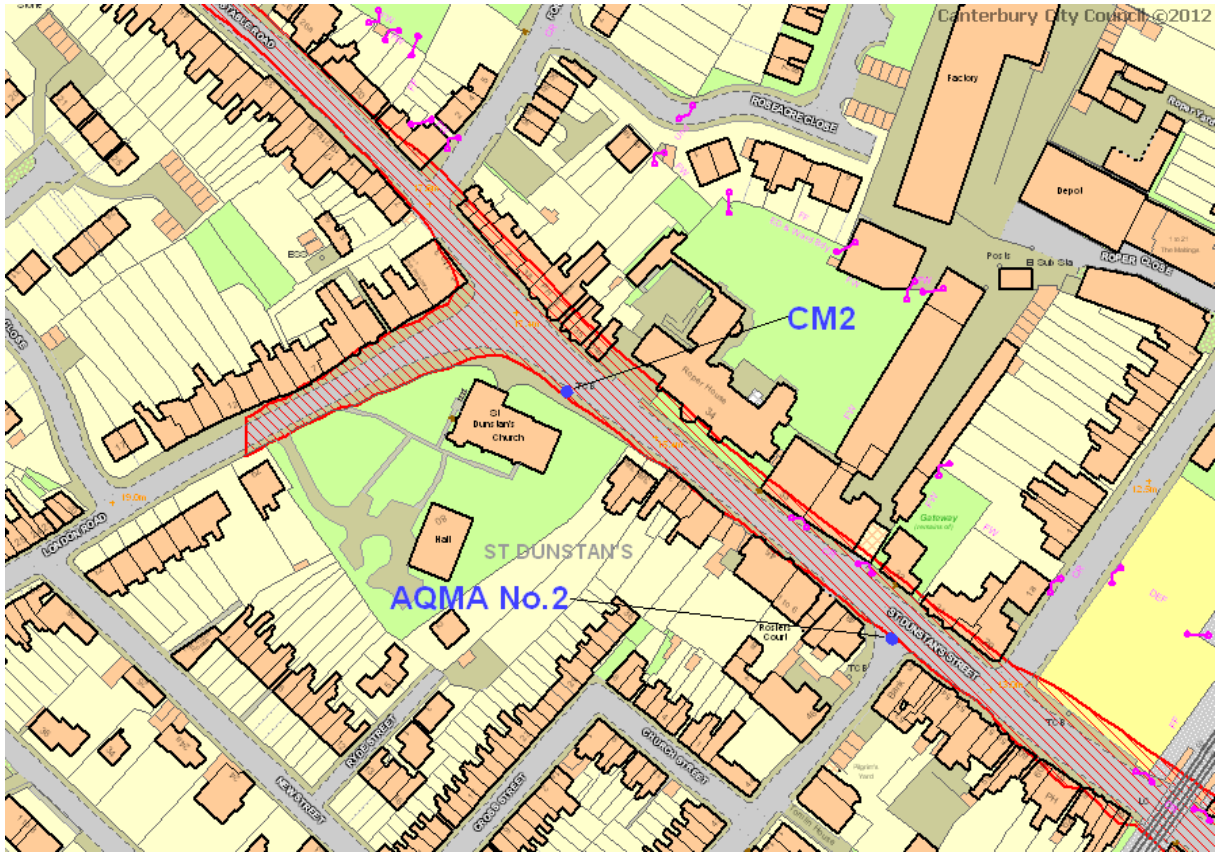
The North Lane monitoring site is currently not affiliated to the Kent network, however data for 2012 has been ratified.

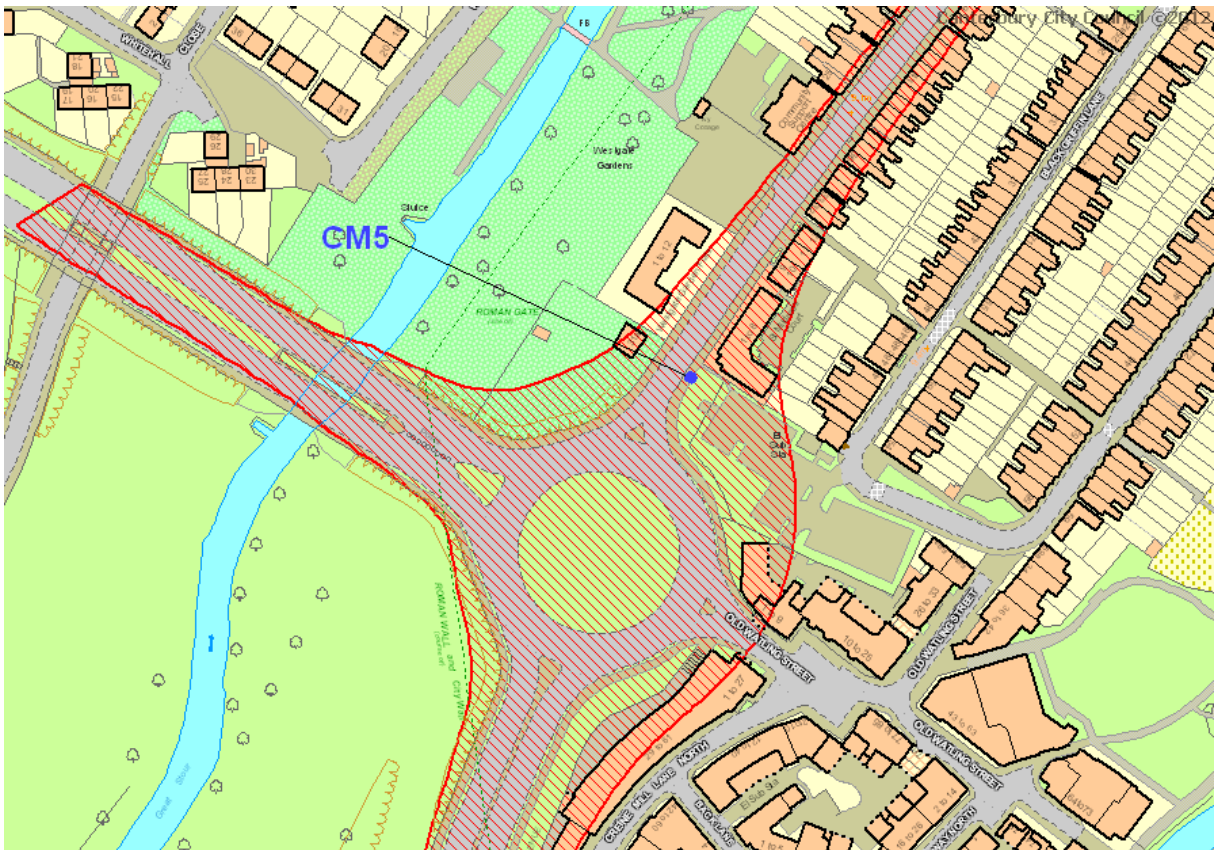
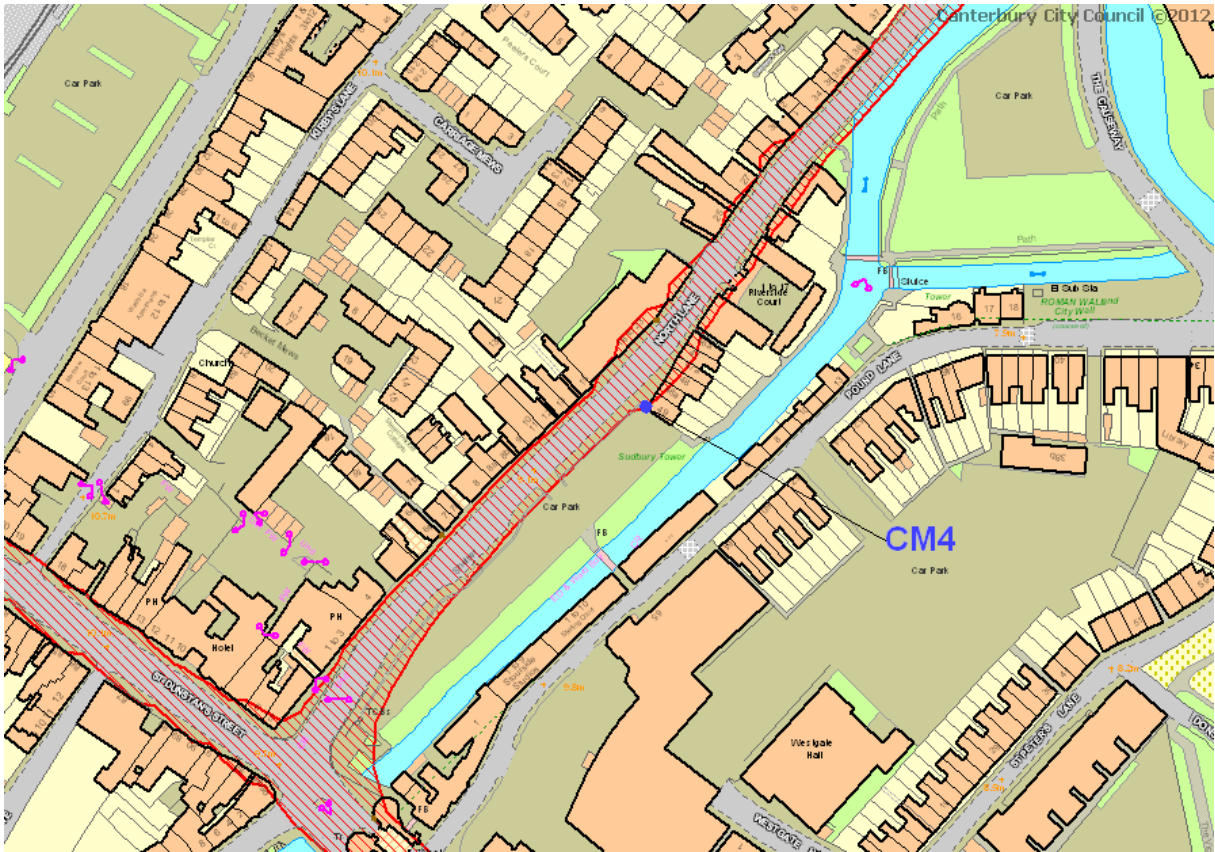
The council calibrates analysers every two weeks. Site services are carried out every 6 months. Air conditioning units are serviced once a year. All sites are covered by an emergency breakdown call out service. QA/QC audits are carried out twice per year for the Chaucer Technology School, and once per year for St.Dunstan's, Military Road, and St.Peter's Place. The North Lane site is not currently audited.

Figure 2.1 and Table 2.1 give details of the automatic monitoring sites located in Canterbury during 2012.

**Figure 2.1 Maps of Automatic Monitoring Sites**









**Table 2.1 Details of Automatic Monitoring Sites**

<b>Site ID</b>	<b>Site Name</b>	<b>Site Type</b>	<b>X OS Grid Reference</b>	<b>Y OS Grid Reference</b>	<b>Pollutants Monitored</b>	<b>In AQMA?</b>	<b>Monitoring Technique</b>	<b>Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)</b>	<b>Distance to Kerb of Nearest Road (m) (N/A if not applicable)</b>	<b>Does this Location Represent Worst-Case Exposure?</b>
<b>CM1</b>	Chaucer Technology School	Urban background	616186	157320	NO <sub>2</sub> , PM <sub>10</sub>	N	Chemiluminescence, TEOM	Y (0m)	N/A	N/A
<b>CM2</b>	St.Dunstan's Street	Roadside	614259	158324	NO <sub>2</sub>	Y	Chemiluminescence	N (representative of relevant exposure)	1.8m	N
<b>CM3</b>	Military Road	Roadside	615401	158169	NO <sub>2</sub>	Y	Chemiluminescence	N (representative of relevant exposure)	3.2m	N
<b>CM4</b>	North Lane	Roadside	614668	158207	NO <sub>2</sub>	Y	Chemiluminescence	Y (1.9m)	4.0m	Y

**Canterbury City Council**

<b>Site ID</b>	<b>Site Name</b>	<b>Site Type</b>	<b>X OS Grid Reference</b>	<b>Y OS Grid Reference</b>	<b>Pollutants Monitored</b>	<b>In AQMA?</b>	<b>Monitoring Technique</b>	<b>Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)</b>	<b>Distance to Kerb of Nearest Road (m) (N/A if not applicable)</b>	<b>Does this Location Represent Worst-Case Exposure?</b>
<b>CM5</b>	St.Peter's Place	Roadside	614462	157831	NO <sub>2</sub>	Y	Chemiluminescence	N (representative of relevant exposure)	2.2m	N

### 2.1.2 Non-Automatic Monitoring Sites

In 2012, Canterbury City Council monitored annual mean nitrogen dioxide at 29 sites across the district, using passive diffusion tubes. These diffusion tubes were supplied and analysed by Environmental Scientifics Group (ESG), utilising the 50% triethanolamine in acetone preparation method. ESG is a UKAS accredited laboratory. Tube preparation and analysis follows operating procedures HS/WI/1015. Analysis procedures are compliant with the Diffusion Tubes for Ambient NO<sub>2</sub> Monitoring: Practical Guidance for users and laboratories (February 2008).

ESG takes part in the Workplace Analysis Scheme for Proficiency (WASP), which is an independent proficiency testing scheme, operated by the Health and Safety Laboratory. WASP offers a number of test samples designed to test the proficiency of laboratories undertaking analysis of chemical pollutants in workplace and ambient air. The WASP scheme is an integral part of NO<sub>2</sub> diffusion tube QA/QC. During 2012, ESG held the highest rank possible under WASP, as a satisfactory laboratory.

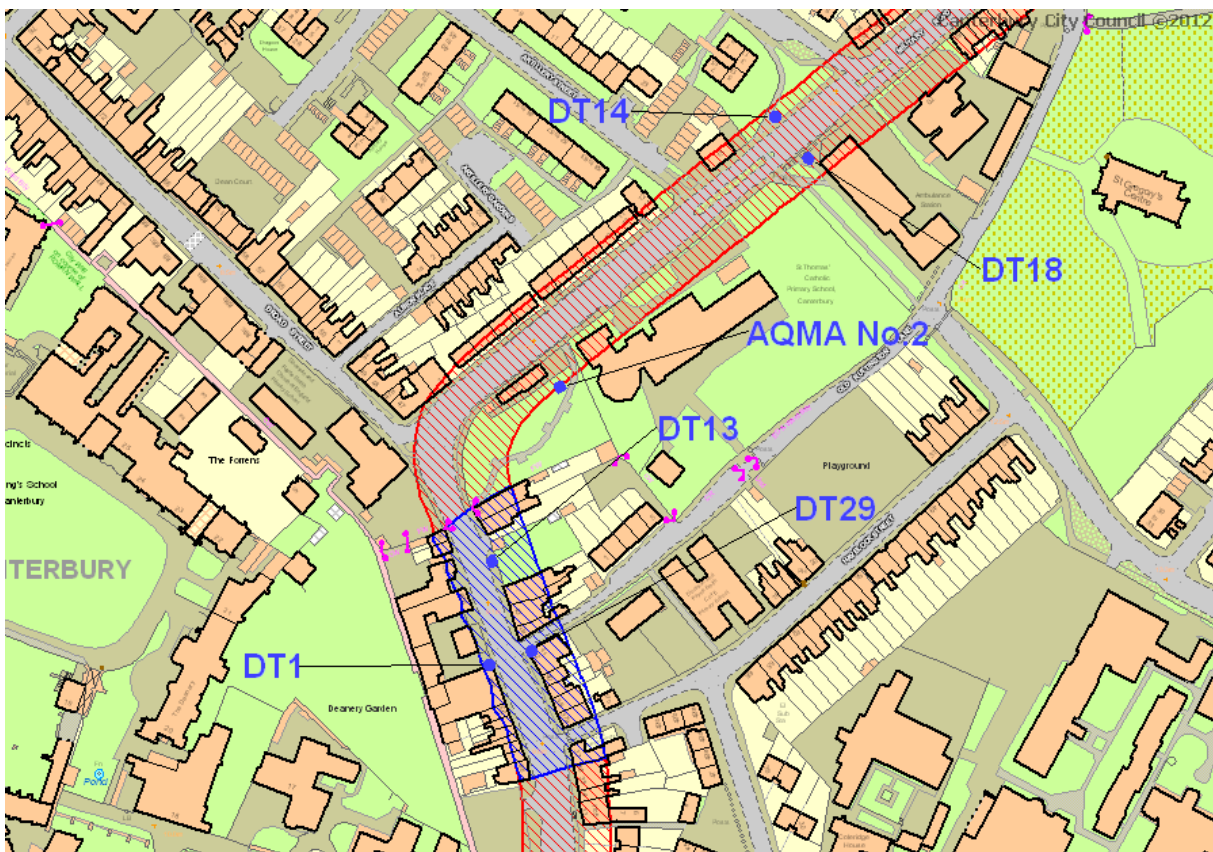
Two sites have tubes colocated with the automatic monitoring sites **CM1 Chaucer Technology School** and **CM3 Military Road**. Data for these colocated tubes have been used to calculate a local combined adjustment factor of 0.81 (CM1 = 0.79; CM3 = 0.83). The bias adjustment factor for ESG during 2012, taken from the national bias adjustment factor spreadsheet is 0.79.

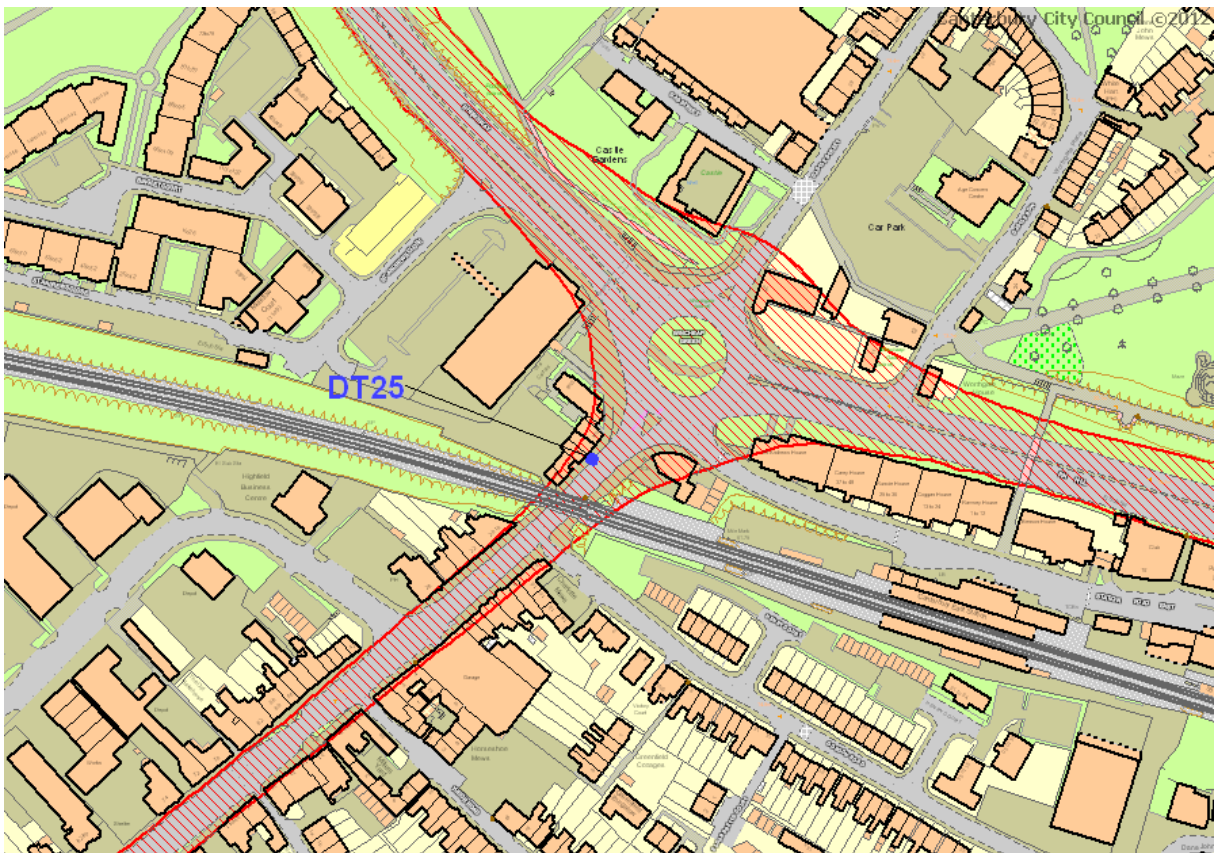
For recent rounds of review and assessment, the council has used a locally derived bias adjustment factors to correct nitrogen dioxide diffusion tube data. This is in part due to the high quality data obtained by the chemiluminescent analysers, and good precision of diffusion tube data. Furthermore, the locally derived factors have remained relatively consistent since the council's first collocation study was carried out on 2006 (2006 = 0.84, 2007 = 0.84, 2008 = 0.80, 2009 = 0.78, 2010 = 0.78, 2011 = 0.85). This suggests laboratory practices and procedures, and local handling and deployment, have remained consistent. For this reason the local combined bias adjustment factor has been used to correct the diffusion tube annual mean data for 2012.

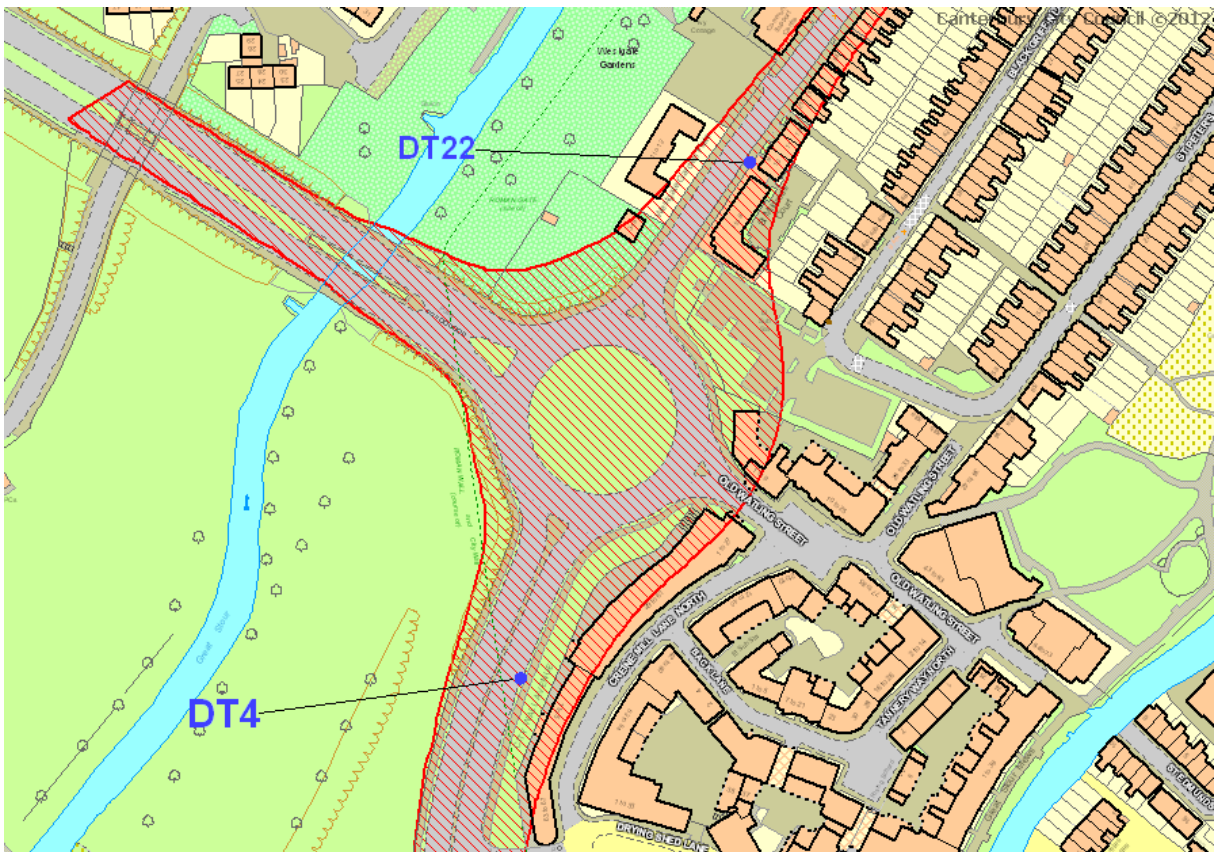
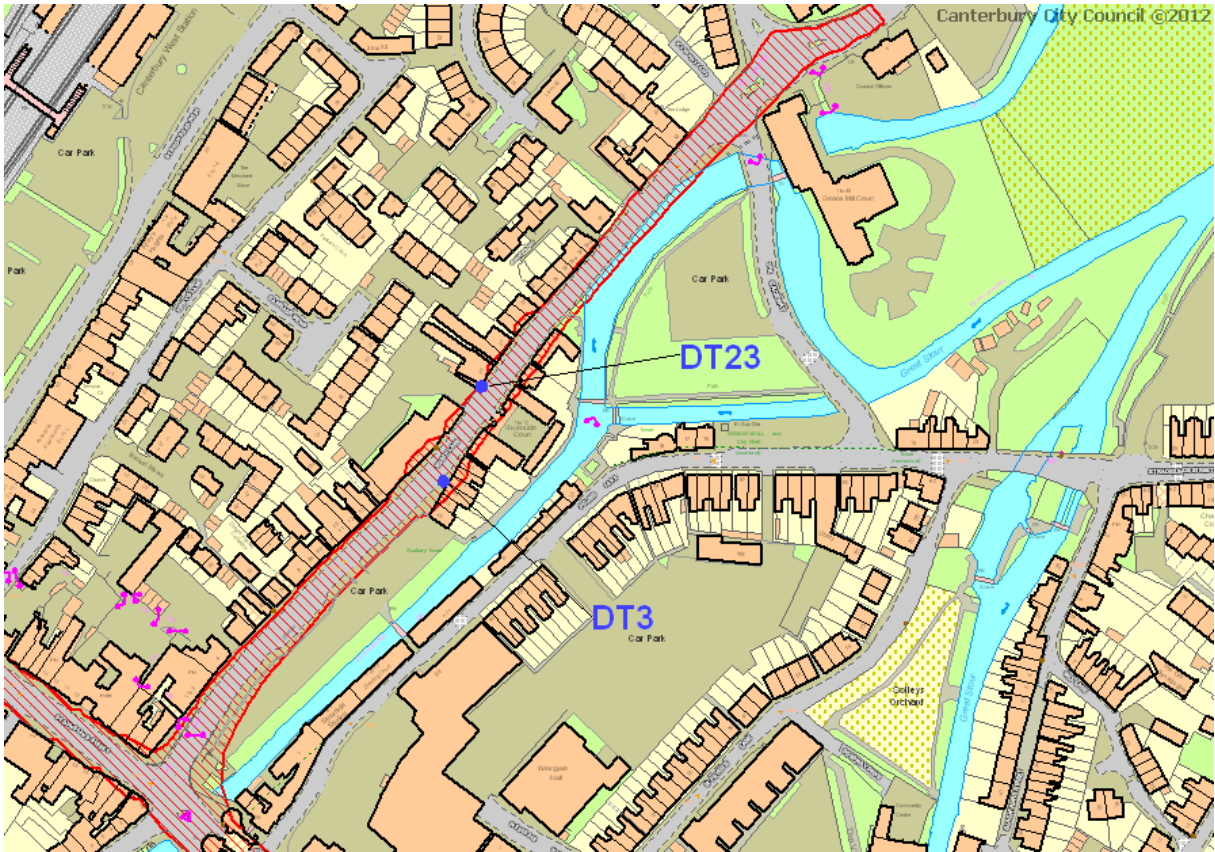
Following the Updating and Screening Assessment in 2012, **DT7 New Dover Road** was redeployed to a new monitoring site, **DT28 Herne Street 2**, to further investigate annual mean nitrogen dioxide in Herne. Monitoring at **DT13 Broad Street 2** was moved to a new monitoring site, **DT29 Broad Street3**, following removal of the lighting column the tube was mounted to, due to a road traffic collision. The monitoring site **DT13 Broad Street 2** will be reinstated should the lighting column be replaced by Kent County Council Highways, in the same location.

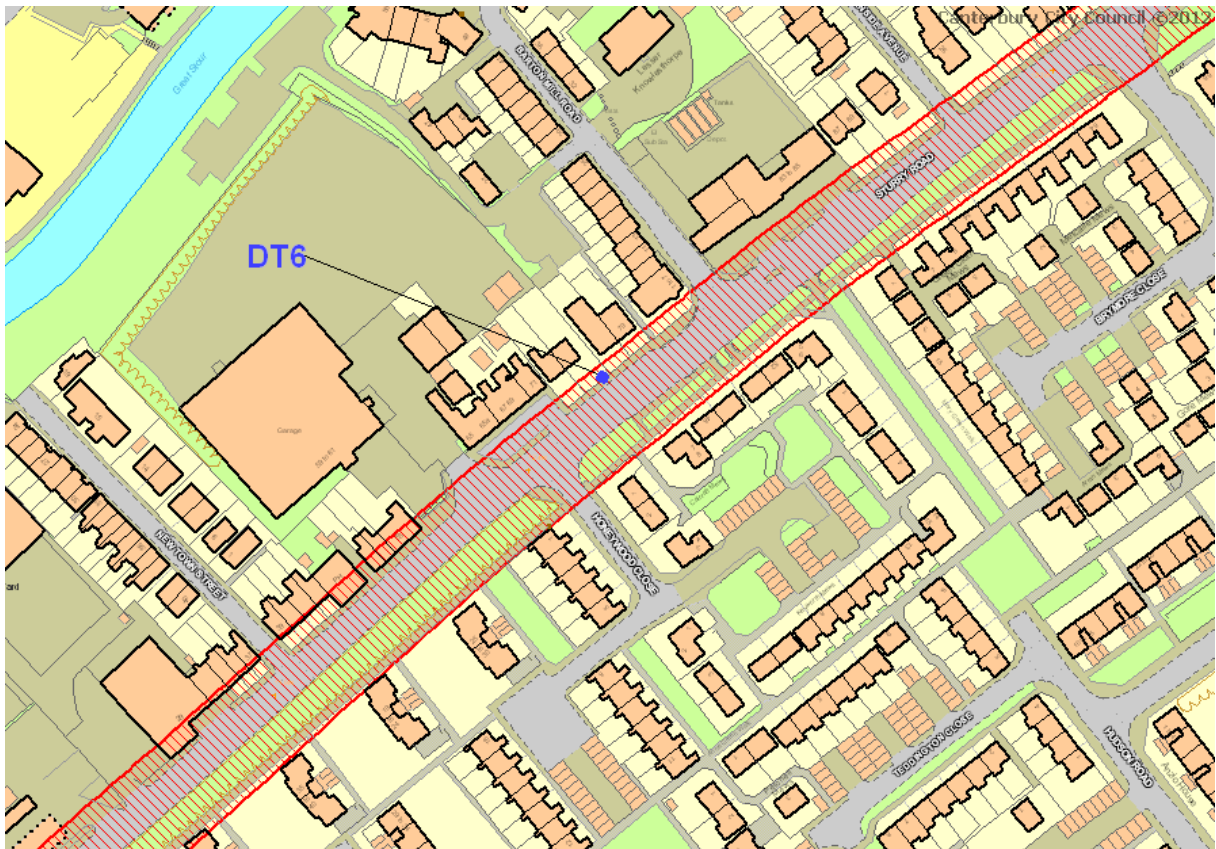
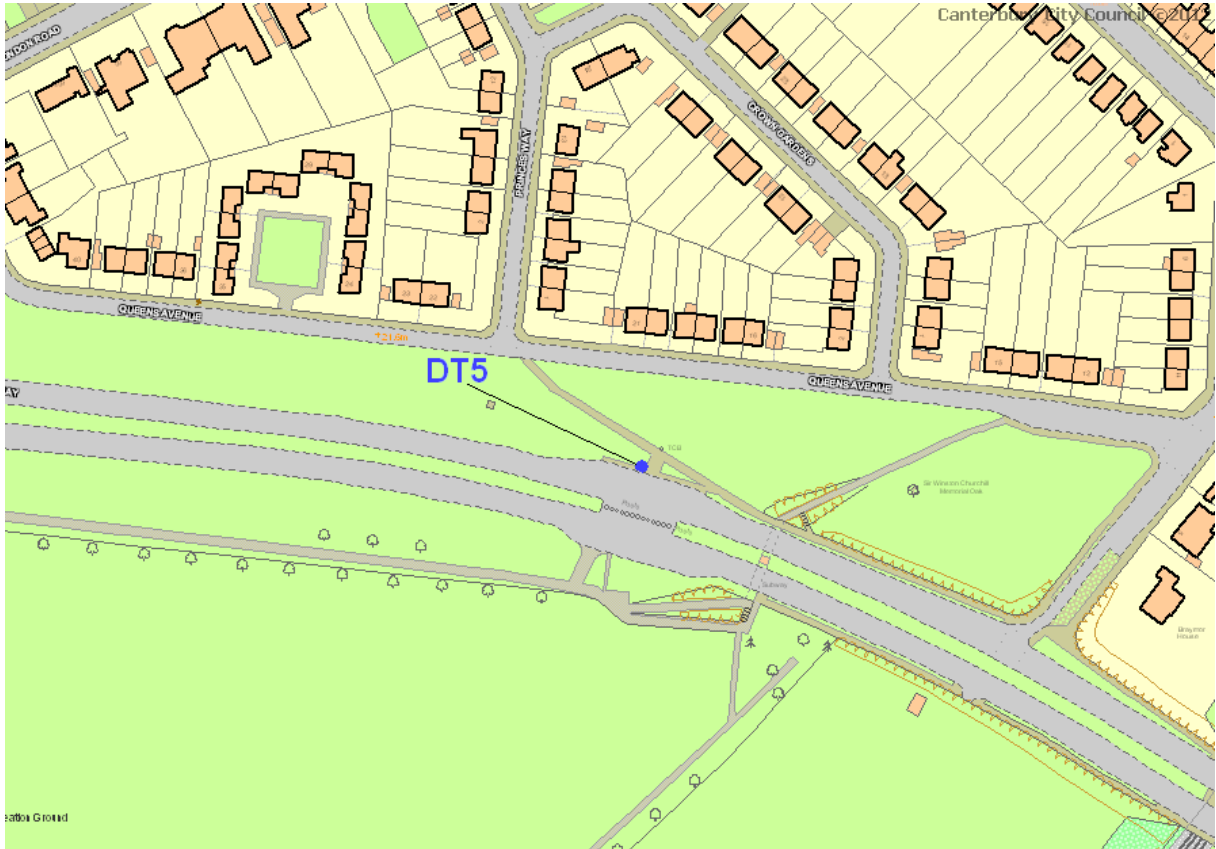
No other changes were made to the network of diffusion tube monitoring sites in the Canterbury district during 2012. Figure 2.2 and Table 2.2 give details of the diffusion tube sites located in the Canterbury district during 2012.

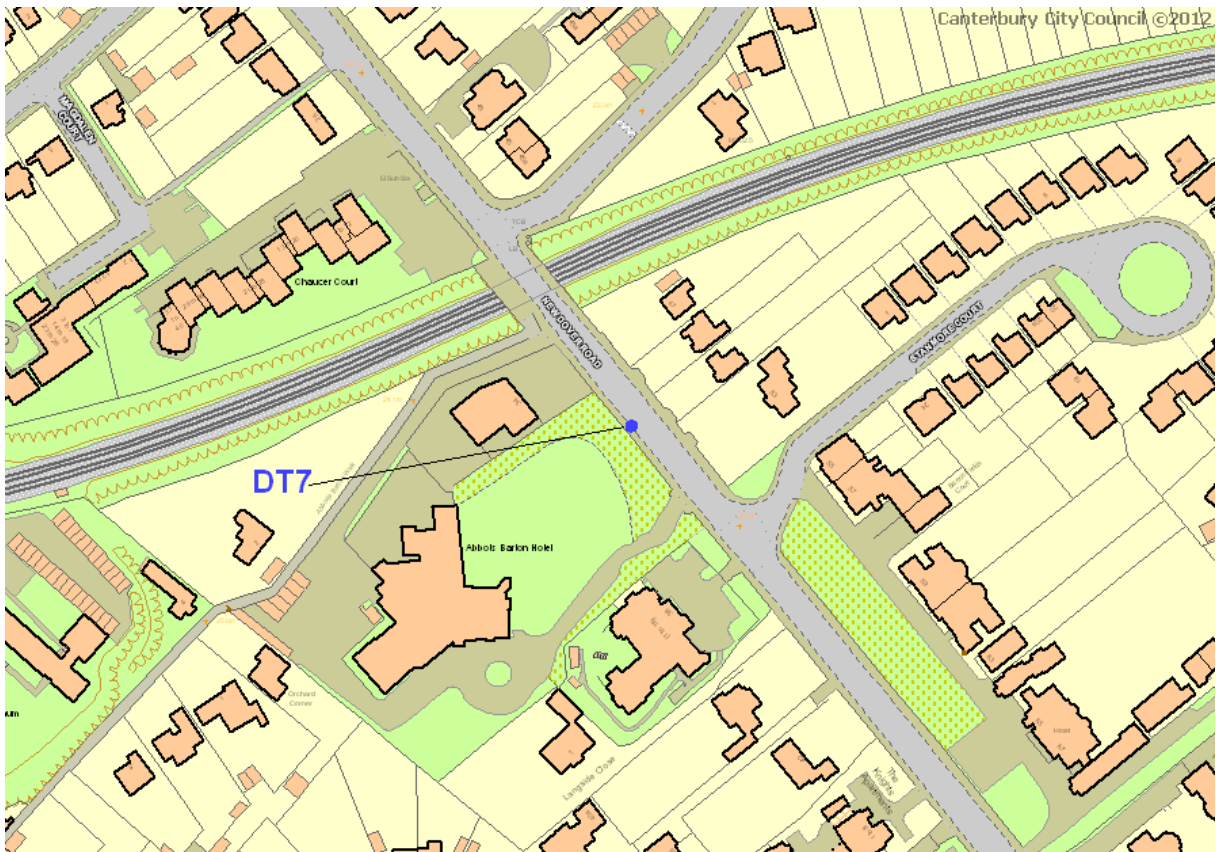
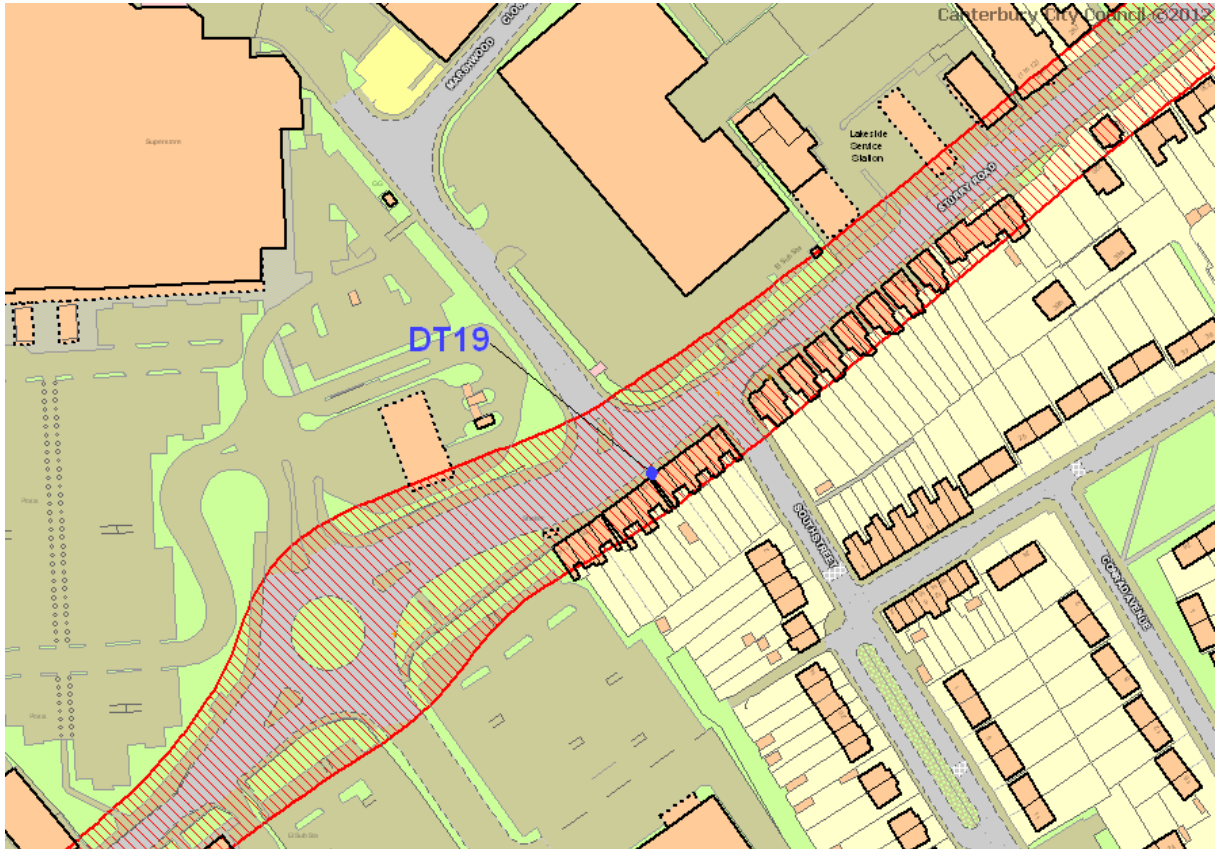
**Figure 2.2 Maps of Non-Automatic Monitoring Sites**



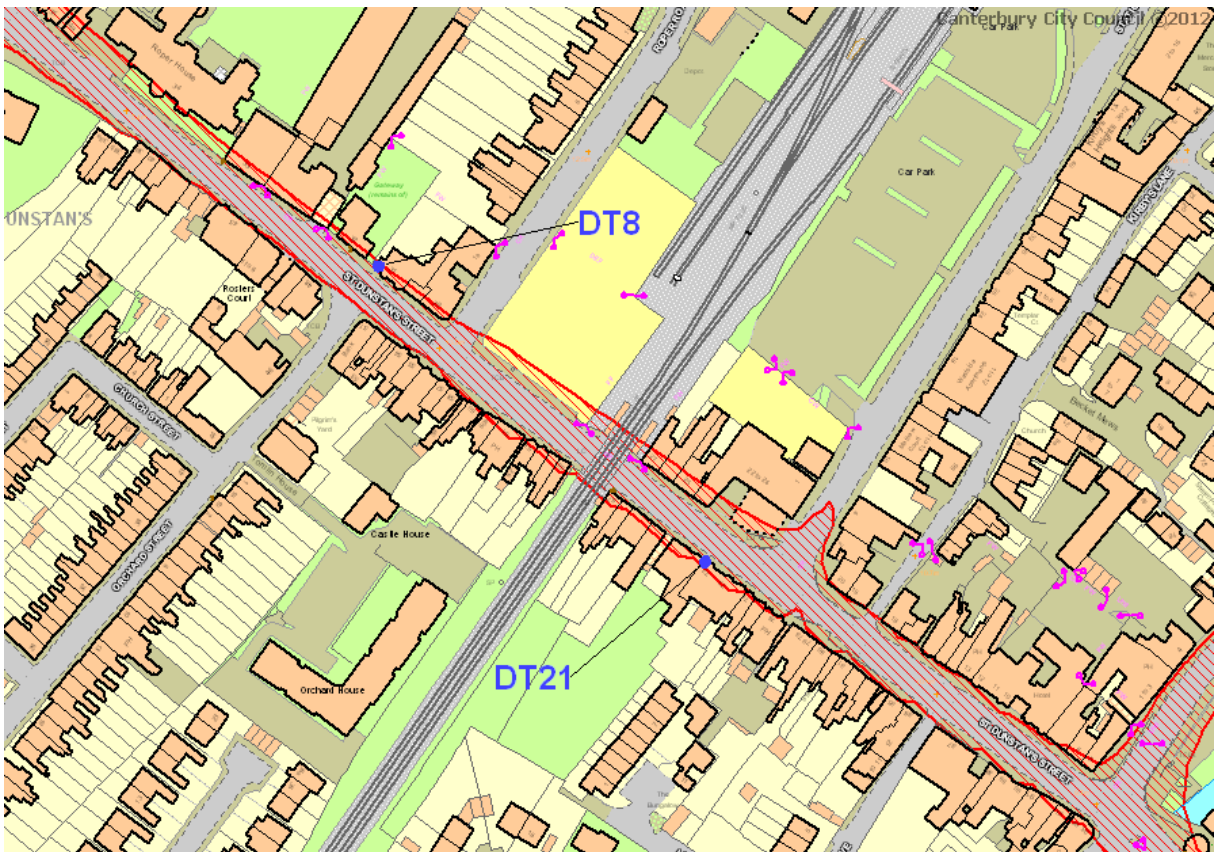
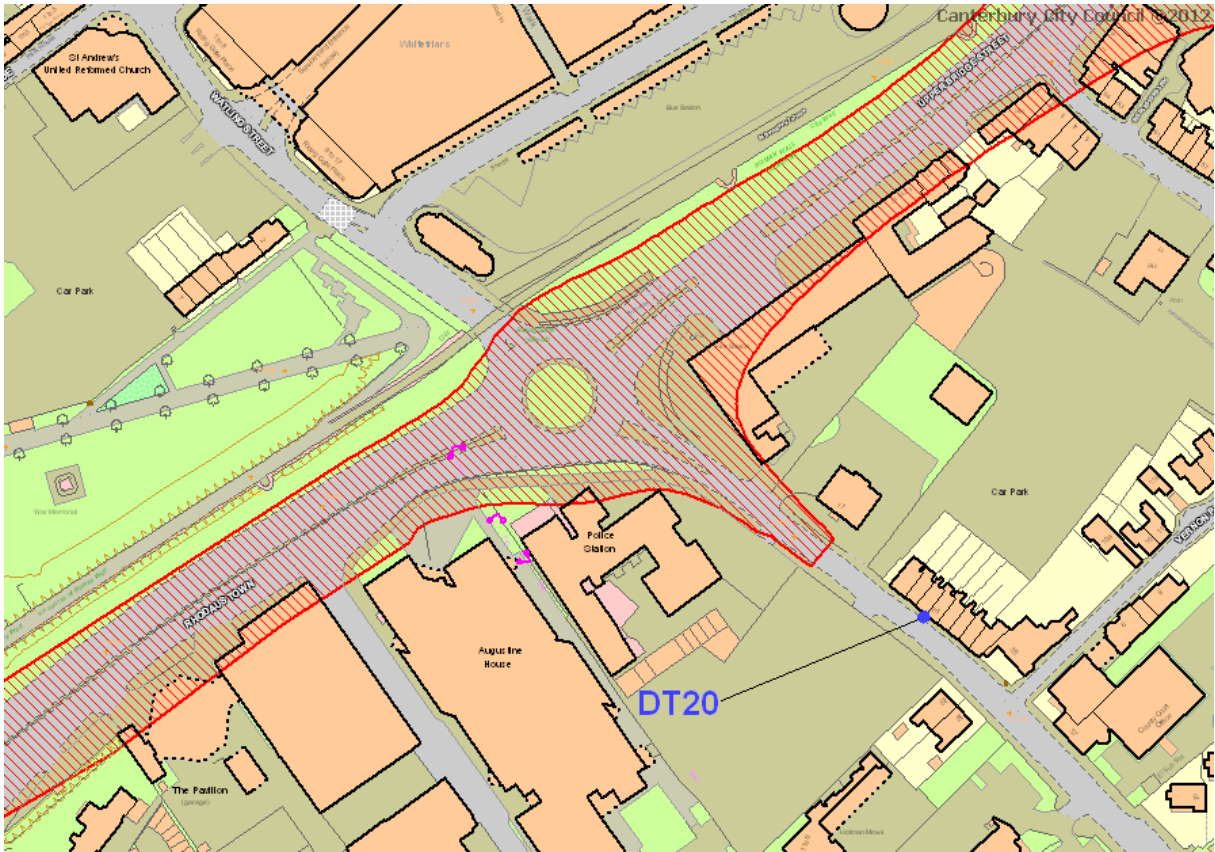


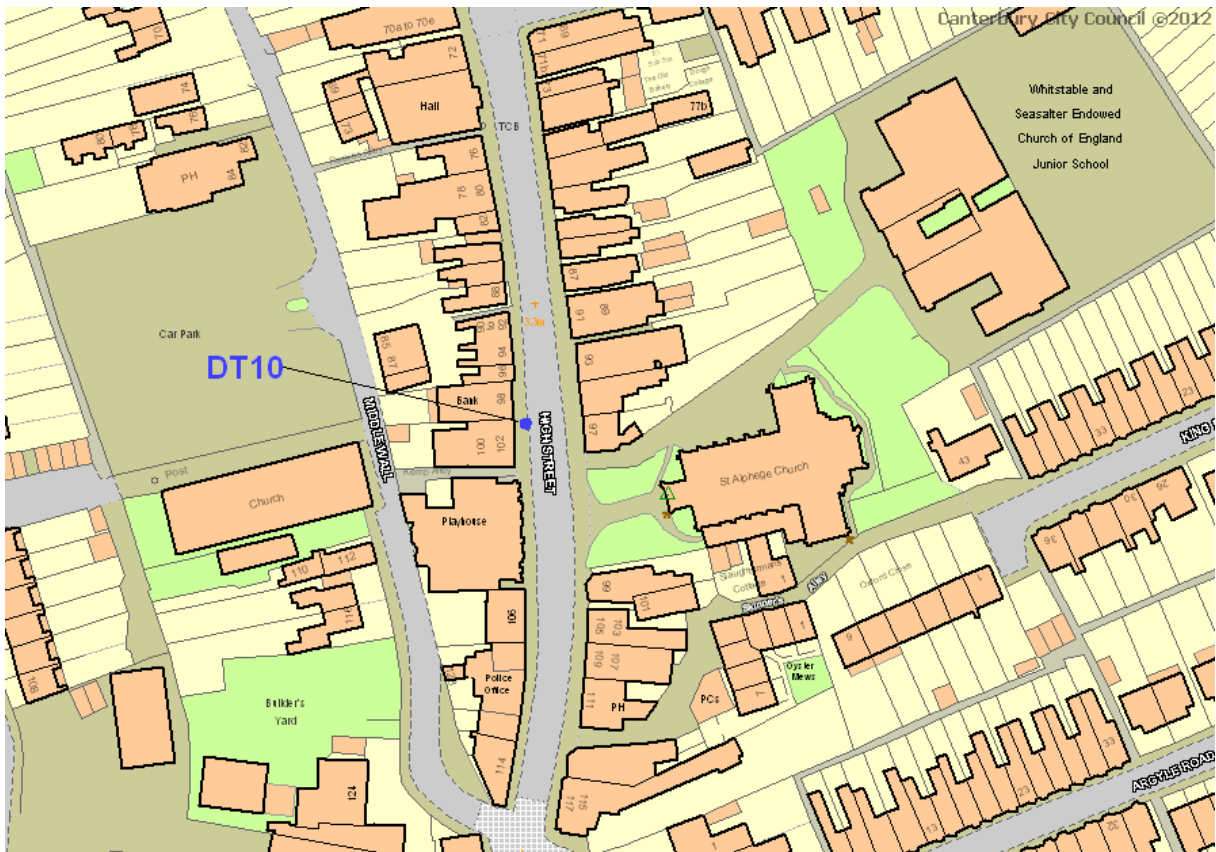


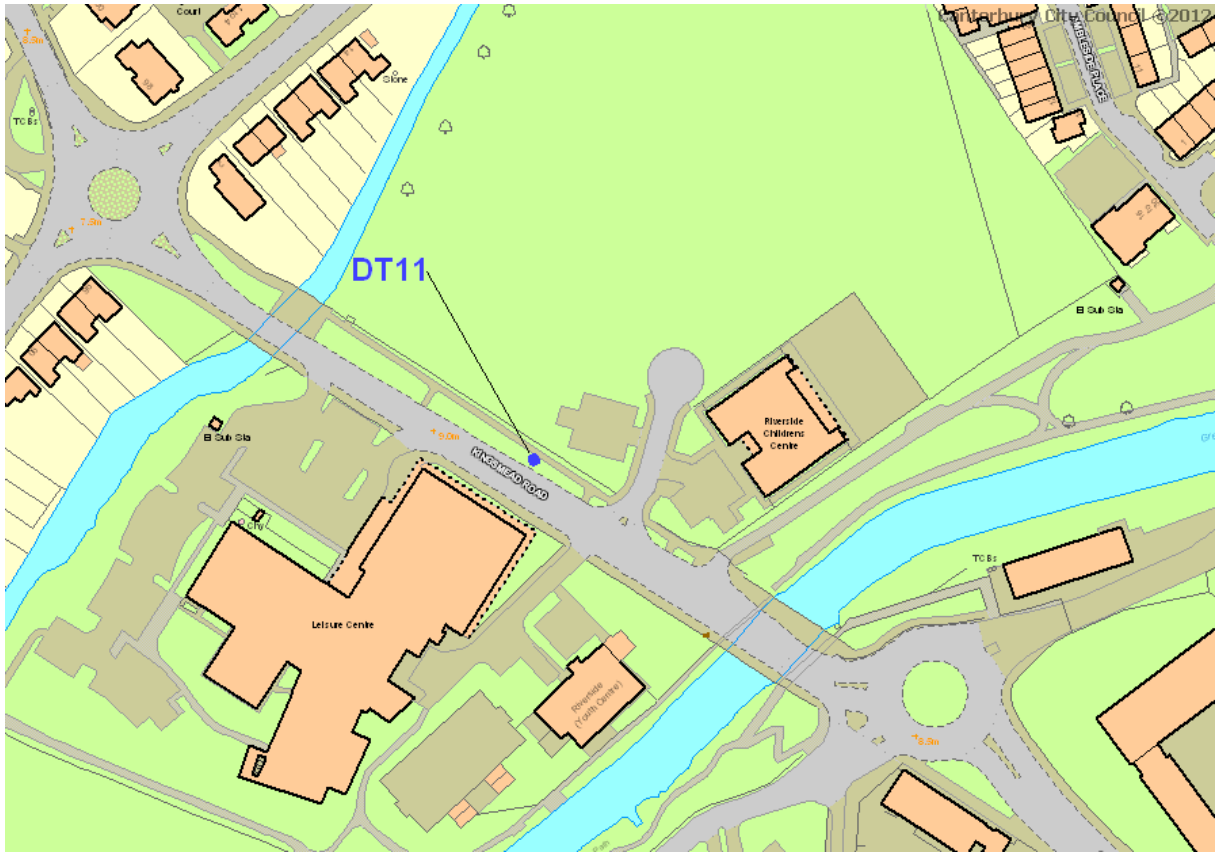


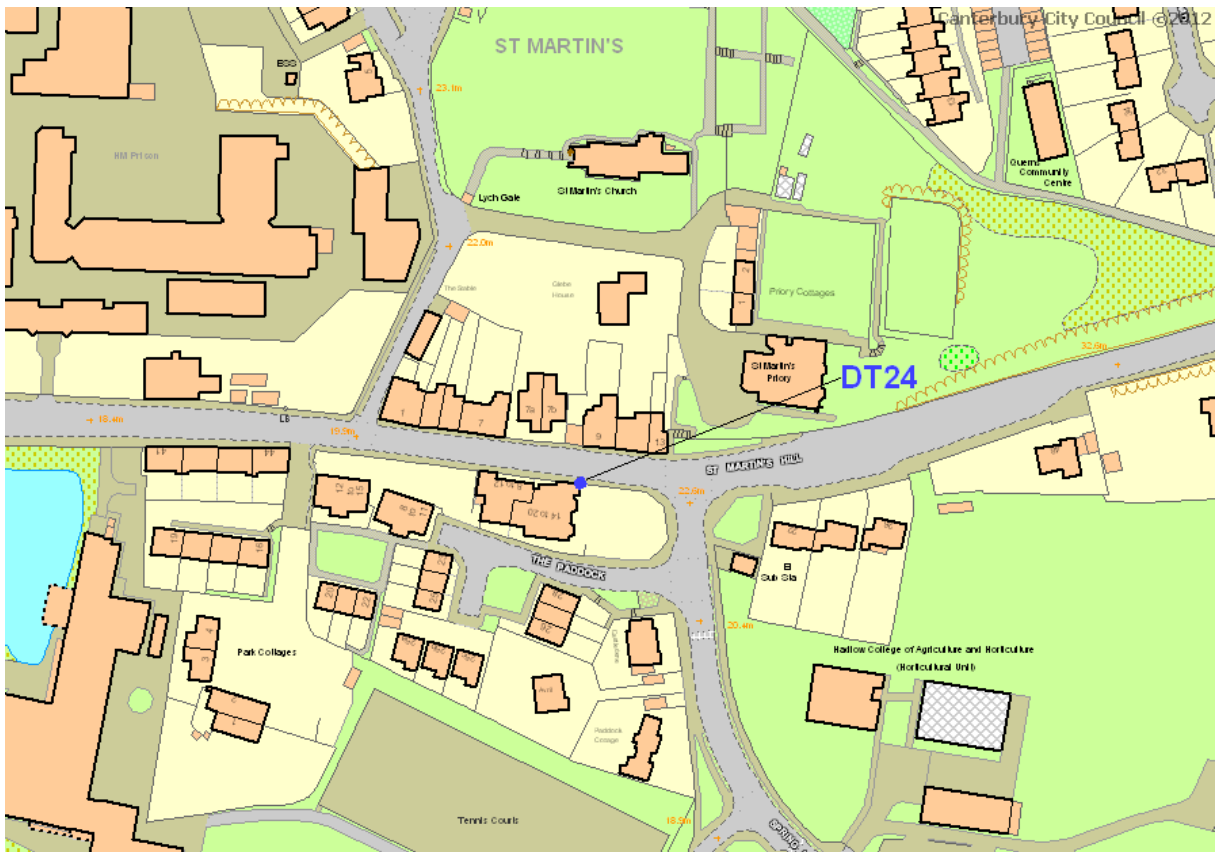


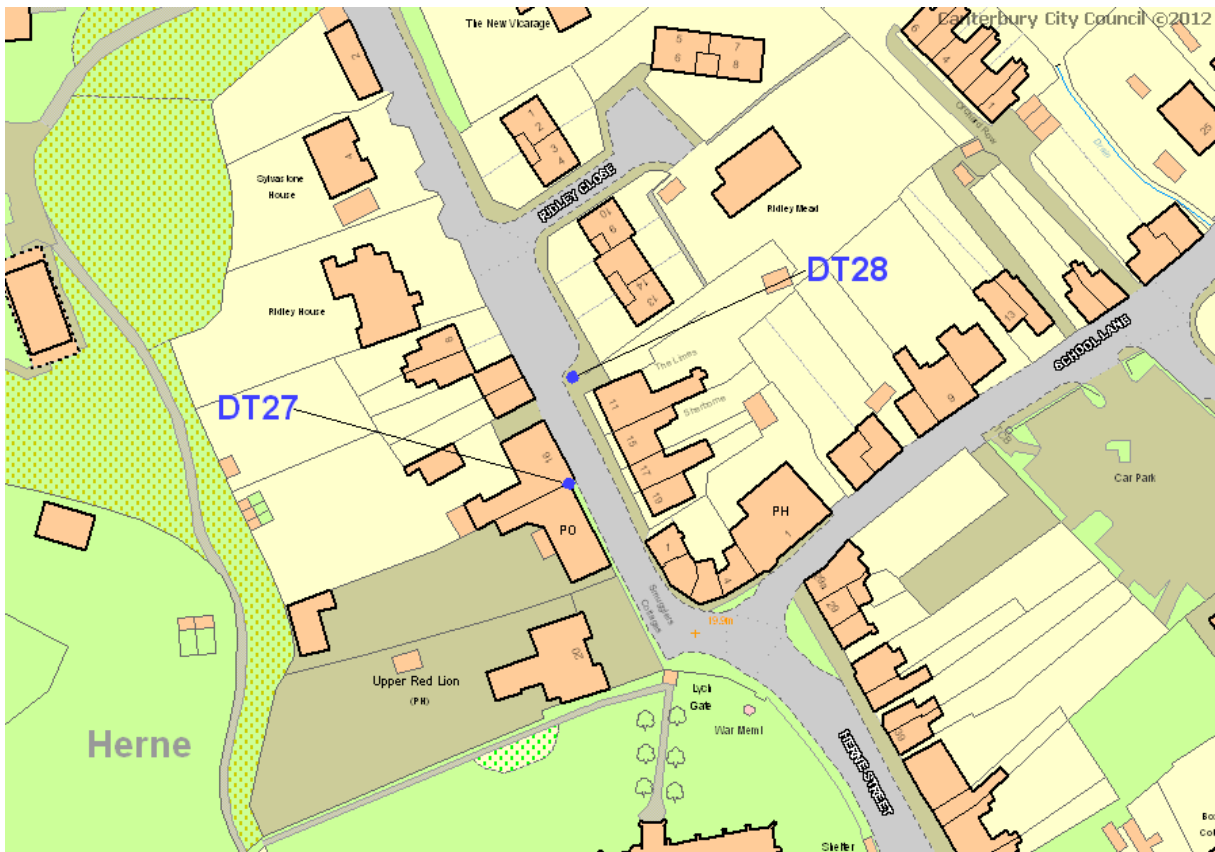












**Table 2.2 Details of Non- Automatic Monitoring Sites**

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DT1	Broad Street 1	Roadside	615295	158001	2.8	NO <sub>2</sub>	Y	N	Y (0.4m)	1.4	Y
DT2	Wincheap 2	Kerbside	614229	157091	2.6	NO <sub>2</sub>	Y	N	N (representative of relevant exposure)	0.4	N
DT3	North Lane 1	Kerbside	614675	158219	2.2	NO <sub>2</sub>	Y	N	Y (2.4m)	0.3	Y
DT4	Old Tannery	Kerbside	614410	157702	2.6	NO <sub>2</sub>	Y	N	Y (11m)	0.6	N
DT5	Rheims Way	Roadside	614043	158016	2.7	NO <sub>2</sub>	N	N	N	3.3	N
DT6	Sturry Road 1	Roadside	615655	158696	2.6	NO <sub>2</sub>	Y	N	Y (9.5m)	3.7	N

**Canterbury City Council**

<b>Site ID</b>	<b>Site Name</b>	<b>Site Type</b>	<b>X OS Grid Reference</b>	<b>Y OS Grid Reference</b>	<b>Site Height (m)</b>	<b>Pollutants Monitored</b>	<b>In AQMA?</b>	<b>Is Monitoring Co-located with a Continuous Analyser (Y/N)</b>	<b>Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)</b>	<b>Distance to Kerb of Nearest Road (m) (N/A if not applicable)</b>	<b>Does this Location Represent Worst-Case Exposure?</b>
DT7	New Dover Road*	Kerbside	615660	157159	2.5	NO <sub>2</sub>	N	N	N	0.3	N
DT8	St.Dunstons 1	Roadside	614355	158267	2.3	NO <sub>2</sub>	Y	N	Y (0.2m)	2.1	Y
DT9	High Street, Herne Bay	Kerbside	617785	168231	2.6	NO <sub>2</sub>	N	N	Y (1.8m)	0.4	N
DT10	High Street, Whitstable	Kerbside	610686	166421	2.9	NO <sub>2</sub>	N	N	Y (2.7m)	0.7	N
DT11	Kingsmead Road	Roadside	615123	158630	2.0	NO <sub>2</sub>	N	N	N	1.7	N
DT12	Littlebourne	Roadside	620909	157426	2.1	NO <sub>2</sub>	N	N	Y (4.5m)	1.8	Y
DT13	Broad Street 2**	Kerbside	615294	158033	2.9	NO <sub>2</sub>	Y	N	Y (2.5m)	0.6	Y

**Canterbury City Council**

<b>Site ID</b>	<b>Site Name</b>	<b>Site Type</b>	<b>X OS Grid Reference</b>	<b>Y OS Grid Reference</b>	<b>Site Height (m)</b>	<b>Pollutants Monitored</b>	<b>In AQMA?</b>	<b>Is Monitoring Co-located with a Continuous Analyser (Y/N)</b>	<b>Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)</b>	<b>Distance to Kerb of Nearest Road (m) (N/A if not applicable)</b>	<b>Does this Location Represent Worst-Case Exposure?</b>
DT14	Military Road 1	Roadside	615390	158180	2.9	NO <sub>2</sub>	Y	N	N (representative of relevant exposure)	1.7	N
DT15	Chaucer School 1/2/3	Urban background	616186	157320	2.7	NO <sub>2</sub>	N	Y	Y (0m)	N/A	N
DT16	Wincheap 3	Roadside	614065	156976	2.5	NO <sub>2</sub>	Y	N	N (representative of relevant exposure)	1.7	Y
DT17	Wincheap 4	Roadside	613902	156851	2.6	NO <sub>2</sub>	Y	N	Y (2.8m)	1.7	Y
DT18	Military Road 2/3/4	Roadside	615401	158169	1.4	NO <sub>2</sub>	Y	Y	N (representative of relevant exposure)	3.2	N
DT19	Sturry Road 3	Roadside	616169	159067	2.8	NO <sub>2</sub>	Y	N	Y (0m)	2.0	Y



**Canterbury City Council**

<b>Site ID</b>	<b>Site Name</b>	<b>Site Type</b>	<b>X OS Grid Reference</b>	<b>Y OS Grid Reference</b>	<b>Site Height (m)</b>	<b>Pollutants Monitored</b>	<b>In AQMA?</b>	<b>Is Monitoring Co-located with a Continuous Analyser (Y/N)</b>	<b>Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)</b>	<b>Distance to Kerb of Nearest Road (m) (N/A if not applicable)</b>	<b>Does this Location Represent Worst-Case Exposure?</b>
DT20	Old Dover Road	Roadside	615106	157382	2.4	NO <sub>2</sub>	N	N	Y (0m)	1.8	N
DT21	St.Dunstans 2	Roadside	614454	158180	2.6	NO <sub>2</sub>	Y	N	Y (0m)	1.8	Y
DT22	St.Peters Place	Roadside	614479	157857	2.0	NO <sub>2</sub>	Y	N	Y (2m)	2.8	N
DT23	North Lane 2	Roadside	614688	158251	2.4	NO <sub>2</sub>	Y	N	Y (1m)	1.1	Y
DT24	St.Martins Hill	Roadside	615851	157672	2.6	NO <sub>2</sub>	N	N	Y (0m)	1.2	Y
DT25	Wincheap 5	Kerbside	614502	157335	2.7	NO <sub>2</sub>	Y	N	Y (2.6m)	0.5	Y
DT26	Mill Road, Sturry	Roadside	617748	160331	2.4	NO <sub>2</sub>	N	N	Y (0m)	1.3	Y
DT27	Herne Street 1	Kerbside	618242	165929	2.2	NO <sub>2</sub>	N	N	Y (0m)	0.8	Y

**Canterbury City Council**

<b>Site ID</b>	<b>Site Name</b>	<b>Site Type</b>	<b>X OS Grid Reference</b>	<b>Y OS Grid Reference</b>	<b>Site Height (m)</b>	<b>Pollutants Monitored</b>	<b>In AQMA?</b>	<b>Is Monitoring Co-located with a Continuous Analyser (Y/N)</b>	<b>Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)</b>	<b>Distance to Kerb of Nearest Road (m) (N/A if not applicable)</b>	<b>Does this Location Represent Worst-Case Exposure?</b>
DT28	Herne Street 2	Roadside	618242	165948	2.9	NO <sub>2</sub>	N	N	Y (5.7m)	1.0	Y
DT29	Broad Street 3	Roadside	615306	158003	2.3	NO <sub>2</sub>	Y	N	Y (0m)	1.5	Y

\* Monitoring ceased 28/06/12 and tube moved to Herne Street 2 site starting 28/06/12

\*\* Lighting column removed by Kent County Council Highways following damage by vehicle collision, and moved to Broad Street 3 site starting 30/10/12

## 2.2 Comparison of Monitoring Results with Air Quality Objectives

### Nitrogen Dioxide (NO<sub>2</sub>)

#### Automatic Monitoring Data

The monitoring results from the urban background **CM1 Chaucer Technology School** automatic monitoring station show that the nitrogen dioxide concentrations were well below the 1-hour and annual mean objective levels during 2012. The roadside sites (CM2, CM3, CM4, CM5), which are all in the current AQMA, recorded much higher concentrations. Data are presented in Table 2.3 and Table 2.4.

Although concentrations monitored at the CM2, CM3 and CM4 monitoring stations have been below the annual mean objective for a number of years now, this is due to their respective location within the current AQMA. More extensive diffusion tube monitoring in these areas confirms the need to retain the AQMA.

Figure 2.3 presents the annual mean NO<sub>2</sub> concentrations recorded at all the automatic monitoring sites since 2001.

NO<sub>2</sub> concentrations at CM5 dropped below the annual mean objective in 2012, for the first time since the monitoring station was installed (44 µg/m<sup>3</sup> in 2011, 39 µg/m<sup>3</sup> in 2012). The nearby monitoring site, CM4, showed a similar decrease in monitored annual mean NO<sub>2</sub> (32 µg/m<sup>3</sup> in 2011, to 27 µg/m<sup>3</sup> in 2012). A third nearby site, CM2, however showed a small increase in monitored annual mean NO<sub>2</sub> (37 µg/m<sup>3</sup> in 2011, to 39 µg/m<sup>3</sup> in 2012). These respective changes are likely due to the influence of a temporary environmental improvement scheme, which took place in the area during 2012. The scheme, called the St.Dunstons and Westgate Towers Environmental Improvements Project, commenced at the end of March 2012, and involved closing the nearby Westgate Towers to all vehicular traffic for a period of 12 months. The scheme was implemented as a temporary trial, giving time for the impact of the trial on traffic congestion, air quality etc to be assessed. Various changes were made to local road layouts, including access, traffic signalling, and vehicle priorities.

It was hoped that the traffic changes would result in an improvement to air quality on some roads, resulting in monitored NO<sub>2</sub> levels falling below the annual mean objective to such an extent that some roads could be removed from the AQMA. ~~And~~ In this respect, the monitoring data shows the trial to have been successful. Levels of NO<sub>2</sub> reduced significantly in some areas of the current AQMA. ~~And~~ Despite traffic being displaced onto other streets in the area, increases in NO<sub>2</sub> do not appear to have exceeded the annual mean objective in these locations. In addition, other sensitive locations such as Broad Street, Military Road and Wincheap appear to have been unaffected by the trial.

The biggest reductions in NO<sub>2</sub> appear to be in St.Peters Place, North Lane and the lower half of St.Dunstons Street. The reductions are significant in that these roads lie within the current AQMA. When monitoring data for January-March 2012 (before the trial came into effect) is excluded from the analysis of the air quality impact, the reductions in annual mean NO<sub>2</sub> concentrations at certain monitoring sites is much more dramatic.

Following the end of the trial in 2013, discussions are due to take place between Canterbury City Council and Kent County Council, about a long term solution to the issues surrounding the St.Dunstons and Westgate Towers area.

A full report on the scheme is available.

**Table 2.3 Results of Automatic Monitoring for NO<sub>2</sub>: Comparison with Annual Mean Objective**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2012 %	Annual Mean Concentration (µg/m <sup>3</sup> )		
					2010	2011	2012
CM1	Urban background	N	N/A	93	18	15	15
CM2	Roadside	Y	N/A	99	36	37	39
CM3	Roadside	Y	N/A	98.5	34	34	33
CM4	Roadside	Y	N/A	97.4	34	32	27
CM5	Roadside	Y	N/A	96.8	<b>45</b>	<b>44</b>	39

**Table 2.4 Results of Automatic Monitoring for NO<sub>2</sub>: Comparison with 1-hour Mean Objective**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2012 %	Number of Hourly Means > 200µg/m <sup>3</sup>		
					2010	2011	2012
CM1	Urban background	N	N/A	93	0	0	0
CM2	Roadside	Y	N/A	99	0	0	1
CM3	Roadside	Y	N/A	98.5	0	0	0
CM4	Roadside	Y	N/A	97.4	0	0	0
CM5	Roadside	Y	N/A	96.8	0	1	0

Figure 2.3 Trends in Annual Mean NO<sub>2</sub> Concentrations Measured at Automatic Monitoring Sites

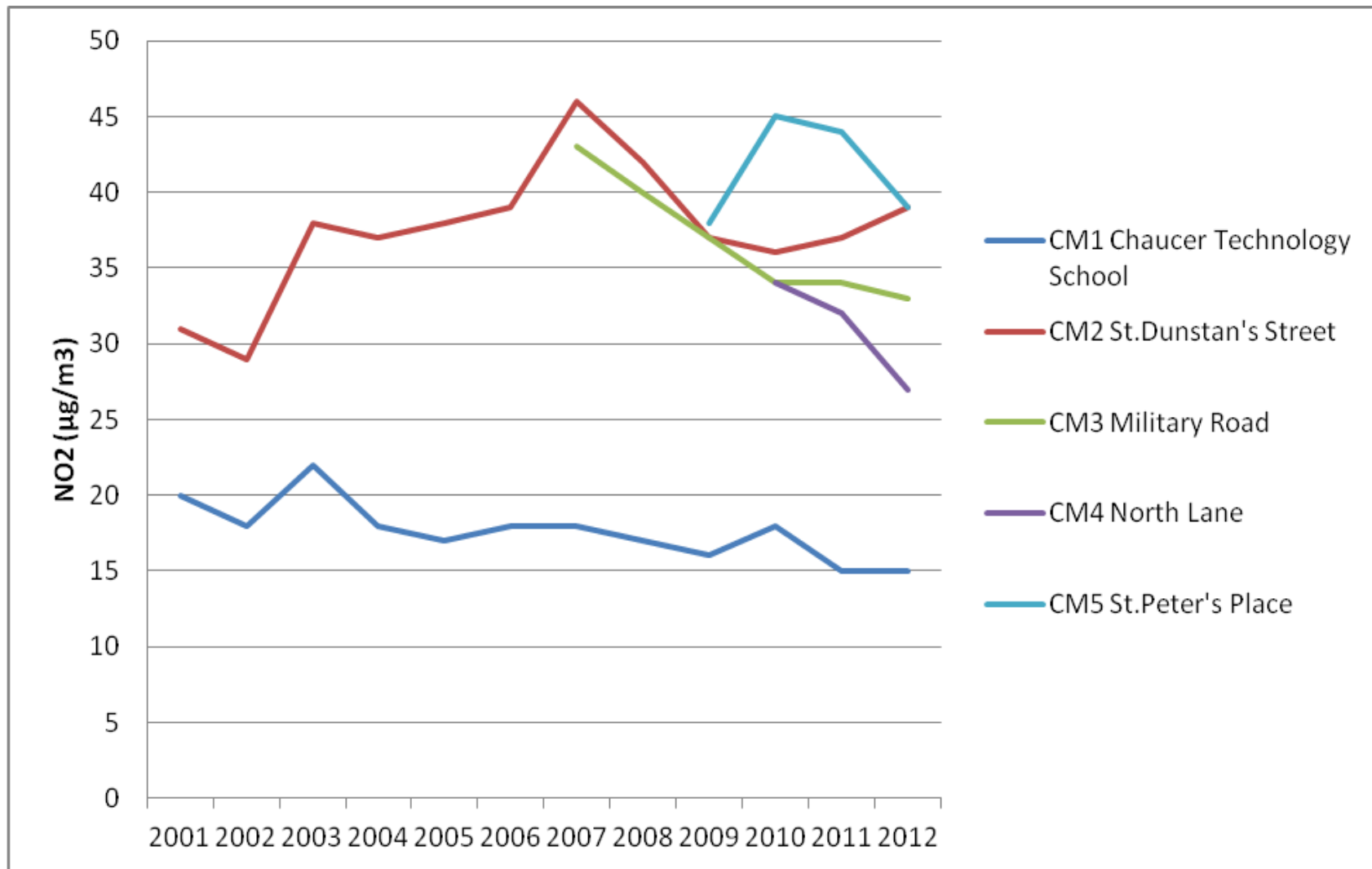


Figure 2.3 shows the long term trends at the automatic monitoring stations in Canterbury.

All monitoring stations measured NO<sub>2</sub> concentrations below the annual mean objective during 2012, however the CM2 St.Dunstan's Street and CM5 St.Peters Place stations are very close to the objective.

Measured NO<sub>2</sub> concentrations at CM1 Chaucer Technology School have been comfortably below the annual mean objective for many years. This shows that the background levels across the urban area have been relatively stable during this time, showing a very slight overall downward trend.

There is a general downward trend at the CM3 Military Road, CM4 North Lane and CM5 St.Peters Place monitoring stations, although there is limited data at present for CM4 and CM5. Large decreases in NO<sub>2</sub> were seen at CM4 and CM5 these sites during 2012, however these are likely to be reversed as the St.Dunstons and Westgate Towers Environmental Improvements Project trial ended in 2013.

After several years of rising NO<sub>2</sub> levels at the CM2 St.Dunstan's Street monitoring station from 2002 to 2007 (when the annual mean objective was exceeded), levels of NO<sub>2</sub> fell back again from 2008 to 2010. However, for the last two years NO<sub>2</sub> levels have increased again slightly. In 2012, some of the increase may be due to the St.Dunstons and Westgate Towers Environmental Improvements Project trial. With the trial due to ending in 2013, some of the increases seen in 2012 may be reversed.

### **Diffusion Tube Monitoring Data**

The 2012 nitrogen dioxide diffusion tube data are summarised in Table 2.5, with the full data set of period means included in Appendix A.

Sites DT7 New Dover Road, DT13 Broad Street 2, DT28 Herne Street 2, and DT 29 Broad Street 3 all have data capture below 75% (9 months) for the 2012 calendar year, therefore the data have been adjusted ("annualised") using the methodology in Box 3.2 of LAQM.TG(09).

A locally derived combined bias adjustment factor of 0.81 has been used to correct the annual mean concentrations.

The NO<sub>2</sub> concentrations measured by diffusion tubes indicate that the annual mean was exceeded at 11 locations in 2012, down from 15 in 2011 (as reported in the 2012 Updating and Screening Assessment). The majority of the sites indicating an exceedence are located within the current AQMA (10 out of 11 sites).

The overwhelming majority of sites indicating an exceedence of the annual mean objective are within the current AQMA, confirming the continuing need for the AQMA. These sites are DT1, DT4, DT13, DT14, DT16, DT17, DT19, DT21, DT25, DT29.

The result for **DT 25 Wincheap 5** suggests another possible location within the current AQMA where there maybe an exceedence of the NO<sub>2</sub> 1-hour mean objective. However, the tubes postion is at the kerbside, and the nearest relevant exposure is office/residential buildings set back further away from the roadside. There is no relevant public exposure at the kerbside/roadside where the 1-hour mean objective may apply. Therefore, the Defra Distance To Roads Calculator tool has been used to calculate the annual mean concentration at the façade of the nearest relevant receptor. At 48.3 µg/m<sup>3</sup> this indicates exceedence of the annual mean objective only at this location, which is covered by the current AQMA.

There is one monitoring site, outside of the current AQMA, where data suggests an exceedence of the annual mean objective, **DT27 Herne Street 1**. Monitoring at this location started in 2010, following identification in the 2009 Updating and Screening Assessment as a sensitive location. The annual mean measured in 2010 was 37.3 µg/m<sup>3</sup>, which rose to 54.0 µg/m<sup>3</sup> in 2011, and fell back again to 51.9 µg/m<sup>3</sup>. There is no apparent reason for these up and down changes. The monitoring site itself is situated in a very sheltered corner of two buildings, so may be recording higher concentrations than would be expected at the actual 'façade' of buildings. Therefore, following the 2012 Updating and Screening Assessment, additional diffusion tube monitoring was carried out at another nearby site. No suitable fixing surfaces are available at the façade of the buildings where DT27 is located. The nearest available fixing surface was a street sign on the opposite carriageway. Monitoring at this site,



**DT28 Herne Street 2**, commenced at the end of June 2012. The annual mean concentration recorded at DT28 in 2012 was  $31.9 \mu\text{g}/\text{m}^3$ , which is significantly different to the concentration recorded for DT 27 Herne Street 1 at  $51.9 \mu\text{g}/\text{m}^3$ . This further strengthens the possibility that the position of DT27 is leading to higher recorded levels of  $\text{NO}_2$ . The difficulty in finding suitable monitoring sites leads to decreased confidence in the concentrations recorded at DT27. One further monitoring location has been identified on the same side of the carriageway as DT27, on a pedestrian crossing beacon, at a similar distance from the kerb, and within the narrow street canyon section of Herne Street where concentrations of  $\text{NO}_2$  are likely to be higher. It is proposed that additional monitoring will be carried out in this location so the Council can have more confidence in the concentrations of  $\text{NO}_2$  being recorded in the area, before proceeding to a more Detailed Assessment. An update on the results of this monitoring will be provided in subsequent review and assessment reporting.

Table 2.5 Results of NO<sub>2</sub> Diffusion Tubes 2012

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2012 (Number of Months)	2012 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ ) - Bias Adjustment factor = 0.81	Distance correction required? Y/N	Distance corrected 2012 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )
DT1	Broad Street 1	Roadside	Y	N	12	<b>52.4</b>	N	-
DT2	Wincheap 2	Kerbside	Y	N	12	32.0	N	-
DT3	North Lane 1	Kerbside	Y	N	12	32.4	N	-
DT4	Old Tannery	Kerbside	Y	N	12	<b>47.1</b>	N	-
DT5	Rheims Way	Roadside	N	N	12	29.1	N	-
DT6	Sturry Road 1	Roadside	Y	N	12	34.8	N	-
DT7	New Dover Road	Kerbside	N	N	4	21.9	N	-
DT8	St.Dunstans 1	Roadside	Y	N	11	32.8	N	-
DT9	High Street, Herne Bay	Kerbside	N	N	12	31.2	N	-
DT10	High Street, Whitstable	Kerbside	N	N	12	33.0	N	-
DT11	Kingsmead Road	Roadside	N	N	11	33.6	N	-
DT12	Littlebourne	Roadside	N	N	12	21.8	N	-
DT13	Broad Street 2	Kerbside	Y	N	7	<b>49.7</b>	Y	-

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2012 (Number of Months)	2012 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ ) - Bias Adjustment factor = 0.81	Distance correction required? Y/N	Distance corrected 2012 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )
DT14	Military Road 1	Roadside	Y	N	12	<b>43.9</b>	N	-
DT15	Chaucer School 1/2/3	Urban background	N	Triplicate and co-located	12	16.2	N	-
DT16	Wincheap 3	Roadside	Y	N	12	<b>48.5</b>	N	-
DT17	Wincheap 4	Roadside	Y	N	11	<b>50.2</b>	N	-
DT18	Military Road 2/3/4	Roadside	Y	Triplicate and co-located	12	32.8	N	-
DT19	Sturry Road 3	Roadside	Y	N	12	<b>49.8</b>	N	-
DT20	Old Dover Road	Roadside	N	N	10	35.2	N	-
DT21	St.Dunstans 2	Roadside	Y	N	12	<b>55.3</b>	N	-
DT22	St.Peters Place	Roadside	Y	N	12	35.5	N	-
DT23	North Lane 2	Roadside	Y	N	12	27.3	N	-
DT24	St.Martins Hill	Roadside	N	N	12	38.6	N	-
DT25	Wincheap 5	Kerbside	Y	N	12	<b>62.4</b>	Y	<b>48.3</b>
DT26	Mill Road, Sturry	Roadside	N	N	12	36.8	N	-

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2012 (Number of Months)	2012 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ ) - Bias Adjustment factor = 0.81	Distance correction required? Y/N	Distance corrected 2012 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )
DT27	Herne Street 1	Kerbside	N	N	9	<b>51.9</b>	N	-
DT28	Herne Street 2	Roadside	N	N	6	31.9	N	-
DT29	Broad Street 3	Roadside	Y	N	2	<b>42.1</b>	N	-

In bold, exceedence of the NO<sub>2</sub> annual mean AQS objective of 40 $\mu\text{g}/\text{m}^3$

Underlined, annual mean > 60 $\mu\text{g}/\text{m}^3$ , indicating a potential exceedence of the NO<sub>2</sub> hourly mean AQS objective

### Particulate Matter (PM<sub>10</sub>)

Automatic monitoring of PM<sub>10</sub> concentrations in Canterbury is carried out at the CM1 Chaucer Technology School monitoring station. The monitoring site is located within the grounds of the school, therefore there is relevant exposure as an urban background location. Annual mean results are presented in Table 2.7 and 24-hour mean results are presented in Table 2.8. The results show that there were no exceedences of the PM<sub>10</sub> objectives during 2012.

PM10 results have been taken directly from the Kent and Medway Air Quality Monitoring Network annual reports produced by Ricardo-AEA (available at <http://www.kentair.org.uk>), which have been VCM (Volatile Correction Model) corrected.

Figure 2.5 presents the annual mean PM<sub>10</sub> concentrations recorded at the automatic monitoring site since 2008. This shows that annual mean concentrations of PM10 have remained relatively stable over the last 5 years.

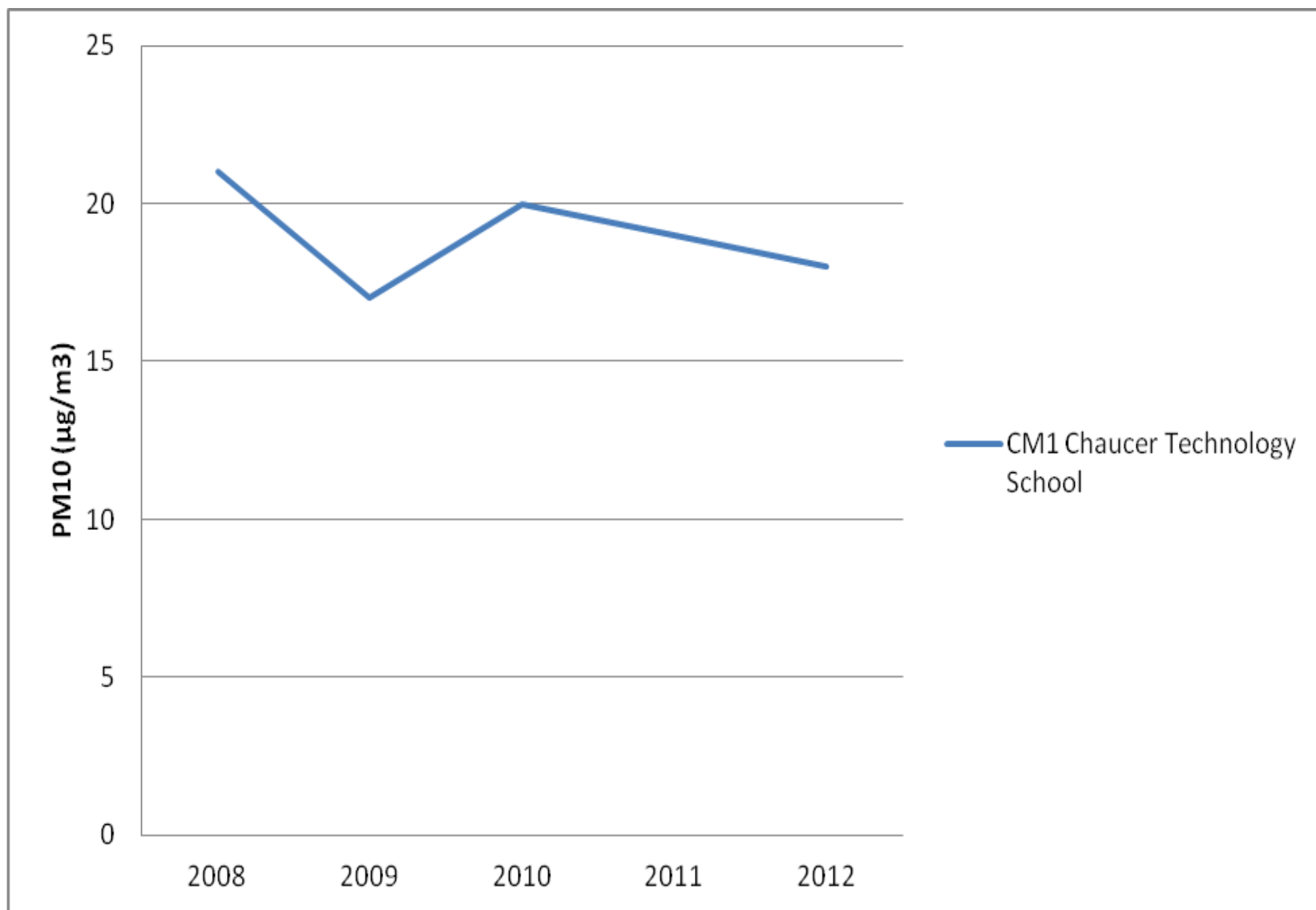
**Table 2.6 Results of Automatic Monitoring for PM<sub>10</sub>: Comparison with Annual Mean Objective**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2012 %	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m <sup>3</sup> )				
						2008	2009	2010	2011	2012
CM1	Urban Background	N	N/A	95.3	Y	21	17	20	19	18

**Table 2.7 Results of Automatic Monitoring for PM<sub>10</sub>: Comparison with 24-hour Mean Objective**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2012 %	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m <sup>3</sup>				
						2008	2009	2010	2011	2012
CM1	Urban background	N		95.3	Y	6	0	0	4	0

Figure 2.4 Trends in Annual Mean PM<sub>10</sub> Concentrations



**2.2.1 Sulphur Dioxide (SO<sub>2</sub>)**

No monitoring of sulphur dioxide was carried out by the council during 2012.

**2.2.2 Benzene**

No monitoring of benzene was carried out by the council during 2012.



## Summary of Compliance with AQS Objectives

Canterbury City Council has examined the results from monitoring in the district. Concentrations within the current AQMA still indicate exceedences of the annual mean and 1-hour mean objectives for nitrogen dioxide at relevant locations, and therefore the AQMA should remain.

Concentrations outside of the AQMA are generally below the objectives at relevant locations. Diffusion tube monitoring at the Herne Street indicates a potential exceedence of the nitrogen dioxide annual mean objective. However, diffusion tube monitoring carried out during 2012, at the new Herne Street 2 site, shows that there may not be an exceedence of the annual mean objective. The monitoring site at Herne Street 1 is situated in a very sheltered corner of two buildings, so may be recording higher concentrations than would be expected at the actual 'façade' of the building. To better understand concentrations of nitrogen dioxide in Herne Street, additional diffusion tube monitoring will be carried out, before proceeding to a Detailed Assessment. The additional monitoring will include the installation of a third diffusion tube site in Herne Street.

### 3 New Local Developments

#### 3.1 Commercial and Domestic Sources

The 2012 Updating and Screening Assessment identified three new commercial biomass boiler sources. Two sources were assessed using the Defra review and assessment tool or biomass combustion, and their respective stack emissions were calculated to be below the target emissions rates produced by the calculator tool.

The third biomass source, at the Canterbury City Council offices, was identified, but not assessed using the Defra biomass tool because it was not operational due to fuel feed issues. The conclusion of the 2012 USA was to wait and assess the boiler when it was operational again, and report the findings in this progress report.

Stack emissions of NO<sub>2</sub> and PM<sub>10</sub> from the boiler have been calculated from the manufacturers published emissions data. These have then been compared to the target emissions rates produced by the Defra biomass calculator tool, which can be found in Appendix C. The calculated stack emission rates are below the respective target emission rates, and therefore a Detailed Assessment is not required.

A comparison of the target and stack emissions data is presented in Table 3.1.

**Table 3.1 Canterbury City Council Biomass Boiler: Comparison of Target and Stack Emission Rates**

		<b>Target emissions rate (g/s)</b>	<b>Stack emissions rate (g/s)</b>
<b>NO<sub>2</sub></b>	<b>Annual mean</b>	0.0585	0.0078
	<b>1-hour mean</b>	0.0321	
<b>PM<sub>10</sub></b>		0.0112	0.00255

Canterbury City 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.

Canterbury City Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

## 4 Implementation of Action Plans

The current air quality action plan, covering the Broad Street/Military Road AQMA received Defra approval in January 2010, and was subsequently formally adopted by the council.

The action plan contains a range of measures that aim to reduce emissions within the AQMA (Direct Measures), and to improve air quality across the district as a whole (General Measures).

A summary of the measures included in the final Action Plan is shown in **Table 4.1**.

More detail on specific action plan measures is given below.

### **DM1 Freight**

During 2012 Kent County Council (KCC) consulted on its draft Freight Action Plan for Kent, which was formally adopted in October 2012, and covers the 2012-2016 period. The plan recognises, and seeks to mitigate, the impact that freight has on the communities of Kent.

The plan sets an overall vision to:

*“Promote safe and sustainable freight distribution networks into, out of and within Kent, which support local and national economic prosperity and quality of life, whilst working to address any negative impacts on local communities and the environment both now and in the future.”*

Objective 1: To take appropriate steps to tackle the problem of overnight lorry parking in Kent.

Objective 2: To find a long-term solution to Operation Stack.

Objective 3: To effectively manage the routing of HGV traffic to ensure that such movements remain on the Strategic Road Network for as much of their journey as possible.

Objective 4: To take steps to address problems caused by freight traffic to communities.

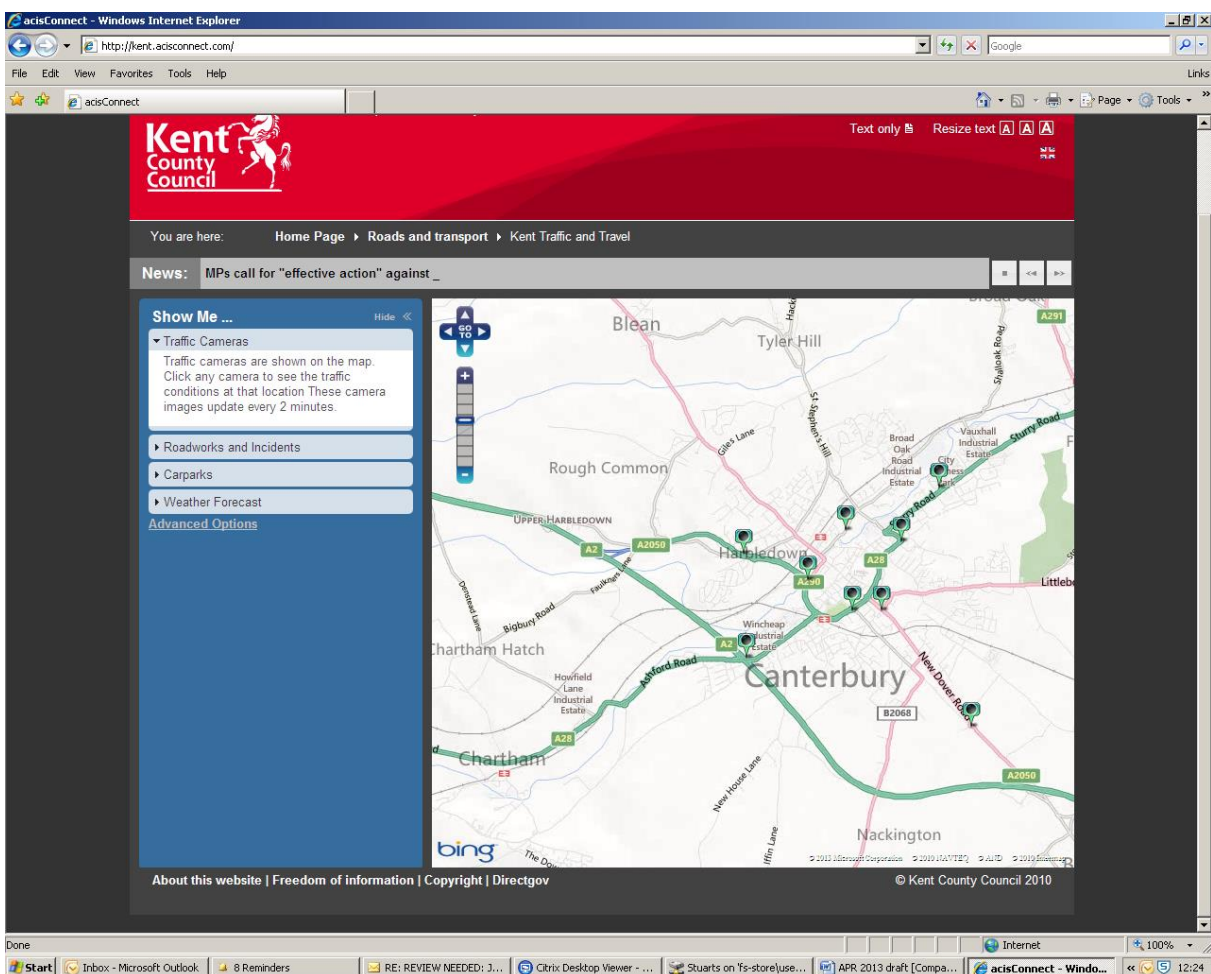
Objective 5: To ensure that KCC continues to make effective use of planning and development control powers to reduce the impact of freight traffic.

Objective 6: To encourage sustainable distribution

The Action Plan will be monitored on an ongoing basis by the KCC Traffic Manager, and be viewed at <https://shareweb.kent.gov.uk/Documents/council-and-democracy/policies-procedures-and-plans/plans/Freight%20Action%20Plan.pdf>

## DM2 Traffic Management

To assist in managing traffic in Canterbury, cameras and variable message signs have been installed at key points on the road network in Canterbury. The locations of the cameras are shown in **Figure 4.1**.



**Figure 4.1** Locations of traffic management cameras in Canterbury

The cameras are linked to the KCC Traffic Management Centre, who monitors and manages traffic, and distributes traffic information via variable message signs.

Although the system is successful to a certain degree in that traffic flows can be monitored, with incidents being dealt with more effectively, very little can be done to influence traffic flows by city centre managing traffic lights. Most junctions in Canterbury are larger roundabouts, with very few traffic light controlled junctions. The vast majority of traffic lights are linked to pedestrian crossings. This provides limited opportunities for the Traffic Management Centre to actively alter traffic flows in Canterbury.

**DM6 Kent Freedom Pass Scheme**

Young people in school ~~years~~ years 7 to 11 can travel by bus throughout Kent at any time with a Freedom Pass, making travel easier and more affordable. After the single payment for the pass each year, bus travel is free any day of the week on participating bus routes in Kent.

Numbers of pass holders, and journey figures are not available on a district by district basis, however, annual Kent wide figures are available, see **Table 4.1** and **4.2**.

**Table 4.1 Annual Freedom Pass Numbers for Kent**

Years	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
<b>Freedom Pass Numbers</b>	5209	13856	22568	27033	25741	27685

**Table 4.2 Annual Freedom Pass Journey Numbers for Kent**

Years	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
<b>Freedom Pass Journeys (millions)</b>	0.776 (part year, pilot areas)	2.71 (full year, pilot areas with some extension)	5.48 (full County roll out)	7.48	7.88	8.65

## DM7 Emissions testing

Recent studies across the UK have shown that emissions from cars with petrol engines have decreased in line with ever more stringent Euro standards. However, emissions from all categories of diesel vehicles (light and heavy duty) have been shown to have changed very little in the last 15 years or so, in urban driving conditions.

The failure of the Euro standards to effectively combat emissions of nitrogen oxides (NO<sub>x</sub>) from diesel vehicles in urban areas has led to difficulty in improving local air quality across the UK, with the increasing proportion of diesel vehicles on our roads. European Commission and UK policies are encouraging the purchase of diesel vehicles over their petrol driven counterparts, due to their like for like carbon dioxide emissions (CO<sub>2</sub>).

To better understand vehicle emissions in Canterbury, and identify possible policies and projects aimed at tackling these emissions, the council carried out a campaign to test vehicle emissions in real time urban conditions using a remote sensing device, replicating similar studies carried out in other parts of the UK. The project was funded by a combination of a Defra Air Quality Grant and Section 106 developer contributions.

A two week emissions testing campaign, was carried between Monday 30<sup>th</sup> April and Thursday 10<sup>th</sup> May 2012 at five sites:

- Kingsmead Road (B2248)
- Military Road (A28)
- New Dover Road (A2050)
- Sturry Road (A28)
- Thanington Road (A28)

As well as obtaining emissions data, a digital image of the vehicles number plate was captured for post processing and vehicle type identification. More than 15000 quality checked vehicle emissions measurements were collated over the two week period. This is significantly higher than a traditional emissions testing survey, which would have involved stopping vehicles at the roadside. The analysis and interpretation of the emissions measurements has been presented in a comprehensive analytical report. In summary the main findings of the report are:

- Diesel vehicle NO<sub>x</sub> emissions controls, for both light and heavy duty categories, have been shown to underperform in the urban driving conditions in Canterbury.
- The NO<sub>x</sub> emissions of diesel cars, vans, buses, coaches and HGV's is relatively high, and stable across all Euro Standards. The exception is the Euro 5 generation of buses which emit about 50% less NO<sub>x</sub> than their predecessors.
- The scheduled bus service NO<sub>x</sub> emission factors were the highest category observed/predicted during the testing survey. The majority of the bus pass-bys were double-deckers (60.1%) as opposed to single deckers (35.9%) or

mini-buses (4%). Scheduled buses are essentially heavy duty vehicles operated intensively over fixed urban routes with frequent stops-starts. These are challenging operating conditions for exhaust after treatment systems, particularly NO<sub>x</sub> emission controls.

Some policy recommendations have been made which could tackle emissions from specific vehicle groups:

- The UK is considering Low Emission Zones (L.E.Z's) that restrict or deter older vans, buses, coaches and HGV's from accessing environmentally sensitive areas. The vehicle emission results indicate that L.E.Z's could significantly reduce tail-pipe emissions of harmful particulate matter (PM<sub>10</sub>), but are expected to have limited success in reducing NO<sub>x</sub> and primary NO<sub>2</sub> in Canterbury.
- The city bus fleet is suggested to be a priority category. Canterbury City Council has a greater influence on these than other light and heavy duty vehicles, through the Quality Bus Partnership, Local Transport Plans and bus operator engagements etc. As these buses make repeated scheduled journeys each day, there is the opportunity to reduce emissions in sensitive areas, for example:
  - Routing newer vehicles through the AQMA
  - Renewing some vehicles with cleaner technology (Euro 5/6). This also applies to Park and Ride vehicle replacement.
  - Introducing buses with cleaner technologies, including hybrid vehicles.

There is a price premium for these cleaner technologies, however they can cut NO<sub>x</sub> and PM<sub>10</sub> emissions by 50% or more, and promise 30% reductions in fuel and carbon dioxide emissions, so can have dual benefits for air quality and climate change. Financial support to invest in emerging cleaner bus technologies, accelerating their up-take and development may be applied for from the Department for Transport, for example via the Green Bus Fund Round.

- The Hackney Carriage and Private Hire taxi fleets comprise about 10% of the passenger fleet in the centre of Canterbury. As taxis are intensively operated light duty vehicles, their emissions are greater than those for a comparable privately owned vehicle, especially diesel taxis. Incentives could be targeted at accelerating the renewal of the Canterbury taxi fleet with less polluting vehicles. Phasing in 'green' (hybrid only) taxi ranks at priority locations such as train stations, could be a low capital cost but effective air quality management policy. A 'green taxi' feasibility study could be undertaken in partnership with some of the larger taxi companies.

The above policies are a selection of those which could be adopted to reduce harmful vehicle emissions, demonstrate progress on the councils adopted air quality action plan, and contribute towards working to achieve the air quality standards in Canterbury.



### **GM1 Work place travel plans**

There is no specific annual requirement in terms of numbers of travel plans to be secured annually in Canterbury District.

KCC seek to secure travel plans for commercial and residential developments, commensurate to the size, scale and likely impact. These will always require the developer to instigate certain physical and/or promotional interventions prior to occupation or within an agreed time period post-occupation. More strategic sites may also be required to actively monitor the effectiveness of their travel plans over time and take remedial action if targets are not achieved.

There are currently 22 sites in Canterbury District with a travel plan, the majority of those will be associated with a planning application although one or two have been developed on a voluntary basis. KCC also work with a number of Canterbury employers through the collaborative New Ways 2 Work partnership - see [www.newways2work.org.uk](http://www.newways2work.org.uk)

Between 2005 and 2011, in common with all top tier local authorities, KCC worked towards developing travel plans in partnership with all school in the district. All local authority run schools in Canterbury developed a travel plan to nationally accredited standards during this time period. Schools are encouraged to review their travel plan on a regular basis, and KCC offer a range of incentives to assist schools in furthering the aims and objectives of their plans.

Currently out of 595 Kent schools, 557 have a travel plan.

### **GM4 Car sharing**

In recognition of the role everyone has in reducing traffic congestion and pollution, KCC has created “kentjourneyshare” to encourage more sustainable travel in Kent. The scheme is part of the New Ways 2 Work initiative, which seeks to raise awareness of green travel issues, promote sustainable ways to travel and encourage companies in Kent to develop travel plans.

Kentjourneyshare is a free, simple, secure scheme that enables people to register a car, bike, taxi and walking journey, and find others to share the costs.

Individuals can save money on fuel and parking with kentjourneyshare, as well as reducing the stress of driving every day, and building networks with colleagues and neighbouring businesses.

Employers can use kentjourneyshare to help reduce demand on limited parking, improve employee relations and boost their environmental credentials, which can help to generate new business and contracts.

The kentjourneyshare scheme is provided by liftshare, the largest provider of journey-sharing schemes in the country, on behalf of KCC. Liftshare operates over 1000 schemes in the UK.

There are 4113 members of kentjourneyshare across Kent. In addition a number of private car share groups in are operation. Canterbury city council is partner in the KCC scheme.

### **GM6 Canterbury cycle network**

Over recent years a number of very popular off-road green walking and cycling routes have been created in the Canterbury district. These include the labyrinth of city centre riverside routes, The Crab & Winkle route linking Canterbury to Whitstable, the Great Stour Way between Canterbury and Chartham, and the Oyster Bay Trail which connects Reculver to Whitstable.

The total number of miles of cycle network in Kent is approximately 547 miles. The total number of miles of cycle network in the Canterbury District is approximately 65 miles. These figures may not include all shared cycle/footways or mandatory and advisory cycle lanes on the highway e.g. designated by lines on the road or that are just signed.

### **GM 7 Development Control**

The following planning applications were dealt with during 2012.

CA/11/01866/FUL

Installation of a biomass boiler at Sainsbury's, Kingsmead Road, Canterbury.

An air quality assessment was submitted at Environmental Health's request as part of the planning application in respect of the proposed biomass boiler. The assessment was asked to assess the impact on sensitive receptors, and the nearby AQMA. No further work, or assessment was required as the report and modelling

undertaken concluded that impact would be negligible. No development contributions were imposed in relation to the AQMA, and the planning application was granted.

However, complaints of dark smoke emissions were received when the boiler was installed and commissioned. Upon investigation this was found to be due to problems with the fuel feed. This was rectified and no further complaints have been received.

CA/11/00108/FUL and CA/12/01157/SOD

Demolition of existing building and erection of student accommodation at 41 St. George's Place, Canterbury.

A condition was imposed upon the original planning application for the development:

*Full details of the measures to be incorporated into the development to reduce the impact of noise from traffic and the adjoining leisure facilities and deteriorating air quality affecting the site shall be submitted to and approved by the Local Planning Authority. The measures shall accord with and meet the expectations set out in the relevant remediation strategies that accompanied the application. Thereafter the works shall be constructed fully in accordance with the approved details.*

*REASON: To limit the impact of noise and fumes to ensure the provision of satisfactory living conditions for future residents.*

An air quality assessment was submitted, and deemed acceptable. Minor mitigation measures were incorporated into the building, including mechanical ventilation as an alternative method of fresh air intake.

CA/11/00922/FUL and CA/12/00705/SOD

Change of use from office to dwellings and erection of a further 5 dwellings at 45-47 Wincheap, Canterbury.

A condition was imposed upon the original planning application for the development:

*Prior to commencement of the development a noise and air quality assessment of the impact of road noise and air pollution on the proposed new residential units shall be carried out and shall be submitted to the Local Planning Authority together with details of measures necessary to ameliorate the effect of road noise and air pollution on the occupiers of those properties. Such measures as are identified as necessary by the Local Planning Authority shall be implemented prior to the first occupation of any unit to which they apply.*

*REASON: To safeguard future occupiers from undue noise disturbance and air pollution from highway traffic.*

An air quality assessment was submitted detailing the mitigation measures to be incorporated into the change of use. These included mechanical ventilation with fresh air intake at the rear of the buildings in order to provide an alternative air source as the report indicated that ground floor rooms would exceed the NO<sub>2</sub> annual mean objective. The site is within an existing AQMA.

CA/12/02149/FUL

Installation of a biomass boiler at Sainsbury's, Reeves Way, Chestfield, Whitstable.

An air quality assessment was submitted at the request of Environmental Health to address the impact of the proposed biomass boiler on relevant receptors and also the overall air quality in the area. The assessment which involved dispersion modelling did not indicate any problems and concluded that impact significance of the boiler was negligible. No further action was required and the planning application was granted.

**Table 4.3 Action Plan Progress**

<b>No.</b>	<b>Measure</b>	<b>Focus</b>	<b>Lead Authority</b>	<b>Indicator</b>	<b>Progress to Date</b>	<b>Progress in Last 12 Months</b>	<b>Estimated Completion Date</b>
DM1	Freight	CCC will work in partnership with KCC and freight operators to implement the Freight Quality Partnership Action Plan	CCC/KCC/ Freight operators	Implementation of improvement schemes	KCC have produced a Freight Action Plan covering the 2012-2016 period	The Freight Action Plan was adopted by KCC on 16 <sup>th</sup> October 2012	Ongoing
DM2	Traffic management	CCC will work in partnership with KCC to implement traffic management improvements in the city centre, particularly within the Broad Street/Military Road AQMA	KCC/CCC	Implementation of traffic management measures	Cameras and variable message signs for UTMC have been installed at key points on the road network in Canterbury.	No details have been received on progress with this measure.	2010/11
DM3	A2 slip roads	CCC will work in partnership with the Highways Agency and KCC to deliver the New A2 Slip Roads Schemes	Highways Agency /KCC/CCC	Implementation of new A2 slips	A new on slip road on the northbound carriageway of the A2 was completed in 2011.	No further progress with other slip road schemes for the A2.	2010-2014

No.	Measure	Focus	Lead Authority	Indicator	Progress to Date	Progress in Last 12 Months	Estimated Completion Date
DM4	Canterbury Parking Strategy	CCC will continue to work with partners to implement measures within the Canterbury Parking Strategy, including enhancement of Park and Ride	KCC/CCC	Implementation of additional Park & Ride provision. Passenger numbers. Number of Parking spaces.	Park and ride services operate from New Dover Road, Wincheap and Sturry Road. A dedicated service running to the Kent and Canterbury hospital operates from the New Dover ride site. CCC's current parking strategy covers the 2006-2016 period.	No details have been received on progress with this measure.	2006-2016
DM5	Canterbury Bus Strategy/Quality Bus Partnership	CCC will work in partnership with KCC to implement the Canterbury Bus Strategy and support the Quality Bus Partnership with Stagecoach East Kent in Canterbury	KCC/CCC	Implementation of the improvement schemes. Passenger numbers.	CCC published a draft Bus Strategy in 2002. At the core of the strategy is a Quality Bus Partnership, which continues.	A bus priority scheme has been implemented at the Tourtel Road roundabout. The scheme has been designed to improve bus journey times into the city centre by introducing bus priority signals at the roundabout to allow buses to exit the bus lane onto the roundabout.	On going
DM6	Kent Freedom Pass Scheme	CCC will work in partnership with KCC to continue with the Kent Freedom Pass scheme in Canterbury	KCC/CCC	Passenger numbers; modal shift.	The Kent Freedom pass scheme is still in operation in the Canterbury district.	The number of Freedom Pass holders, and journeys made across Kent continued to an increase	On going

No.	Measure	Focus	Lead Authority	Indicator	Progress to Date	Progress in Last 12 Months	Estimated Completion Date
DM7	Emissions testing	CCC will investigate the potential for Roadside Emissions Testing in Canterbury, in particular within the Broad Street/Military Road AQMA	CCC	% failure rate	Complete	Two week campaign of remote emissions testing carried out in May 2012. Interpretive report produced.	2010
DM8	Developer contributions	CCC will request S106 contributions for developments likely to have a direct impact on air quality in the AQMA	CCC	Contributions secured for air quality through S106	Section 106 contributions received to enable progress with DM7 above.	No contributions have been sought from new developments during 2012.	Ongoing
DM9	NOx reducing materials	CCC will investigate the potential for use of NO <sub>x</sub> reducing paving and paints within the AQMA	CCC	Implementation of improvement schemes	Application made for Defra Air Quality Grant funding, but unsuccessful	No further opportunities for funding this measure have been identified	2010
DM10	Low emission vehicles	CCC will consider investing in and making more use of LPG or electric cars and vehicles	CCC	Implementation of improvement schemes	No details have been received on progress with this measure.	No details have been received on progress with this measure.	Post 2012

No.	Measure	Focus	Lead Authority	Indicator	Progress to Date	Progress in Last 12 Months	Estimated Completion Date
DM11	A28/A257 link road	CCC will work in partnership with KCC to investigate a route for a new A28/A257 link road.	KCC/CCC	Implementation of improvement schemes	No progress has been made to date with this measure.	No progress has been made in the last 12 months with this measure. A new link road is only likely to be progressed with the redevelopment of the MOD occupied land at Howe Barracks.	Post 2011
GM1	Work place travel plans	CCC will work in partnership with KCC to increase uptake and implementation of School and Workplace Travel Plans, particularly where likely to impact on the AQMA	KCC/CCC/ Schools/ Businesses	Number of new travel plans	There are currently 22 sites in Canterbury with a Travel Plan. During 2005-11 all local authority run school in Kent prepared a school travel plan. 557 out of the 595 schools in Kent have a travel plan.	No details have been received on progress with this measure.	Ongoing
GM2	Council travel plan	CCC will continue to develop and implement the Council Travel Plan	CCC	Implementation of Council Travel Plan; progress with targets	No details have been received on progress with this measure.	No details have been received on progress with this measure.	Ongoing
GM3	Emissions standards	CCC will continue to work with KCC and other partners to deliver improvements in emissions standards, where practicable	KCC/CCC/ Public transport operators	Number of new/improved vehicles within fleets	No details have been received on progress with this measure.	No details have been received on progress with this measure.	Ongoing



No.	Measure	Focus	Lead Authority	Indicator	Progress to Date	Progress in Last 12 Months	Estimated Completion Date
GM4	Car sharing	CCC will continue to work with partners to actively support and promote the Kent-wide car share scheme, to encourage greater uptake	CCC	Number new joiners to share lifts	There are 4113 members of kentjourneyshare, with a number of private car share groups in operation.	No details have been received on progress with this measure.	Ongoing
GM5	Car club schemes	CCC will explore, with KCC and other partners, the potential for operation of Car Club Schemes in Canterbury	CCC/KCC	Introduction of Car Club	No progress has been made to date with this measure.	No progress has been made to date with this measure.	2010/11
GM6	Canterbury cycle network	CCC will work in partnership with KCC to implement improvements to the Canterbury local cycle network	KCC/CCC	Number miles new cycle lanes/ routes.	New cycle routes created: Oyster Bay Trail, Great Stour Way, Crab & Winkle Way, Viking Coastal Trail	No details have been received on progress with this measure.	Ongoing

No.	Measure	Focus	Lead Authority	Indicator	Progress to Date	Progress in Last 12 Months	Estimated Completion Date
GM7	Development control	All relevant CCC Departments including Environmental Protection, Planning Policy and Development Control will continue working closely together, to ensure that air quality is taken into account in the planning process when considering future land uses particularly with sites in or close to AQMAs or in areas marginally below air quality objectives.	CCC	Number of planning applications with air quality conditions/ assessments	The Environmental Health team is consulted on all planning applications.	4 planning applications required an input from Environmental Health on air quality grounds.	Ongoing

No.	Measure	Focus	Lead Authority	Indicator	Progress to Date	Progress in Last 12 Months	Estimated Completion Date
GM8	Air quality planning guidance	CCC will develop through the Kent & Medway Air Quality Partnership a planning guidance document to assist with air quality assessments of development proposals	CCC/ K&MAQP	Completion of planning guidance	The K&MAQP Air Quality and Planning Technical Guidance document was published in July 2011.	Developers have been required to have consideration to the guidance for developments in Canterbury. The guidance is due to be reviewed in 2013 to take into account, amongst other things, the changes in the national planning framework.	2009/10
GM9	Air quality monitoring	CCC will continue their commitment to undertake local air quality monitoring within the District to ensure a high standard of data is achieved to assess against air quality objectives	CCC	Number of monitoring sites % data capture	CCC maintains 5 automatic monitoring stations in the city, and 29 diffusion tube sites. CCC aims to achieve the LAQM target of 90% at each of its automatic monitoring stations	Data capture rates for 2012: Military Road 98.5% St.Dunstan's 99.0% St.Peter's 96.8% Chaucer School 95.1% North Lane 97.5%	Ongoing

No.	Measure	Focus	Lead Authority	Indicator	Progress to Date	Progress in Last 12 Months	Estimated Completion Date
GM10	Review and assessment reports	CCC will make details of the Action Plan measures and annual progress reports available on its website to ensure accessibility to the consultation and implementation process	CCC	Availability of recently published reports on the Website	All review and assessment reports are made available at <a href="http://www.kentair.org.uk">http://www.kentair.org.uk</a>	2012 USA uploaded to <a href="http://www.kentair.org.uk">http://www.kentair.org.uk</a>	Ongoing
GM11	Airtext	CCC will investigate the potential for setting up an airTEXT service in Canterbury	CCC	Implementation of AirText scheme	The provision of an air pollution early warning system, was included in the new contract to run the Kent & Medway Air Quality Monitoring Network from 2012-2015. The system will take the form of a free email pollution forecast service. Subscription to the forecast will be via the new Kentair website when it goes live in 2013.	New Kentair website in development. Free email pollution forecast service to go live in 2013.	2010

No.	Measure	Focus	Lead Authority	Indicator	Progress to Date	Progress in Last 12 Months	Estimated Completion Date
GM12	Kent & Medway Air Quality Partnership and Monitoring Network	<p>CCC will continue to support and be a Member of the Kent and Medway Air Quality Partnership and Monitoring Network Group. Canterbury will also work together with the Kent &amp; Medway Air Quality Partnership on air quality studies within the County to raise the profile of air quality in Canterbury and County-wide.</p>	CCC	Membership of the Partnership and Network continued.	CCC continues to become a member of the partnership, and attend meetings.	<p>In 2012, the CCC officer who attends partnership meeting was elected to the position of vice chair of the partnership, and chair of its dedicated, and public health focussed, sub-group. Both roles are for a two year period, after which the positions are rotated to be of chair of the partnership and vice chair of the health sub-group. The CCC officer is also a member of the monitoring network contract monitoring group.</p>	Ongoing

No.	Measure	Focus	Lead Authority	Indicator	Progress to Date	Progress in Last 12 Months	Estimated Completion Date
GM13	Industrial pollution control and nuisance	CCC will continue to proactively enforce industrial pollution control and nuisance legislation to minimise pollutant emissions from these sources in the Canterbury area.	CCC	BVPI for upgrade of permitted industrial processes	The Environmental Health team continues to fulfill its duties in relation to industrial pollution control, and in dealing with complaints made under the Environmental Protection Act 1990, which have a general benefit to air quality.	Inspection information is submitted via the Defra annual statistical survey for pollution control. For 2012/13 100% of inspections were completed, and no enforcement action was necessary. The environmental health department. The total number of nuisance complaints related to dust, smoke, odour has been reducing in recent years, but in the last two years has remained relatively consistent: 2009 = 115 2010 = 92, 2011 = 71, 2012 = 76	Ongoing
GM14	Energy efficiency	CCC will continue to work together with the Kent Energy Centre and other partners to promote and implement energy efficiency measures in Canterbury	CCC/Kent Energy Centre	% improvement in energy efficiency Standard Assessment Procedure rating	No details have been received on progress with this measure.	No details have been received on progress with this measure.	Ongoing

## **5 Conclusions and Proposed Actions**

### **5.1 Conclusions from New Monitoring Data**

Monitoring data for 2012 demonstrates a need to retain the current AQMA. A potential exceedence of the NO<sub>2</sub> annual mean objective is indicated in Herne Street, Herne. However it is thought that the location of the diffusion tube, in a very sheltered corner between two buildings, is leading to higher recorded levels of NO<sub>2</sub>. The conclusion is to add a third diffusion tube site in Herne Street, commencing January 2014, to better understand levels of NO<sub>2</sub> in the area before proceeding to a Detailed Assessment. All other monitoring sites outside of the current AQMA are below the NO<sub>2</sub> objective levels.

### **5.2 Conclusions relating to New Local Developments**

This report concludes that there are no new or newly identified local developments which will require consideration in subsequent rounds of review and assessment reporting.

### **5.3 Other Conclusions**

The council has reported progress with its current Air Quality Action Plan during 2012. Whilst there has been some good progress during 2012, most notably with respect to DM7 and GM11, it has been difficult to report progress on a number of measures due to a lack of information.

Since the action plan was formally adopted by the Council, an expanded AQMA covering a number of the key routes in and out of the city centre has been declared. For this reason it is probably now appropriate to review the air quality action plan, so it better reflects the expanded AQMA, takes into consideration new evidence from the recent vehicle emissions study carried out in 2012, and examples of best practice being adopted elsewhere. This review will be informed by a number of key council strategies/policies, which include the Corporate Plan, Local Plan, Transport Action Plan, and Environment Strategy, some of which are in various stages of production/review. This should provide much better links between these council policies and the measures in the new action plan.

## 5.4 Proposed Actions

The following actions are proposed.

- to carry out additional diffusion tube monitoring in Herne Street. This will include a third monitoring site from January 2014. A review of the monitoring data will be carried out in July 2014, to identify if a Detailed Assessment is required for Herne Street
- to submit the 2014 Air Quality Progress Report
- to carry out a review of the current air quality action plan with stakeholders in 2014



# Appendices

## Appendix A

### Unadjusted nitrogen dioxide diffusion tube data

Site ID	J	F	M	A	M	J	J	A	S	O	N	D
DT1	76.0	71.8	68.7	49.0	59.0	58.1	59.6	70.4	63.1	70.0	72.6	58.4
DT2	47.8	50.2	40.2	30.0	31.2	33.2	35.6	36.4	38.9	47.6	41.3	41.0
DT3	59.0	55.4	50.0	40.2	28.4	27.3	28.1	32.6	35.1	40.2	45.1	38.3
DT4	65.2	63.2	60.0	54.0	55.2	52.1	53.4	55.2	54.6	69.5	66.0	49.0
DT5	38.1	45.6	44.0	38.7	22.1	23.7	24.4	31.7	36.2	38.2	45.6	42.3
DT6	58.0	56.8	50.1	30.0	28.2	30.1	32.6	32.1	44.2	46.6	53.7	52.9
DT7	40.2		35.8	27.0	20.2							
DT8	38.8	51.9	45.8	27.2	26.6	27.7	28.7	31.2	39.8		85.9	41.5
DT9	42.2	47.1	50.0	34.3	26.2	26.0	25.0	36.3	40.7	47.2	44.2	43.8
DT10	52.0	49.1	44.6	33.2	28.5	32.1	34.8	45.0	47.2	38.9	50.7	33.5
DT11	52.1	46.5	50.0	38.0	40.1	33.9	32.2	32.8		40.0	46.8	43.2
DT12	40.0	37.2	33.4	24.2	16.9	18.2	19.0	24.6	22.7	22.6	33.9	30.5
DT13	60.8	72.4	74.0	60.0	56.9		47.3	62.8				
DT14	68.0	66.8	61.0	50.2	45.6	42.4	44.5	50.9	58.4	55.5	60.6	46.5
DT15	27.5	30.0	26.0	18.5	15.7	10.1	9.5	11.7	13.4	18.5	24.6	27.9
	27.0	29.7	25.9	18.8	15.4	10.4	10.6	11.9	14.8	20.0	22.4	30.6
	26.9	30.3	26.4	18.7	14.3	10.7		13.5	16.0	22.1	24.3	24.7
DT16	67.0	69.9	60.0	57.8	58.1	52.4	50.6	55.3	63.2	68.5	63.8	52.4
DT17	69.0	73.2	69.0	50.2	53.1	48.2	45.5		71.5	64.0	72.4	65.2
DT18	47.3	49.0	45.6	31.5	44.3	34.0	32.0	34.0	41.4	42.1	45.2	42.4
	47.1	48.4	45.4	31.2	43.8	33.7	32.8	31.7	47.2	42.5	41.0	43.2
	46.8	49.2	45.0	31.0	43.4	33.5	32.6	36.5	36.7	43.4	42.9	41.4
DT19	68.2	66.8	60.4	62.1	67.3	56.0	55.4	58.1	58.3	61.7	65.0	58.4
DT20	47.3	43.4	46.0	44.2	38.6			32.9	42.6	44.8	49.7	45.3
DT21	74.0	72.9	67.4	65.0	62.2	64.2	65.0	76.8	75.7	74.2	52.6	69.8

**Canterbury City Council**

DT22	61.1	56.9	48.9	37.8	31.0	33.0	34.5	36.6	45.7	45.6	47.2	47.4
DT23	40.4	44.6	37.3	32.6	36.0	20.1	20.7	24.5	32.4	34.0	43.0	38.6
DT24	59.4	57.6	55.2	42.8	33.9	39.8	41.1	43.3	45.5	47.6	58.1	47.9
DT25	77.9	99.0	80.4	57.2	57.9	60.2	69.9	71.2	86.6	85.4	89.6	89.1
DT26	47.8	57.2	48.0	36.2	33.0	34.1	35.3	44.2	49.1	48.8	57.3	54.2
DT27	62.0	74.4	60.1	50.3	47.3		75.9	67.0			73.0	67.1
DT28							27.0	35.7	32.9	40.0	44.2	45.2
DT29											63.9	63.0

## Appendix B Defra biomass calculator tool results

Review and Assessment Tool for oxides of nitrogen emissions from biomass combustion stacks		
Annual mean NO <sub>2</sub> objective		
<p>The target emissions of NO<sub>x</sub> in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedence of the annual mean objective for NO<sub>2</sub></p>		
<p>Enter required information in Cream Cells Resulting Emission in Red Bold</p>		
Building height	<input type="text" value="7.82"/>	m
Stack diameter	<input type="text" value="0.25"/>	m
Stack height	<input type="text" value="8.82"/>	m
Location {Scotland, Rest of UK}	<input type="text" value="Rest of UK"/>	
NO <sub>2</sub> Annual mean background concentration (include roadside contribution at relevant receptors)	<input type="text" value="15"/>	µg/m <sup>3</sup>
Calculated Effective stack height	<input type="text" value="1.7"/>	m
Target Emission Rate	<input type="text" value="0.0585"/>	g/s
<p>If the maximum stack emission rate is less than the target above then it is not likely that the annual mean limit value for NO<sub>2</sub> will be exceeded</p>		

Review and Assessment Tool for oxides of nitrogen emissions from biomass combustion stacks		
Hourly mean NO <sub>2</sub> objective		
The target emissions of NO <sub>x</sub> in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedence of the annual mean objective for NO <sub>2</sub>		
Enter required information in Cream Cells Resulting Emission in Red Bold		
Building height	<input style="background-color: #FFFF00;" type="text" value="7.82"/>	m
Stack diameter	<input style="background-color: #FFFF00;" type="text" value="0.25"/>	m
Stack height	<input style="background-color: #FFFF00;" type="text" value="8.82"/>	m
Location {Scotland, Rest of UK}	<input style="background-color: #FFFF00;" type="text" value="Rest of UK"/>	
NO <sub>2</sub> Annual mean background concentration (include roadside contribution at relevant receptors)	<input style="background-color: #FFFF00;" type="text" value="15"/>	µg/m <sup>3</sup>
Calculated Effective stack height	<input style="border: 1px solid black;" type="text" value="1.7"/>	m
Target Emission Rate	<input style="border: 1px solid black;" type="text" value="0.0321"/>	g/s
If the maximum stack emission rate is less than the target above then it is not likely that the hourly mean objective for NO <sub>2</sub> will be exceeded		

Review and Assessment Tool for PM <sub>10</sub> from biomass combustion stacks		
<p>The maximum emissions of PM<sub>10</sub> in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedence of the 24 hour objective for PM10 in England, Wales and Northern Ireland or the annual mean objective in Scotland.</p>		
<p>Enter required information in Cream Cells Resulting Emission in Red Bold</p>		
Building height	<input type="text" value="7.82"/>	m
Stack diameter	<input type="text" value="0.25"/>	m
Stack height	<input type="text" value="8.82"/>	m
Location {Scotland, Rest of UK}	<input type="text" value="Rest of UK"/>	
PM <sub>10</sub> Annual mean background concentration (include roadside contribution at relevant receptors)	<input type="text" value="18"/>	µg/m <sup>3</sup>
Calculated Effective stack height	<input type="text" value="1.7"/>	m
Target Emission Rate	<input type="text" value="0.0112"/>	g/s
<p>If the maximum stack emission rate is less than the target above then it is not likely that the most stringent objective for PM<sub>10</sub> will be exceeded</p>		