Clackmannanshire Council

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2011 Air Quality Progress Report for *Clackmannanshire Council*

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

April 2011

TSI Scotland

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Executive Summary

The Local Air Quality Management process as set out in Part IV of the Environment Act (1995) (Ref.1) and the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 (Ref.2) requires all local authorities to complete a Progress Report due for submission in April 2011 in accordance with technical guidance LAQM.TG(09) (Ref.3). The progress report is intended to maintain continuity in the Local Air Quality Management (LAQM) process, and fill in the gaps between the three-yearly cycle of Review and Assessment.

This is the 2011 Progress Report for Clackmannanshire Council which identifies all matters regarding impacts to local air quality that are new or have changed since the last Progress Report in 2010 and whether further consideration of such changes is required.

The Air Quality Strategy (AQS) details objective concentrations for the following pollutants:

- Benzene
- 1,3-Butadiene
- Carbon Monoxide (CO)
- Lead
- Sulphur Dioxide (SO_2)
- Nitrogen Dioxide (NO_2)
- Particles (PM_{10})

Further to the conclusions of the 2009 Updating and Screening Assessment and previous Review and Assessment reports, local monitoring has only been carried out for NO_2 and PM_{10} in recent years. The results of the monitoring program across Clackmannanshire Council are as follows:

- Diffusion tube results indicate that annual average concentrations of nitrogen dioxide (NO_2) are below the AQS annual mean objective of 40µg/m^3 at all monitoring locations. The maximum recorded annual mean concentration was 38µg/m^3 at Clackmannan Road and Shillinghill/Bridge Terrace in Alloa.
- The annual average concentration of NO_2 is variable from year to year at each site but has decreased at 7 out of 10 sites since 2009.
- Continuous automatic monitoring of particulate matter (PM_{10}) is carried out at South Ring Road, Alloa. The results show that there has been no exceedence of the annual mean or 24-hour mean PM_{10} AQS objectives during 2010.

A review of planning applications submitted in 2010 showed that there were no new developments likely to result in any exceedences of the AQS objectives for any pollutant.

Consultation with SEPA has confirmed that there are no existing or new installations likely to cause an exceedence of the AQS objectives for any pollutant. There is one exception, namely Cambusview Poultry Farm which was identified in the 2009

Updating and Screening Assessment (USA) as having the potential to cause an adverse impact on air quality at a number of residential properties close to the unit. The Scottish Government was consulted in February 2011 regarding the availability of new guidance for the assessment of such installations. It is understood that Detailed Assessments have been carried out at several Local Authorities in England to inform such guidance. Some of these studies are still in progress and the Council was advised that this installation should be assessed in the appropriate manner once UK-wide guidance is issued.

Clackmannanshire Council confirmed that there were no new road developments with the potential to result in an exceedence of the AQS objectives. For the majority of roads, the Annual Average Daily Traffic (AADT) count has decreased between 2009-2010. One link, the A908 near Fishcross Primary School experienced an increase of 4.4% in the AADT from 12341 to 12889 between 2009 and 2010. This is an area of relevant public exposure with the school and residential properties adjacent to it. A diffusion tube has therefore been added to the network in this location from April 2011 for an initial period of one year in order that some air quality data will be available for the next USA due in 2012. There are no other significant increases in traffic flow.

Due to the low measured concentrations of NO_2 recorded for several years at some of the diffusion tube sites, it was agreed with the Scottish Government that 5 sites across the area would be discontinued at the end of 2010. The 6 sites that remain are considered the four “worst case” locations, one background site plus the new one detailed above to continue monitoring the trend in local air quality.

Continuous monitoring of PM_{10} will continue at the South Ring Road, Alloa site during 2011-2012.

It is concluded that Clackmannanshire Council is not required to proceed to a Detailed Assessment for any pollutant.

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1 Introduction

1.1 Description of Local Authority Area

Clackmannanshire is the smallest local authority area in mainland Scotland with a population of approximately 50,000 people, of which half live in the main town of Alloa. It is a mainly rural area and shares borders with Falkirk, Perth and Kinross, Fife and Stirling Council areas. The Ochil Hills form the northern border of Clackmannanshire with the River Forth located on the southern border.

The majority of industrial and commercial developments are also located within Alloa and the predominant industries are now agriculture and small to medium sized enterprises.

The Clackmannanshire Council boundary is shown in Figure 1 in Appendix A.

1.2 Purpose of Progress Report

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

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

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in Scotland are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of micrograms 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 Scotland

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	3.25 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	50 $\mu g/m^3$, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	40 $\mu g/m^3$	Annual mean	31.12.2004
	18 $\mu g/m^3$	Annual mean	31.12.2010
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Table 1.2 summarises the Air Quality Review and Assessment reports submitted by Clackmannanshire Council since 2004 with the most recent report of 2010 listed first.

Table 1.2 Summary of Previous Air Quality Review and Assessment Reports 2004-2010

Report	Date Completed	Summary and Conclusions
Progress Report 2010 (Ref.4)	July 2010	New monitoring data confirmed that there were no exceedences of the Air Quality Strategy (AQS) objectives for nitrogen dioxide (NO_2) and (PM_{10}) during 2009. However one site, Shillinghill/Bridge Terrace in Alloa was identified as having an annual mean concentration of NO_2 of 39ug/m^3 (objective level is 40ug/m^3). South Ring in Alloa also recorded an annual mean concentration of PM_{10} of 17ug/m^3 compared with the objective of 18ug/m^3. The elevated concentrations were recorded during a period of construction close-by in August 2009 so may not be representative. It was recommended that monitoring at these locations should continue. Further guidance is awaited regarding the impact on local air quality of intensive poultry farms from monitoring studies carried out elsewhere in the UK, before deciding to proceed to a Detailed Assessment for Cambusview Poultry Farm. It was also concluded that there was no risk of exceedences of any other AQS pollutant objectives.
Updating and Screening Assessment 2009 (Ref.5)	July 2009	New monitoring data confirmed that there were no exceedences of the Air Quality Strategy (AQS) objectives for nitrogen dioxide (NO_2) and (PM_{10}) during 2008. It was also concluded that there was no risk of exceedences of any other AQS pollutant objectives. Intensive poultry farms were added to the updated Technical Guidance LAQM.TG(09) for assessment. One such farm, Cambusview Poultry Farm was identified as being recommended for Detailed Assessment to determine if there was a likelihood of exceedence

		of the PM_{10} objectives in an area of relevant exposure.
Progress Report 2008 (Ref.6)	March 2008	New monitoring data confirmed that there were no exceedences of the AQS objectives for NO_2 and during 2007. The PM_{10} objectives were exceeded at South Ring, Alloa but were attributed to construction of a new roundabout in the vicinity. Elevated concentrations were clearly identified during the construction period in the latter half of the year. It was recommended that Clackmannanshire Council should continue monitoring PM_{10} at this location for a further year before determining the need for a Detailed Assessment.
Progress Report 2007 (Ref.7)	May 2007	New monitoring data confirmed that there were no exceedences of the AQS objectives for NO_2 and during 2006. The PM_{10} objectives were exceeded at South Ring, Alloa but were attributed to construction work being carried out in the vicinity. It was recommended that Clackmannanshire Council should continue monitoring PM_{10} at this location in order to verify the likelihood of exceedence of the objectives.
Updating and Screening Assessment 2006 (Ref.8)	August 2006	New monitoring data confirmed that there were no exceedences of the AQS objectives for NO_2 and PM_{10} during 2005. It was also concluded using the methodology in the technical guidance to project forward that there was no risk of exceedence of any of the AQS objectives in future years.
Progress Report 2005 (Ref.9)	April 2005	New monitoring data confirmed that there were no exceedences of the AQS objectives for NO_2 and PM_{10} during 2004. It was also concluded using the methodology in the technical guidance to project forward that that there was no risk of exceedence of any of the AQS objectives in future years.
Progress Report 2004 (Ref.10)	April 2004	New monitoring data confirmed that there were no exceedences of the AQS objectives for NO_2 and PM_{10} during 2003. It was also concluded that there was no risk of exceedences of any of the AQS pollutants in future years based on a 58% data capture.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

Further to the conclusions of the 2009 Updating and Screening Assessment and previous Review and Assessment reports, local monitoring has only been carried out for NO_2 and PM_{10} in recent years. During 2010, Clackmannanshire Council monitored NO_2 at ten locations using passive diffusion tubes and PM_{10} at one location using a Tapered Element Oscillating Microbalance (TEOM) automatic analyser.

2.1.1 Automatic Monitoring Sites

The TEOM is located in a Groundhog unit in a car park immediately adjacent to South Ring Road, Alloa. It is a busy road with a pedestrian crossing and housing nearby. It is considered a busy pedestrian thoroughfare. The site is classified as a Roadside site and also records ambient temperature. The details of the site are shown in Table 2.1. A photograph of the unit and a map showing the location of the monitoring site are shown in Figures 2 and 3 in Appendix A.

Table 2.1 Details of Automatic Monitoring Site

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	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?
South Ring Road, Alloa	Roadside	288700	693050	PM_{10}	TEOM	N	Y 8m	8.5m	Y

2.1.2 QA/QC of Automatic Monitoring Sites

Data collection from the TEOM analyser is carried out by AEA on behalf of Clackmannanshire Council on a daily basis. The analyser is also audited by AEA every 6 months. All data are ratified 6-monthly using procedures comparable to those used for national network monitoring data. Data are available on the Scottish air quality website **www.scottishairquality.co.uk**

The analyser is also serviced on an annual basis by Casella Monitor.

Personnel from Clackmannanshire Council visit the site on a monthly basis in order to change filters and check diagnostics.

Service and audit certificates are included in Appendix B.

2.1.3 Non-Automatic Monitoring Sites

Non-automatic monitoring of NO_2 was undertaken at 10 locations within Clackmannanshire Council in 2010 using passive diffusion tubes. The location and description of each site is shown in Table 2.2. All sites are classified as kerbside sites except Stirling Road, Tullibody, which is an Urban Background site and Alloa, South Ring Road, which is a roadside site. Maps showing the locations of the monitoring sites are shown in Figure 4 in Appendix A.

Table 2.2 Details of Non-Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Norwood Avenue	Kerbside	287600	693600	NO_2	N	Y (2m)	1.7m	Y
Shaftsbury Street	Kerbside	288400	693500	NO_2	N	Y (2m)	1.2m	Y
Stirling Road, Tullibody	Urban Background	286000	695100	NO_2	N	Y (2m)	1.3m	Y
Clackmannan Road	Kerbside	289300	692900	NO_2	N	Y (2m)	2m	Y
High Street, Tillicoultry	Kerbside	291500	697100	NO_2	N	Y (2m)	1.8m	Y
Bus Station, Tillicoultry	Kerbside	292000	696900	NO_2	N	Y (2m)	1.3m	Y
Glasshouse Loan, Alloa	Kerbside/ Industrial	288200	692600	NO_2	N	Y (2m)	3.1m	Y
Bus Station, Alloa	Kerbside	288800	692900	NO_2	N	Y (2m)	1.3m	Y
Shillinghill/Bridge Terrace, Alloa	Kerbside	288900	692900	NO_2	N	Y (2m)	1.4m	Y
South Ring Road, Alloa	Roadside	288750	693150	NO_2	N	Y (8m)	8.5m	Y

2.1.4 QA/QC of Non-Automatic Monitoring Sites

The diffusion tubes used by Clackmannanshire Council are supplied and analysed by Glasgow Scientific Services (GSS). The laboratory is UKAS accredited and participates in 3 schemes which ensure that the NO_2 tube results meet acceptable standards. These are:

- **The WASP scheme -** run by the Health & Safety Laboratory (HSL). Every 3 months GSS receive four diffusion tubes spiked with set amounts of nitrite. The tubes are analysed and results returned to HSL. Results are compared with the known spiking levels and with the results from other participating laboratories. Feedback on the performance is provided. The results from the first period gave a Z score for two of the tubes > ± 3 which is unsatisfactory. This poor performance led to an investigation which highlighted a problem and the method was amended for later rounds. The results from the remaining three periods of 2010 show that the laboratory achieved a Z score of between -1.4 and 0.3 which is considered to be well within the classification of satisfactory.
- **Field Intercomparison Study –** run by National Physical Laboratory (NPL) as part of the Support to Local Authorities for Air Quality Management Contract funded by the Scottish Government, DEFRA and the Devolved Administrations. Every 3 months, 3 tubes and a blank which have been exposed at a field intercomparison site are supplied to GSS for analysis. The results are compared with those from the automatic chemiluminescent analyzer at the site, which is defined as the reference method for measurement of NO_2 (Ref.3).
- **NO_2 Solution Test –** the laboratory performs an in-house check for analysis of NO_2 tubes every 20 NO_2 tube samples.

2.1.5 Bias Correction Factor for NO_2 Diffusion Tubes

Clackmannanshire Council does not carry out any co-location study of its own as it does not operate a chemiluminescent analyzer. At the time of writing, no other Local Authorities had submitted results of their co-location studies. The results of the co-location field intercomparison study were input to the National Bias Correction Factor spreadsheet (Diffusion_Tube_Bias_Factors_v04_11_v6.xls) (Ref.11) via the Review and Assessment Helpdesk.

In this case, the bias adjustment factor from the intercomparison study is used as the overall factor to be applied to the diffusion tubes across Clackmannanshire Council monitoring network. Table 2.3 shows a summary of the results for tubes analysed by GSS. The bias adjustment correction factor for 2010 is 1.1.

Table 2.3 Calculated Laboratory Bias Adjustment Factors for NO_2 Diffusion Tubes for Glasgow Scientific Services 2010

Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) ($\mu g/m^3$)	Automatic Monitor Mean Conc. (Cm) ($\mu g/m^3$)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
20% TEA in Water	2010	Kerbside	Field Intercomparison Study	12	85	93	-8.8%	Good	1.1
								Overall Factor	**1.1**

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

The AQS objectives for NO_2 are summarised in Table 2.4 below:

Table 2.4 AQS Objectives for NO_2

Pollutant	Definition of AQS
NO_2	Annual mean concentration of 40µg/m^3 to be achieved by 2005
	Hourly Mean concentration of 200µg/m^3 not to be exceeded more than 18 times in a year to be achieved by 2005.[1]

Diffusion Tube Monitoring Data

The bias adjusted diffusion tube results for 2010 are shown for each site in Table 2.5. The data capture was 100% for each site with the exception of Bus Station, Alloa which had one tube missing in May, resulting in a 91.7% data capture rate. One monthly result was also discounted in the calculation of the annual mean for Norwood Avenue, Shaftsbury Street and Stirling Road, Tullibody as the result was below the detection limit of the analytical method. The raw, unadjusted monthly results are summarised in Appendix B.

Table 2.5 Bias Adjusted Annual Mean Concentrations of NO_2 for 2010

Site ID	Location	Within AQMA?	Data Capture 2010	Bias Adjusted Annual Mean Concentration for 2010 (µg/m^3)
Norwood Avenue	Alloa	N	91.7%	14
Shaftsbury Street	Alloa	N	91.7%	17
Stirling Road	Tullibody	N	91.7%	23
Clackmannan Road	Alloa	N	100%	38
High Street	Tillicoultry	N	100%	22
Bus Station	Tillicoultry	N	100%	19
Glasshouse Loan	Alloa	N	100%	22
Bus Station	Alloa	N	91.7%	33
Shillinghill/Bridge Terrace	Alloa	N	100%	38
South Ring Road	Alloa	N	100%	27

[1] Corresponds to the 99 8th Percentile of hourly mean concentration measurements.

The highest annual mean concentration was 38µg/m^3 recorded at both Clackmannan Road and Shillinghill/Bridge Terrace in Alloa and the lowest concentration of 14µg/m^3 was recorded at Norwood Avenue in Alloa. There were therefore no exceedences of the NO_2 annual mean AQS objective at any of the monitoring sites during 2010.

A summary of the bias corrected annual mean concentration at each site for the period 2005-2010 is shown in Table 2.6. A graph showing the annual variation at each site is shown in Figure 6 in Appendix C. The graph indicates that the concentrations are variable from year to year with no clear upward or downward trend. The concentration has decreased at 7 out of 10 sites between 2009-2010 with all sites remaining below the objective of 40µg/m^3.

Table 2.6 Bias Adjusted Annual Average Concentrations from 2005-2010 (µg/m^3)

Site ID	2005 (0.74)*	2006 (0.96)*	2007 (1.09)*	2008 (0.97)*	2009 (1.23)*	2010 (1.1)
Norwood Avenue	9	13	10.7	9.8	15	14
Shaftsbury Street	12	17	10.9	10.4	16	17
Stirling Road	25	33	19.7	19.3	24	23
Clackmannan Road	19	23	38.2	30.1	35	38
High Street	17	21	21.4	17.2	21	22
Bus Station	15	23	18.7	15.2	20	19
Glasshouse Loan	29	36	21.4	21.7	25	22
Bus Station	18	23	35.5	29.7	34	33
Shillinghill/Bridge Terrace	19	25	36.5	28	39	38
South Ring Road	29	39	27.1	22.8	30	27

* Bias correction factor used for correcting raw diffusion tube data

Due to the low measured concentrations of NO_2 recorded for several years at some of the diffusion tube sites, it was agreed with the Scottish Government that 5 sites across the area would be discontinued at the end of 2010. These are:

- Shaftsbury Street, Alloa;
- Stirling Road, Tullibody;
- High Street, Tillicoultry;
- Bus Station, Tillicoultry; and
- Glasshouse Loan, Alloa.

The 5 sites that remain are considered the four “worst case” locations plus one background site (Norwood Avenue, Alloa) to continue monitoring the trend in local air quality.

There is no continuous automatic monitoring of NO_2 within Clackmannanshire Council. The Technical Guidance, LAQM.TG(09) document (Ref.3) also states that where the measured annual mean concentration is below 60µg/m^3, it is unlikely that the hourly mean NO_2 objective of 200µg/m^3 will be exceeded. It is therefore concluded that there are no exceedences of the hourly mean objective for NO_2 at any of the Clackmannanshire monitoring sites during 2010.

2.2.2 PM_{10}

Table 2.7 AQS Objectives for PM_{10} in Scotland

Pollutant	Definition of AQS
PM_{10}	Annual mean concentration of 18µg/m^3 to be achieved by 2010
	Daily mean concentration of 50µg/m^3 not to be exceeded more than 7 times in a year to be achieved by 2010

Clackmannanshire Council monitor PM_{10} at South Ring Road, Alloa using a TEOM automatic analyser. The results require to be corrected to a gravimetric equivalent for comparison with the AQS objectives. The ratified data from the TEOM for 2010 has been corrected using the Volatile Correction Model (VCM) (Ref.10). The methodology used to correct the data is shown in Appendix B. The results of PM_{10} automatic monitoring compared with the annual mean objective for the period 2006-2010 is shown in Table 2.8. The results show that the annual mean concentration for 2010 was 17µg/m^3.

Table 2.8 Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for 2010 %	Annual mean concentrations (µg/m^3)				
				2006*	2007*	2008$^+$	2009$^+$	2010$^+$
South Ring Rd	Alloa	N	99.5	23.5	22.0	15.8	17	17

*Gravimetric Adjustment Factor of 1.3 applied to data
$^+$VCM used to correct TEOM data

The results of PM_{10} automatic monitoring compared with the 24-hour mean objective for the period 2006-2010 is shown in Table 2.9. The results show that there was one exceedence of the 24-hour mean objective concentration of 50µg/m^3 compared with an allowance of 7 exceedences. A graph of the 24-hour mean concentrations is shown in Figure 7 Appendix C.

Table 2.9 Results of PM_{10} Automatic Monitoring: Comparison with the Daily Mean Objective

Site ID	Location	Within AQMA?	Data Capture for 2010 %	No. of Exceedences of the Daily Mean Objective of 50µg/m^3				
				2006*	2007*	2008$^+$	2009$^+$	2010$^+$
South Ring Rd	Alloa	N	99.5	10	9	0	3	1

*Gravimetric Adjustment Factor of 1.3 applied to data
$^+$VCM used to correct TEOM data

2.2.3 Summary of Compliance with AQS Objectives

Clackmannanshire Council has examined the results from NO_2 and PM_{10} monitoring in the local authority area. Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

This section examines any local development changes that have taken place since the last Progress Report which may affect air quality. The items included are:

- Road Traffic Sources;
- Other Transport Sources;
- Industrial Sources;
- Commercial and Domestic Sources; and
- Fugitive and Uncontrolled Sources.

3.1 Road Traffic Sources

Traffic data for 2009 were unavailable due to a problem retrieving data from the monitoring system. However it was concluded that there were no new or newly identified sources that were likely to result in an exceedence of any of the AQS objectives since completion of the 2009 USA which used 2008 traffic flow data. The data from 2009 have since been retrieved and are presented along with 2008 and 2010 data in Table 3.1 in order to examine the percentage change in traffic flows on each road link used in the survey. A map showing the locations of the survey points for 2010 is shown in Figure 8 in Appendix D.

For the majority of roads, the Annual Average Daily Traffic (AADT) count has decreased between 2009-2010. One link, the A908 near Fishcross Primary School experienced an increase of 4.4% in the AADT from 12341 to 12889 between 2009 and 2010. This road link has become more popular in recent years, possibly due to road widening on another section towards Stirling and the opening of Clackmannanshire Bridge making it a more popular route with commuters. This is an area of relevant public exposure with the school and residential properties adjacent to it. A diffusion tube has therefore been added to the network in this location from April 2011 for an initial period of one year in order that some air quality data will be available for the next USA due in 2012. There are no other significant increases in traffic flow.

Clackmannanshire Council confirms that there are no new road traffic developments which may have an impact on air quality within the Local Authority area.

Clackmannanshire Council has identified the following road traffic source with an increase in traffic flow which may impact on air quality in the Local Authority area.

A908 Fishcross Primary School

An additional NO_2 diffusion tube has been located at the public exposure location since April 2011 for an initial period of one year in order that this location can be taken into consideration in the next Updating and Screening Assessment, due in 2012.

Table 3.1 Summary of Traffic Survey Data for Clackmannanshire Council 2008-2010

ID	Description	Speed	AADT			% Change 2009-2010
			2008	2009	2010	
49	A977 Gartlove	60	5325	5949	5437	-8.6
287	A907 Blackgrange	60	22896	20768	20407	-1.7
288	A907 Cambus	40	10182	9027	8869	-1.8
292	A907 Ring Road Westbound	30	12259	11915	11416	-4.2
295	A907 Clackmannanshire Bypass	60	12431	14395	13302	-7.6
300	**A908 Fishcross Primary School**	**30**	**12204**	**12341**	**12889**	**4.4**
301	A908 Blackfaulds	40	8574	9061	9167	1.2
302	A908 Devonside	30	7274	7388	7649	3.5
309	A91 Menstrie/Alva	60	10559	9758	9121	-6.5
311	A91 Menstrie Mains	60	10458	9760	9252	-5.2
314	A91 Tillicoultry	30	7641	7225	6513	-9.9
321	A91 Muckhart	60	3543	3545	3346	-5.6
50	A977 Blairingone	60	4631	5355	3957	-14.6
581	B908 Fairfield	30	5699	6178	6341	2.6
589	B9096 Tullibody Sign	30	10291	9517	9407	-1.2
590	B9096 Tullibody Road	30	11048	10746	10702	-0.4
625	B9096 Tullibody Bypass	60	8435	7567	7668	1.3
626	B9140 Muirside	60	8116	7739	8155	5.4
634	B9140 Sheardale	60	1874	1639	1677	2.3
317	A91 Tillicoultry/Dollar	60	5977	5652	5508	-2.5
49	A977 Gartlove	60	5325	5949	5437	-8.6

3.2 Other Transport Sources

Clackmannanshire Council confirms that there are no new or newly identified transport sources which are likely to have an impact on air quality within the Local Authority area.

3.3 Industrial Sources

Clackmannanshire Council confirms that there are no new, planned or significantly changed industrial developments which may have an impact on air quality within the Local Authority area.

Clackmannanshire Council confirms Cambusview Poultry Farm was identified in the 2009 USA as having the potential to cause an adverse impact on air quality at a number of residential properties close to the unit. The Scottish Government was consulted in February 2011 regarding the availability of new guidance for the assessment of such installations. It is understood that Detailed Assessments have been carried out at several Local Authorities in England to inform such guidance. Some of these studies are still in progress and the Council was advised that this installation should be assessed in the appropriate manner once UK-wide guidance is issued. This will be included in the 2012 USA.

3.4 Commercial and Domestic Sources

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Clackmannanshire Council confirms that there are no new, planned or significantly changed commercial or domestic developments which may have an impact on air quality within the Local Authority area.

3.5 New Developments with Fugitive or Uncontrolled Sources

Clackmannanshire Council confirms that there are no new or newly identified local developments with fugitive or uncontrolled sources which may have an impact on air quality within the Local Authority area.

4 Planning Applications

Clackmannanshire Council can confirm that there are no approved planning applications for development that could have an impact on local air quality. There are tentative proposals for a CHP plant to serve over 500 houses at a new Forestmill Village development but this is unlikely to progress for some years due to the economic climate. The appropriate air quality impact assessment will be undertaken if and when this application advances.

5 Local Transport Plans and Strategies

Clackmannanshire Council has recently published an updated Local Transport Strategy (LTS) 2010-2014 (Ref.13). This is an update of the currently adopted LTS 2006-2009. It sets out how the Council intends to reconcile international, national, regional and local objectives at the local level and outlines actions which will achieve these objectives. It contains a series of aims, objectives, policies and actions supporting the overall vision to meet the transport needs of all within Clackmannanshire.

As part of the preparation of the LTS, a Strategic Environmental Assessment (SEA) was undertaken identifying key environmental problems within Clackmannanshire and the relationship with other plans, policies and strategies.

The study recognised the environmental impact to all media of a number of proposed options for the LTS. Key environmental baseline information was gathered for the report. The baseline air quality data was obtained from the air quality monitoring carried out by the Council and was considered good as all pollutants are below the AQS objectives.

It was recognised that transport plays a key part in air quality and without the LTS, opportunities to improve air quality could be missed. Some of the key issues in the LTS related to air quality are summarised in Table 5.1 below:

Table 5.1 Air Quality Considerations in the LTS

Environmental Issues	Implications for the LTS
Possibility of reduced air quality due to increasing traffic volumes and congestion	Behavioural change is required to reduce the reliance on cars in favour of sustainable modes of transport. Integration with land use planning and improved public transport facilities are required. Improved management of town centre car parks and the introduction of the maximum parking standards. Implementation of travel plans in new and existing developments. Encouragement of walking and cycling as a mode of transport is required to improve physical health and air quality. May require infrastructure to facilitate.
Greenhouse gas emissions contributing to Climate Change	Requires road traffic reduction and greater availability of sustainable transport choices.
Increase in air pollution due to traffic using unsuitable roads due to avoidance of declining conditions on main roads	Maintenance of the road network to a high standard

The options that were accepted for inclusion in the LTS were deemed to have the most benefit for all considerations including the environment. It is recognised that as a result of the preferred strategy there may be negative impacts for noise and vibration as result of traffic management measures and increased use of the bus and rail network, however secondary and cumulative positive impacts have been identified for air quality and health by reducing the need to travel, promoting active and sustainable travel and removing transport from sensitive areas.

6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

The results of the NO_2 monitoring across Clackmannanshire Council during 2010 confirm that there are no exceedences of the AQS objectives for this pollutant.

Analysis of NO_2 concentrations during the period 2005-2010 shows that the concentrations are variable from year to year with no clear upward or downward trend. The concentration has decreased at 7 out of 10 sites between 2009-2010 with all sites remaining below the objective of 40µg/m^3.

The results of the PM_{10} monitoring at South Ring Road in Alloa confirm that there are no exceedences of the AQS objectives for this pollutant. The annual mean concentration was the same as that measured in 2009 at 17µg/m^3.

The review of new monitoring data available for 2010 confirms that Clackmannanshire Council does not need to proceed to a Detailed Assessment for any pollutant.

6.2 Conclusions relating to New Local Developments

Clackmannanshire Council confirm that there are no new local developments that will require more detailed consideration in the next Updating and Screening Assessment.

One existing development, Cambusview Poultry Farm was identified in the 2009 USA as having the potential to cause an adverse impact on air quality at a number of residential properties close to the unit. The Scottish Government was consulted in February 2011 regarding the availability of new guidance for the assessment of such installations and was advised that this installation should be assessed in the appropriate manner once UK-wide guidance is issued. This will be included in the 2012 USA.

6.3 Proposed Actions

The Progress Report has not identified a need to proceed to a Detailed Assessment for any pollutant.

The results of the NO_2 diffusion tube monitoring have returned low measured concentrations for several years at some sites. It was agreed with the Scottish Government that 5 sites across the area would be discontinued at the end of 2010.

These are:

- Shaftsbury Street, Alloa;
- Stirling Road, Tullibody;
- High Street, Tillicoultry;
- Bus Station, Tillicoultry; and
- Glasshouse Loan, Alloa.

The 5 sites that remain are considered the four “worst case” locations plus one background site (Norwood Avenue, Alloa) to continue monitoring the trend in local air quality.

The analysis of available traffic count data for 2009 and 2010 has shown that most road links experienced a decrease in traffic flow. One link, the A908 near Fishcross Primary School experienced an increase of 4.4% in the AADT from 12341 to 12889 between 2009 and 2010. This is an area of relevant public exposure with the school and residential properties adjacent to it. A diffusion tube has therefore been added to the network in this location from April 2011 for an initial period of one year in order that some air quality data will be available for the next USA due in 2012.

Traffic flow data will continue to be recorded across the Clackmannanshire Council area.

The results of these activities will be included in the Updating and Screening Assessment due for submission in April 2012.

7 References

1) The Environment Act (1995)- © Crown Copyright

2) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland - Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland. July 2007

3) Local Air Quality Management Technical Guidance LAQM TG.(09) – DEFRA

4) 2010 Air Quality Progress Report for Clackmannanshire Council, AEA Technology plc, AEAT/ENV/R/3044/Issue1, 1st July 2010

5) 2009 Air Quality Updating and Screening Assessment for Clackmannanshire Council, BMT Cordah Ltd, G_CLA_019,July 2009

6) LAQM Progress Report 2008, BMT Cordah Ltd, G_CLA_018/04-02-01, 31st March 2008

7) Clackmannanshire Council LAQM Progress Report 2006/7, AEA, AEAT/ENV/R/2458/Issue 2, 6th July 2007

8) LAQM Updating and Screening Assessment 2006, BMT Cordah Ltd, E_CLA_015, 31st August 2006

9) LAQM Progress Report 2005, BMT Cordah Ltd, E_CLA_013, 28th April 2005

10) LAQM Progress Report 2004, BMT Cordah Ltd, April 2004

11) http://laqm.defra.gov.uk/documents/Diffusion_Tube_Factors_v04_11_v6.xls

12) Volatile Correction Model, Environmental Research Group, King's College London, SE1 9NH – http://www.volatile-correction-model.info/

13) Local Transport Strategy 2010-2014 Strategic Environmental Assessment, Environmental Report – Clackmannanshire Council www.clacksweb.org.uk

Appendices

Appendix A: Maps and Photographs

Appendix B: QA/QC & Raw NO_2 Data

Appendix C: Graphs of Monitoring Results

Appendix D: Traffic Flow Data

Appendix A: Maps and Photographs

Figure 1-Clackmannanshire Council Boundary

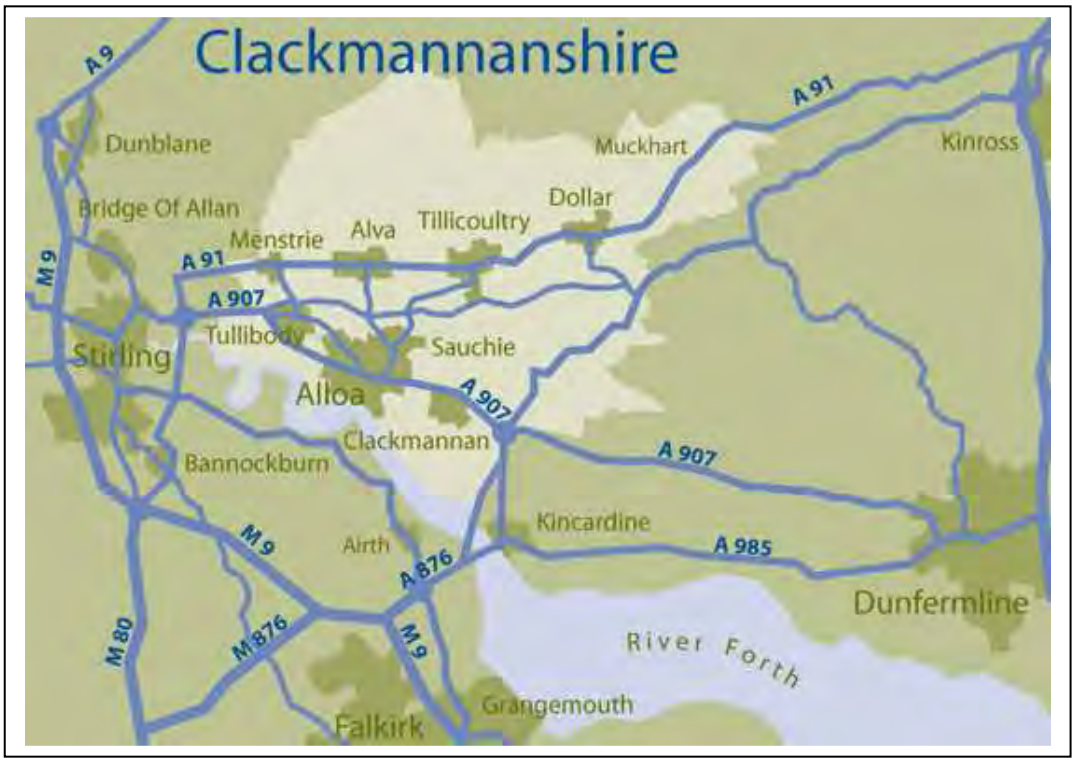


Figure 2 – Automatic Monitoring Station at South Ring Road, Alloa

Figure 3 – Map Location of Automatic Monitoring Site at South Ring Road, Alloa

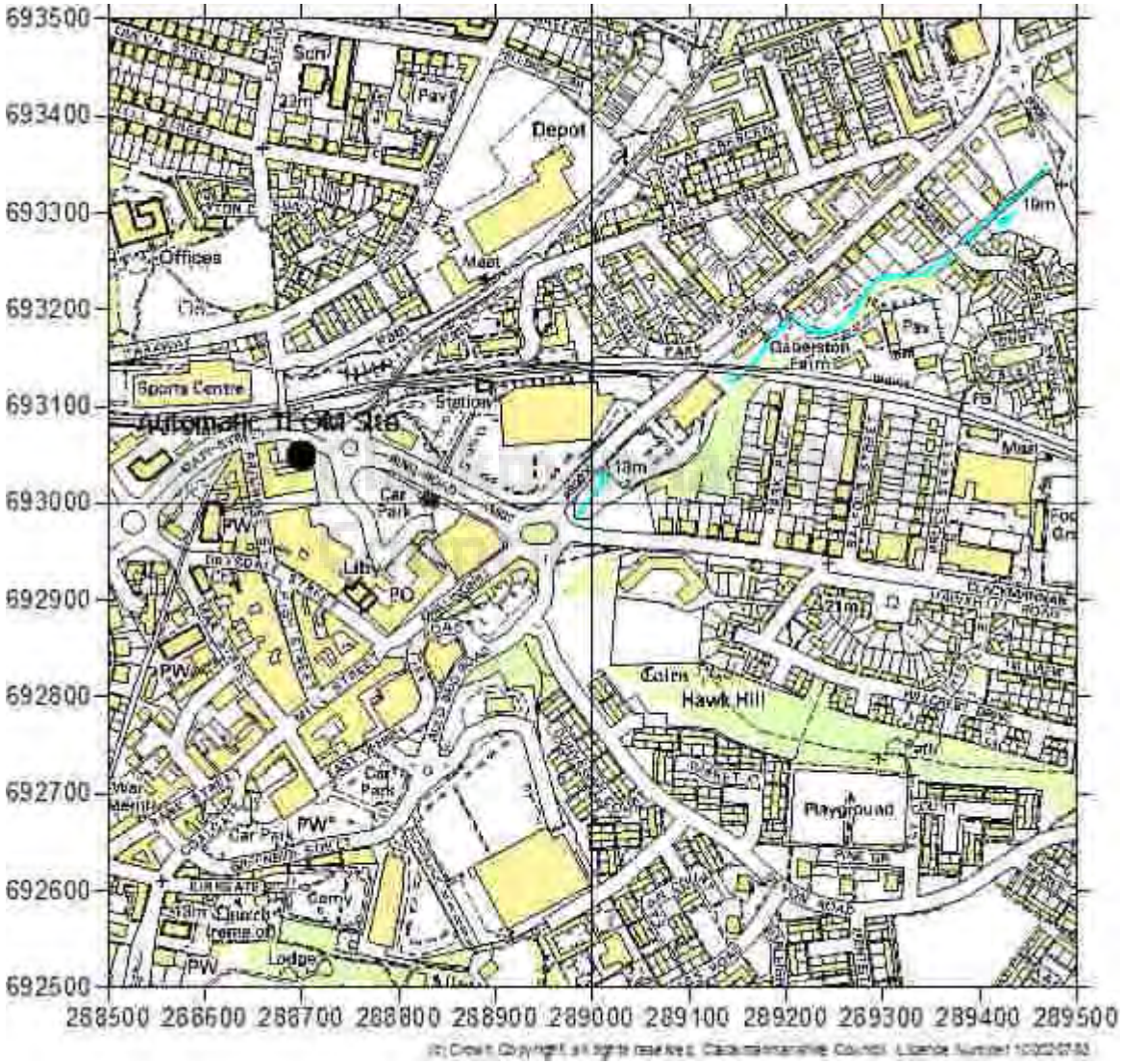


Figure 4- Map of Monitoring Site Locations

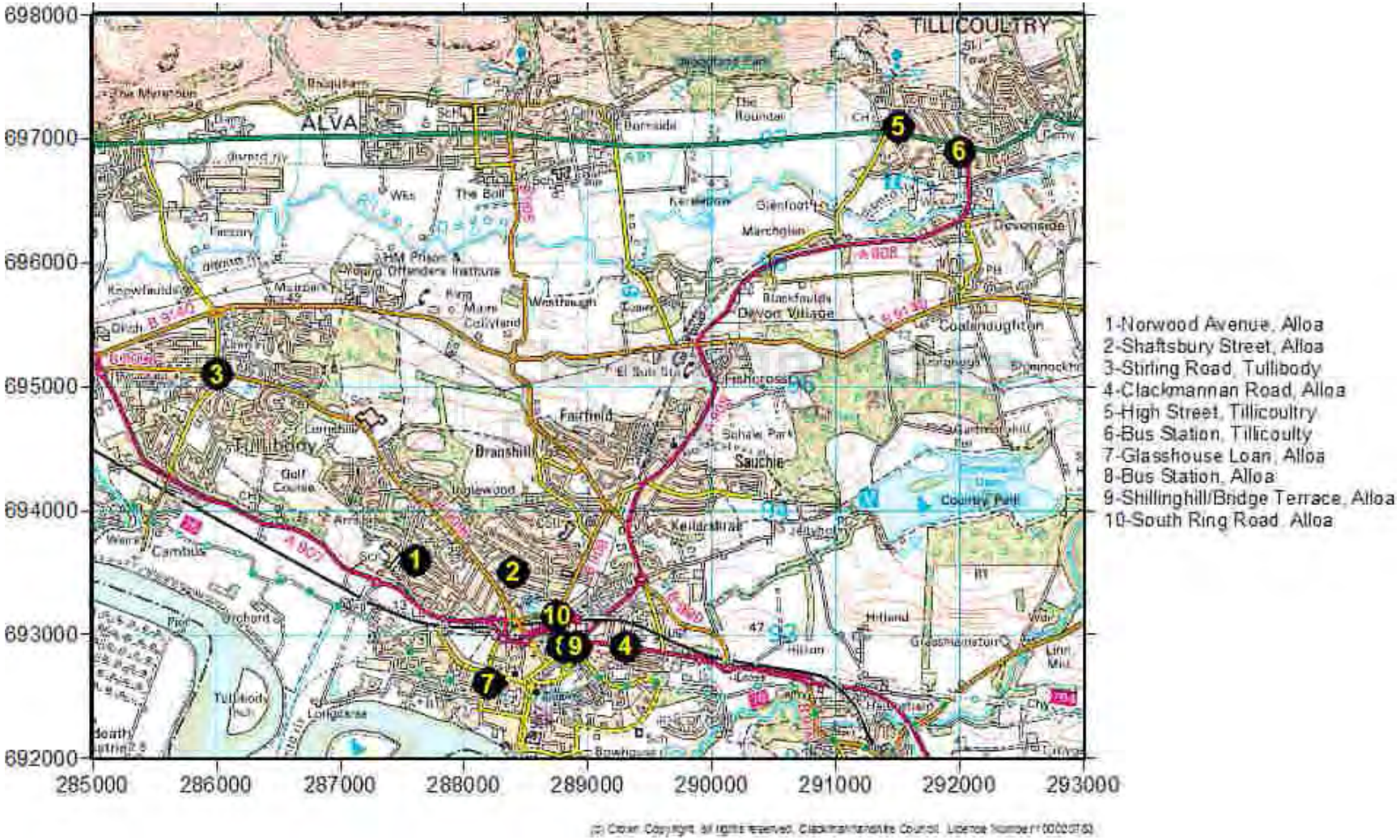
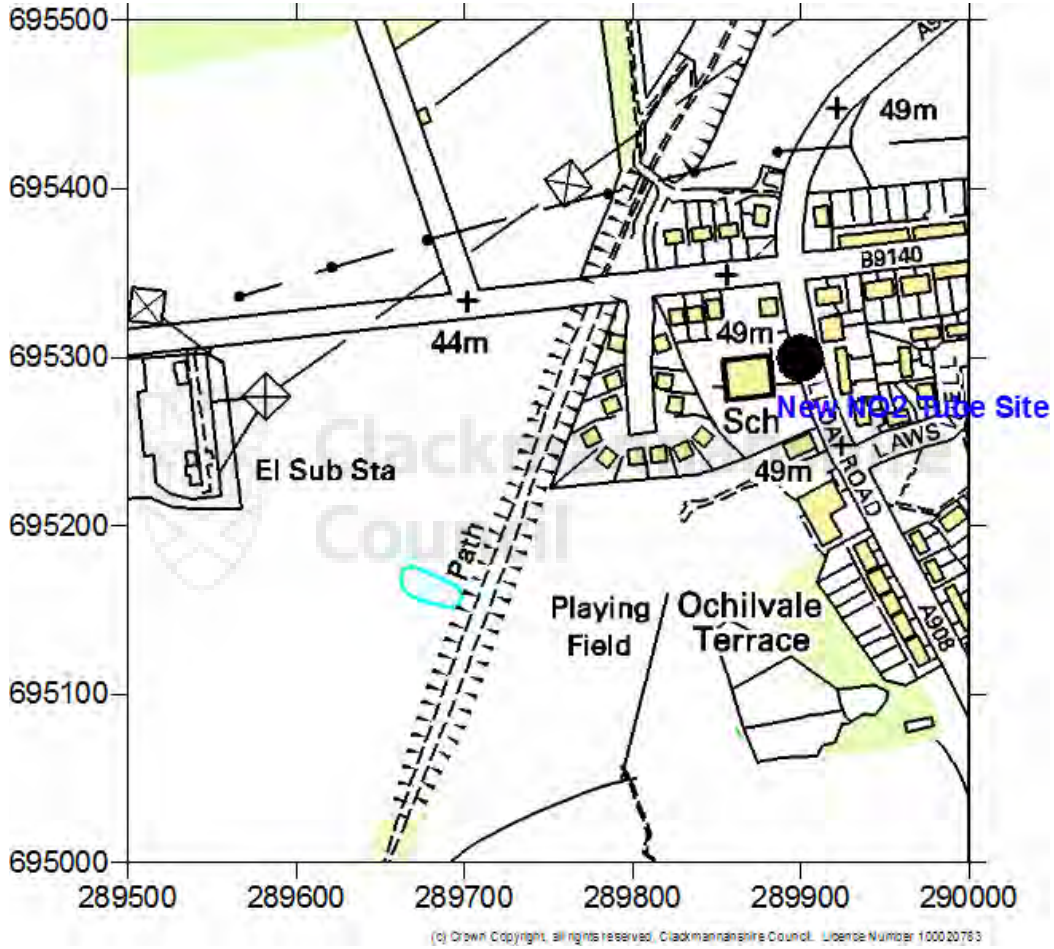


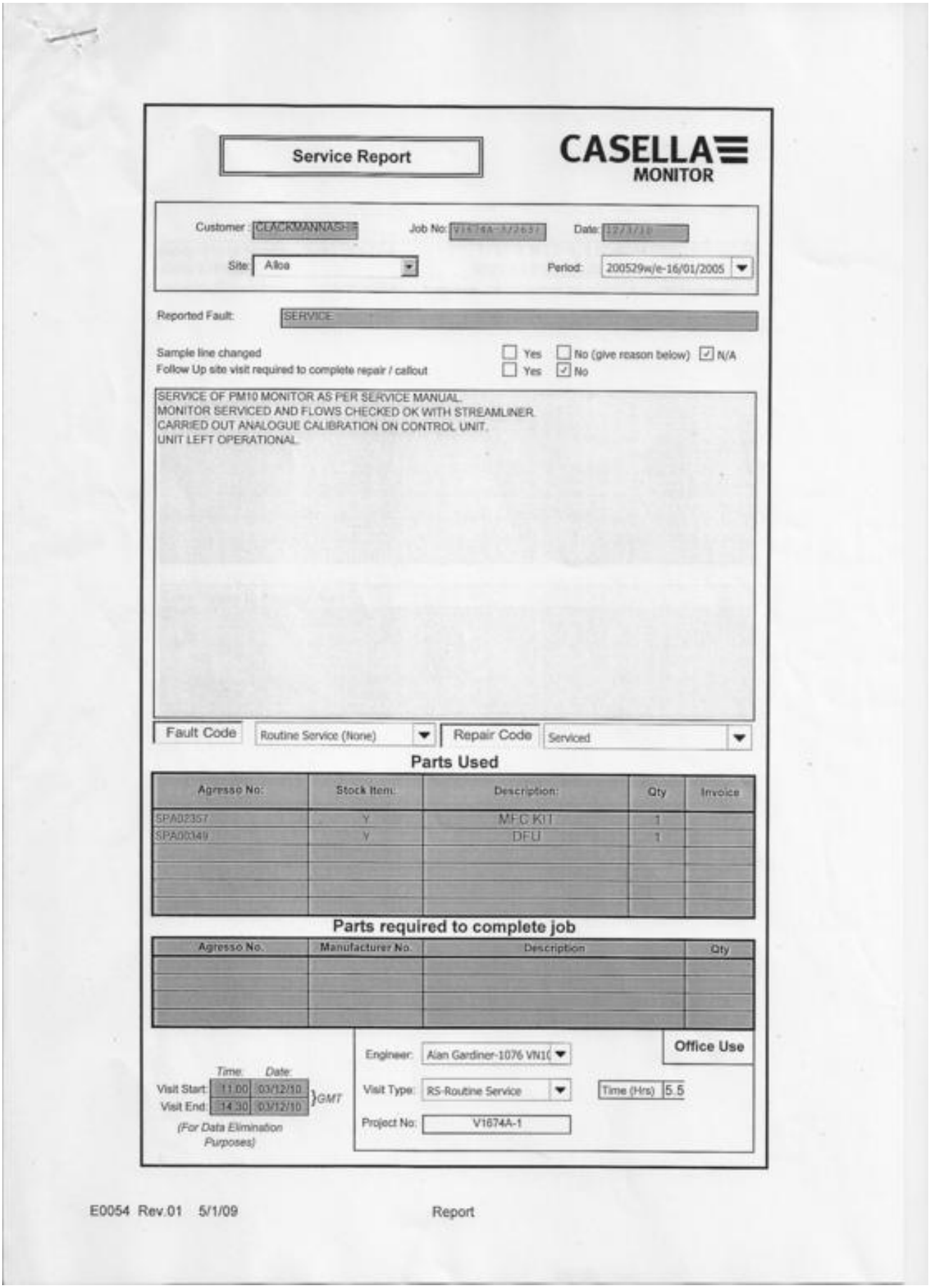
Figure 5- Map of New NO_2 Diffusion Tube Monitoring Site at Fishcross Primary



Appendix B: QA/QC

Table B1 Raw Unadjusted Monthly NO_2 Diffusion Tube Concentrations ($\mu g/m^3$) for 2010

Site Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unadjusted Annual Mean
Norwood Avenue, Alloa	22.4	21.3		7	6.5	4.1	6.9	9.7	10.9	11.9	18.1	25.2	**13**
Shaftsbury Street, Alloa	31.3	17.4	29.8	7.5	8.6	7.5	7.8	10.1	10.2		16.1	21	**15**
Stirling Road, Tullibody	33.8	21.5	17		13.2	13.3	13.8	17.5	17.8	21.5	28.9	31	**21**
Clackmannan Road, Alloa	47.5	38.4	28	18.4	31	37.6	26.7	33.5	29.7	30.4	44.6	45.9	**34**
High Street, Tillicoultry	32.1	16.9	33.4	11.7	14	10.5	11.7	15.3	18	19.9	25.7	32.2	**20**
Bus Station, Tillicoultry	20.1	12.2	22	12.3	14.3	10.8	14.1	14.6	14.9	16.3	20.9	33.7	**17**
Glasshouse Loan, Alloa	33	22.3	20.4	17.8	16.1	12.9	14	13	14.3	20.5	27.3	24.8	**20**
Bus Station, Alloa	37.2	27.9	25.7	20.6		19.5	26.3	28.6	30.3	34.2	42.5	38.7	**30**
Shillinghill/Bridge Terrace, Alloa	44.3	29.3	35.9	29.3	22.4	15.8	23.9	26.4	35	36.4	46.5	64.1	**34**
South Ring Road, Alloa	34.5	24.7	29.2	13	22.3	7.3	18.7	19.9	16.9	24.2	34.2	44.3	**24**



Service Report

CASELLA MONITOR

Customer : CLACKMANNAS

Job No: V1674A-1/2657

Date: 12/12/10

Site: Alloa

Period: 200529w/e-16/01/2005

Reported Fault: SERVICE

Sample line changed — ☐ Yes ☐ No (give reason below) ☑ N/A

Follow Up site visit required to complete repair / callout — ☐ Yes ☑ No

SERVICE OF PM10 MONITOR AS PER SERVICE MANUAL.
MONITOR SERVICED AND FLOWS CHECKED OK WITH STREAMLINER.
CARRIED OUT ANALOGUE CALIBRATION ON CONTROL UNIT.
UNIT LEFT OPERATIONAL.

Fault Code: Routine Service (None)

Repair Code: Serviced

Parts Used

Agresso No:	Stock Item:	Description:	Qty	Invoice
SPA02357	Y	MFC KIT	1	
SPA00349	Y	DFU	1	

Parts required to complete job

Agresso No.	Manufacturer No.	Description	Qty

Time / Date

Visit Start: 11.00 03/12/10 } GMT

Visit End: 14.30 03/12/10

(For Data Elimination Purposes)

Engineer: Alan Gardiner-1076 VN1(

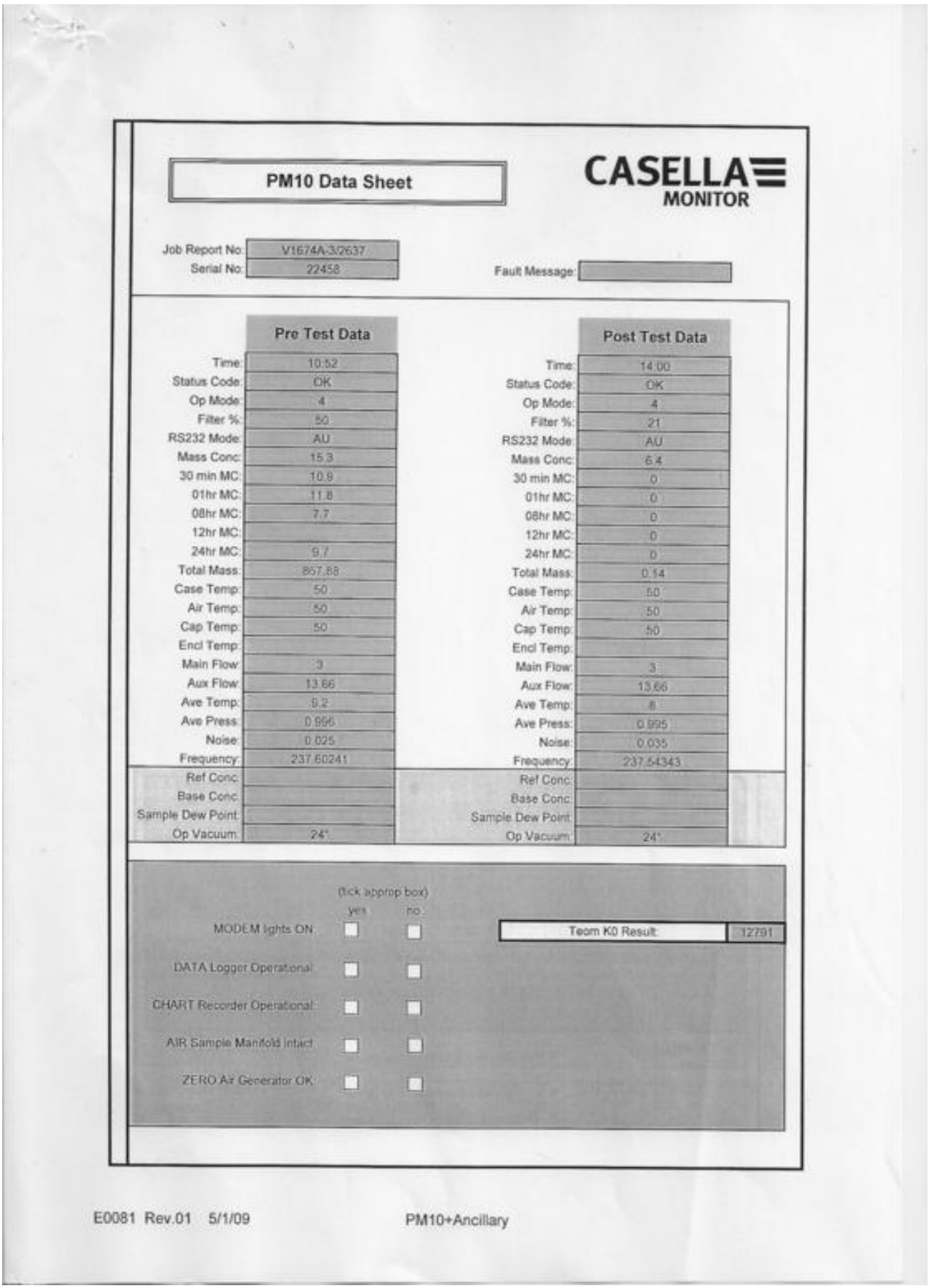
Visit Type: RS-Routine Service

Project No: V1674A-1

Office Use

Time (Hrs) 5.5

E0054 Rev.01 5/1/09 Report



PM10 Data Sheet

CASELLA MONITOR

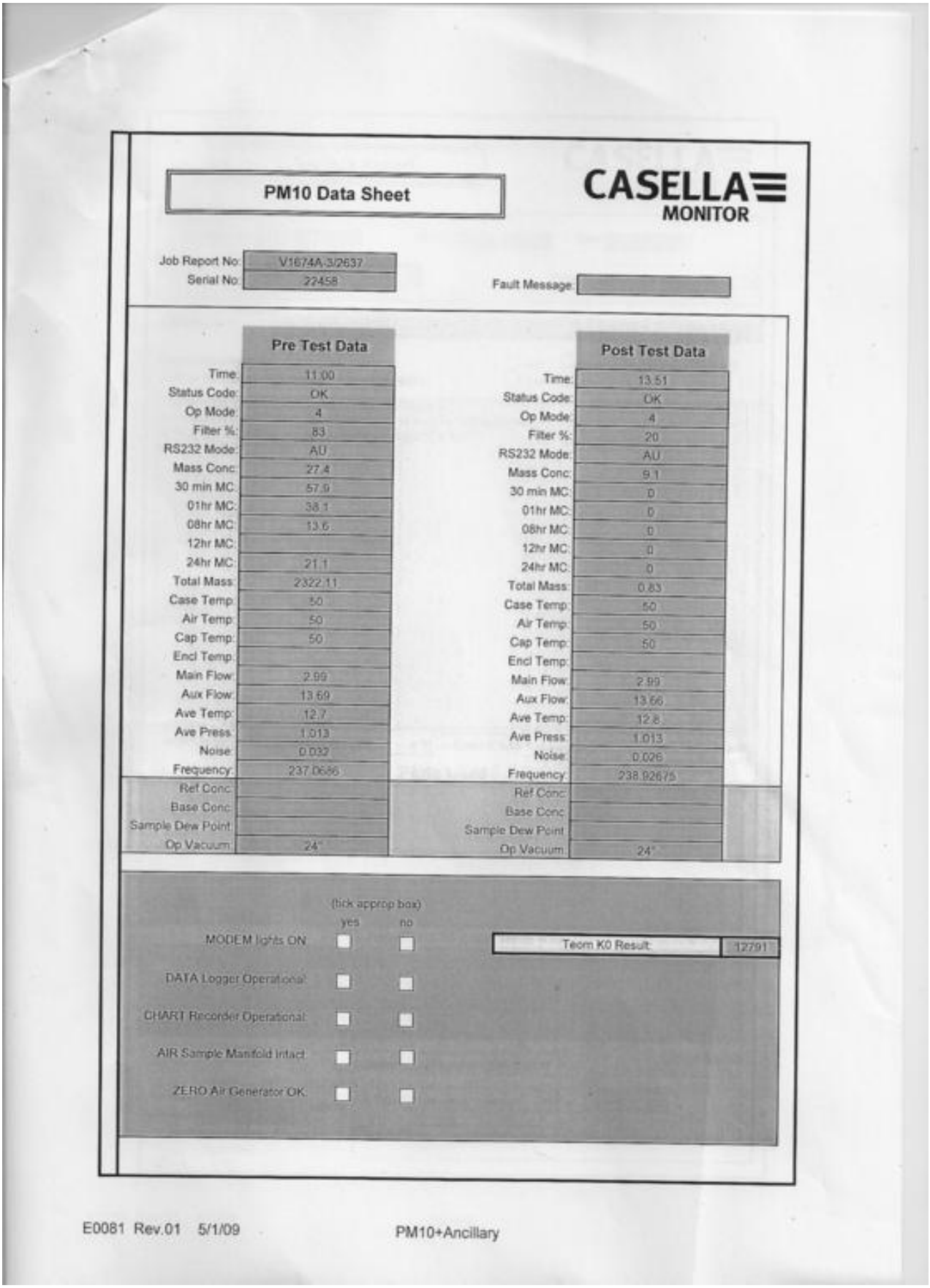
Job Report No: V1674A-3/2637
Serial No: 22458
Fault Message:

	Pre Test Data	Post Test Data
Time:	10:52	14:00
Status Code:	OK	OK
Op Mode:	4	4
Filter %:	50	21
RS232 Mode:	AU	AU
Mass Conc:	15.3	6.4
30 min MC:	10.9	0
01hr MC:	11.8	0
08hr MC:	7.7	0
12hr MC:		0
24hr MC:	9.7	0
Total Mass:	857.88	0.14
Case Temp:	50	50
Air Temp:	50	50
Cap Temp:	50	50
Encl Temp:		
Main Flow:	3	3
Aux Flow:	13.66	13.66
Ave Temp:	9.2	8
Ave Press:	0.996	0.995
Noise:	0.025	0.035
Frequency:	237.60241	237.54343
Ref Conc:		
Base Conc:		
Sample Dew Point:		
Op Vacuum:	24"	24"

	(tick approp box) yes	no
MODEM lights ON:	☐	☐
DATA Logger Operational:	☐	☐
CHART Recorder Operational:	☐	☐
AIR Sample Manifold Intact:	☐	☐
ZERO Air Generator OK:	☐	☐

Team K0 Result: 12791

E0081 Rev.01 5/1/09 PM10+Ancillary



PM10 Data Sheet

CASELLA MONITOR

Job Report No: V1674A-3/2637
Serial No: 22458

Fault Message:

	Pre Test Data	Post Test Data
Time:	11.00	13.51
Status Code:	OK	OK
Op Mode:	4	4
Filter %:	83	20
RS232 Mode:	AU	AU
Mass Conc:	27.4	9.1
30 min MC:	57.9	0
01hr MC:	38.1	0
08hr MC:	13.6	0
12hr MC:		0
24hr MC:	21.1	0
Total Mass:	2322.11	0.83
Case Temp:	50	50
Air Temp:	50	50
Cap Temp:	50	50
Encl Temp:		
Main Flow:	2.99	2.99
Aux Flow:	13.69	13.66
Ave Temp:	12.7	12.8
Ave Press:	1.013	1.013
Noise:	0.032	0.026
Frequency:	237.0686	238.92675
Ref Conc:		
Base Conc:		
Sample Dew Point:		
Op Vacuum:	24"	24"

	(tick approp box) yes	no
MODEM lights ON	☐	☐
DATA Logger Operational	☐	☐
CHART Recorder Operational	☐	☐
AIR Sample Manifold Intact	☐	☐
ZERO Air Generator OK	☐	☐

Teom K0 Result: 12791

E0081 Rev.01 5/1/09 PM10+Ancillary

TEOM Audit

Stephen Gray
<Stephen.Gray@aeat.co.uk
>
11/02/2011 10:39

To "'ayoung@clacks.gov.uk'" <ayoung@clacks.gov.uk>
cc
bcc
Subject ClackmannanshireQA/QC 6 monthly audit summary

History: This message has been forwarded.

For the attention of Andrew and to whoever it my concern,

Here is a brief summary of the AEA QA/QC 6 monthly audit on Clackmannanshire's air quality monitoring site at Alloa, carried out on Thursday 10th February 2011.

Alloa
Pm10 : All Ok, Flows all ok, K0's frequencies all ok, Small leak suspected on the Aux line. The teom head's impactor plate needs a clean. I have attached instructions to do this. This should be cared out once a month, to get the best results out of the analyser.

Please do not hesitate to contact myself or any other air quality member in AEA if you need any advice on any appropriate courses of action.

Many Thanks

Stephen

Stephen Gray

Ambient Air Quality Monitoring
Glengarnock
KA14 3DD

t: 0870 190 5311
m: 0796 870 7400
f: 0870 190 5240
email: Stephen.Gray@aeat.co.uk

AEA

Appendix C: Graphs of Monitoring Results

Figure 6 - Bias Adjusted Annual Mean Concentration of NO2 Across Monitoring Network 2005-2010

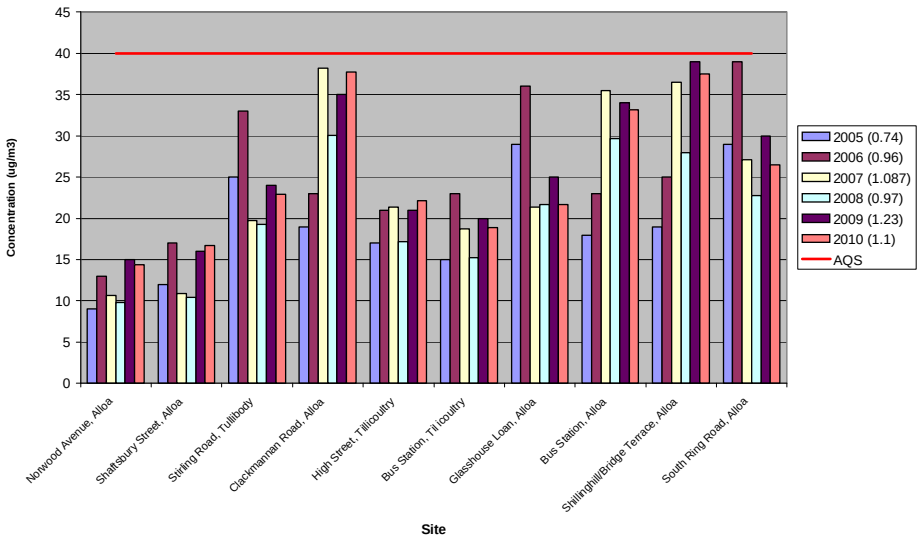
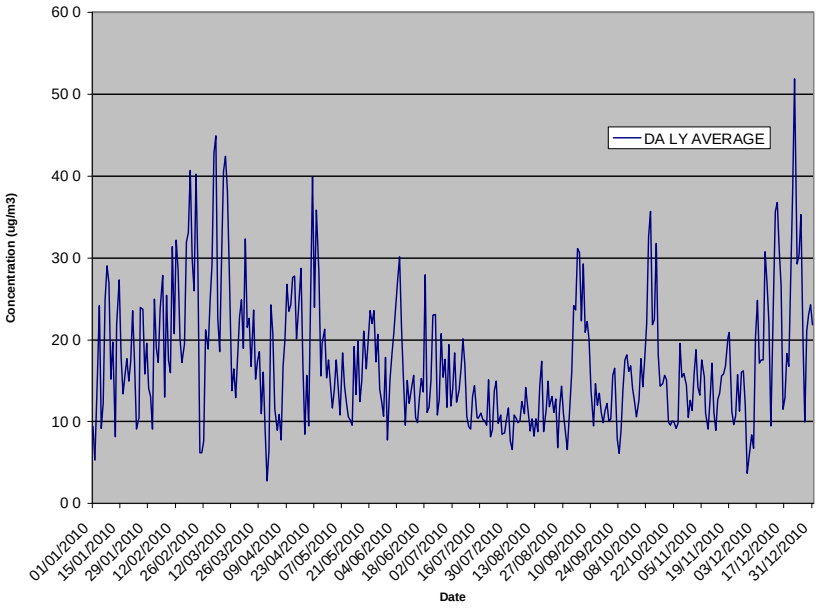


Figure 7 - Daily Average Concentration of PM10 at South Ring Road, Alloa



Appendix D: Traffic Flow Data and Survey Sites

Figure 8- Traffic Survey Locations