
# 2009 Air Quality Updating and Screening Assessment for *Clackmannanshire Council*

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

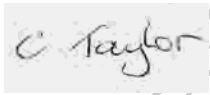
Date July 2009

| | |
|---|---|
| **Local Authority Officer** | Andrew Young |

| | |
|---|---|
| **Department** | Environmental Health |
| **Address** | Clackmannanshire Council,<br>Kilncraigs,<br>Greenside Street,<br>Alloa,<br>FK10 1EB |
| **Telephone** | 01259 452578 |
| **e-mail** | ayoung@clacks.gov.uk |

| | |
|---|---|
| **Report Reference number** | G_CLA_019 |
| **Date** | July 2009 |

| | |
|---|---|
| **Report Title** | LAQM Updating and Screening Assessment |
| **Client** | Clackmannanshire Council |
| **BMT Cordah Report No:** | G_CLA_019 |
| **Status and Version:** | Final |
| **Date of Release:** | July 2009 |
| **Terms:** | The contents of this report are confidential. No part thereof is to be cited without the express permission of BMT Cordah Ltd or Clackmannanshire Council. |

| | **Name** | **Signature** | **Position** | **Date** |
|---|---|---|---|---|
| **Author** | Christine Taylor |  | Senior Consultant | 13/07/09 |
| **Reviewed by**<br>**Approved by** | Stuart McGowan |  | Principal consultant | 13/07/09 |

**BMT Cordah Limited,**
Unit 119, Pentagon Business Centre, 36 Washington Street,
Glasgow, G3 8AZ, UK

Tel: +44 (0)141 221 3236
Fax: +44 (0)141 248 7986
Email: enquiries@bmtcordah.com
Website: www.bmtcordah.com

# Document log

| Version | Date | Summary of changes | Author |
|---|---|---|---|
| Draft 1 | 29/05/09 | | CT |
| Final | 13/07/09 | Incorporated client comments | CT |
| | | | |
| | | | |

# Executive Summary

The 2009 Updating and Screening Assessment for Clackmannanshire Council was undertaken by BMT Cordah Ltd. The assessment followed the guidance contained in the LAQM Technical Guidance TG(09). New monitoring data for $NO_2$ and $PM_{10}$ was reviewed to determine compliance with the associated air quality objectives. It was determined that there were no measured exceedences of $NO_2$ or $PM_{10}$ objectives during 2008 within the Clackmannanshire Council area. In addition, $PM_{10}$ concentrations were projected forward to 2010 for comparison with the future $PM_{10}$ objectives. It was concluded that the future $PM_{10}$ objectives should be met.

New emissions sources, including road traffic, domestic, biomass, and industrial sources, were reviewed and assessed to determine if any sources would cause an exceedence of air quality objectives for any pollutant. It was determined that there are no road traffic, domestic or commercial, or fugitive emissions sources that are likely to result in an exceedence of air quality objectives.

A new industrial emission source that has been added to the updated Technical Guidance was poultry farms. There are two poultry farms within the Clackmannanshire Council area. One farm, Cambusview Poultry Farm is in excess of the criteria outline in the Technical Guidance. It is therefore recommended that a Detailed Assessment is conducted to determine if $PM_{10}$ air quality objectives are being exceeded at locations of relevant exposure within the vicinity of the Cambusview Poultry Farm.

# Table of contents

## Appendices

# 1 Introduction

## 1.1 Description of Local Authority Area

Clackmannanshire Council is located close to the central belt of Scotland and is bounded by the neighbouring local authorities of Fife Council, Stirling Council, Perth and Kinross Council and Falkirk Council. Clackmannanshire is situated to the north of the River Forth, with the river forming its southern boundary. The Ochil Hills dominate the northern half of the area.

Clackmannanshire Council is the smallest mainland local authority in Scotland, with a population of approximately 50,000 people. The main town is Alloa, where around half the population resides. The majority of industrial and commercial activities in the area are also located in Alloa. The remainder of Clackmannanshire is rural, with several towns known as the Hillfoot towns located south of the Ochil Hills. These towns include Tillicoultry, Dollar, Alva and Menstrie. A map of the local authority area is presented in Figure 1 in Appendix A.

## 1.2 Purpose of Report

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

## 1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in 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 µg/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 | Air Quality Objective | | Date to be achieved by |
|---|---|---|---|
| | Concentration | Measured as | |
| **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 |
| | 40 $\mu g/m^3$ | Annual 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 |
| | 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

In general, pollutant concentrations throughout the Clackmannanshire Council area are low due to the rural nature of much of the area. At present, there are no AQMA's within the Council area. However, the 2008 Progress Report identified a risk of the 2010 $PM_{10}$ annual mean objective being exceeded at South Ring Road, Alloa. A summary of all Review and Assessment reports is provided in Table 1.2.

**Table 1.2 Summary of Review and Assessment reports**

| Report Title | Date completed | Conclusion |
|---|---|---|
| Progress Report 2008 | March 2008 | No exceedences of $NO_2$, CO, benzene, 1,3-butadiene or $SO_2$ air quality objectives were predicted.<br><br>The 2010 annual mean $PM_{10}$ objective was predicted to be exceeded using both the 1.3 and 1.14 adjustment factors. However, the elevated PM10 concentrations were attributed to the construction of a new roundabout within 250m of the monitor. A Detailed Assessment was therefore postponed until a full year's monitoring in the absence of construction activities was obtained. |
| Progress Report 2007 | May 2007 | The 2007 report concluded that there was no risk of exceeding $NO_2$ air quality objectives. A risk of exceeding 2010 $PM_{10}$ annual mean objective was identified; however, this was attributed to the construction works as discussed above. |
| Updating and Screening Assessment 2006 | November 2006 | No exceedences of air quality objectives for any Air Quality Strategy pollutants were identified or predicted. |
| Progress Report 2005 | April 2005 | No exceedences of air quality objectives for any Air Quality Strategy pollutants were identified or predicted. |
| Progress Report 2004 | April 2004 | The 2004 report concluded that there were no exceedences of $SO_2$ and $NO_2$ air quality objectives. It identified a risk of exceeding both the 24-hour and annual mean 2010 $PM_{10}$ objectives. However, the results were based on a data capture rate of less than 58% and so there was a lack of confidence in the results. |

# 2 New Monitoring Data

## 2.1 Summary of Monitoring Undertaken

### 2.1.1 Automatic Monitoring Sites

Clackmannanshire Council currently operate one Tapered Element Oscillating Microbalance (TEOM) automatic analyser located at South Ring Road, Alloa, details of which are presented in Table 2.1. A map showing the location of the automatic and non-automatic monitoring sites in included in Figure 2 in Appendix A. The TEOM is serviced and calibrated by Casella-ETi.

**Table 2.1 Details of 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? |
|---|---|---|---|---|---|---|---|
| South Ring Road, Alloa | Kerbside | NS 887 931 | $PM_{10}$ | N | Y | 2 | Y |

### 2.1.2 Non-Automatic Monitoring

Clackmannanshire Council currently monitor $NO_2$ concentrations at 10 locations throughout the Council area using passive diffusion tubes. The details of the non-automatic $NO_2$ monitoring sites are presented in Table 2.2.

**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, Alloa | Kerbside | NS 876 936 | $NO_2$ | N | Y | 2 | Y |
| Shaftesbury Street, Alloa | Kerbside | NS 884 935 | $NO_2$ | N | Y | 2 | Y |
| Stirling Road, Tullibody | Urban background | NS 860 951 | $NO_2$ | N | Y | 2 | Y |
| Clackmannan road, Alloa | Kerbside | NS 893 929 | $NO_2$ | N | Y | 2 | Y |
| High Street, Tillicoultry | Kerbside | NS 915 971 | $NO_2$ | N | Y | 2 | Y |
| Bus Station, Tillicoultry | Kerbside | NS 920 969 | $NO_2$ | N | Y | 2 | Y |
| Glasshouse Loan, Alloa | Kerbside/ Industrial | NS 882 926 | $NO_2$ | N | Y | 2 | Y |
| Bus station, Alloa | Kerbside | NS 888 929 | $NO_2$ | N | Y | 2 | Y |
| Shillinghill/ Bridge Terrace, Alloa | Kerbside | NS 888 | $NO_2$ | N | Y | 2 | Y |
| South Ring Road, Alloa | Kerbside | NS 887 931 | $NO_2$ | N | Y | 2 | Y |

# 2.2 Comparison of Monitoring Results with AQ Objectives

## 2.2.1 Nitrogen Dioxide

The results of the 2008 $NO_2$ diffusion tube monitoring campaign within Clackmannanshire Council area are discussed below. Details of the QA/QC procedures followed by the Council and the laboratory, and the bias correction factor used can be found in Appendix B.

### Automatic Monitoring Data

Clackmannanshire Council does not undertake any automatic monitoring for $NO_2$.

### Diffusion Tube Monitoring Data

The results of the 2008 diffusion tube monitoring campaign in Clackmannanshire Council area are presented in Table 2.3a. The results from 2006, 2007 and 2008 are presented in Table 2.3b for comparative purposes. The monthly mean values measured at each monitoring site are provided in Appendix C.

During 2008, no sites recorded an annual mean $NO_2$ concentration in excess of the annual mean objective of 40 µg/m$^3$. All sites had a data capture rate in excess of the minimum requirement of 90%. Indeed, all sites except High Street and Shillinghill/Bridge Terrace had 100% data capture rates. As discussed in Appendix B, the bias adjustment factor applied to the results was 0.97, which is the laboratory bias adjustment factor based on four studies undertaken by a nearby local authority using the same laboratory. Clackmannanshire Council has not undertaken any local co-location studies as the Council do not undertake any automatic monitoring for $NO_2$.

Comparison with 2007 data indicates that recorded $NO_2$ concentrations the majority of sites decreased during 2008. Only one site, Glasshouse Loan, recorded a higher concentration in 2008 than in 2007, however, the increase was marginal.

**Table 2.3a Results of Nitrogen Dioxide Diffusion Tubes**

| Site ID | Location | Within AQMA? | Data Capture 2008 (%) | Annual mean concentrations 2008 (µg/m3) Adjusted for bias (0.97) |
|---|---|---|---|---|
| Norwood Avenue | Alloa | N | 100 | 9.8 |
| Shaftesbury Street | Alloa | N | 100 | 10.4 |
| Stirling Road | Tullibody | N | 100 | 19.3 |
| Clackmannan Road | Alloa | N | 100 | 30.1 |
| High Street | Tillicoultry | N | 92 | 17.2 |
| Bus Station | Tillicoultry | N | 100 | 15.2 |
| Glasshouse Loan | Alloa | N | 100 | 21.7 |
| Bus Station | Alloa | N | 100 | 29.7 |
| Shillinghill/Bridge Terrace | Alloa | N | 92 | 28.0 |
| South Ring Road | Alloa | N | 100 | 22.8 |

**Table 2.3b Results of Nitrogen Dioxide Diffusion Tubes**

| Site ID | Location | Within AQMA? | Annual mean concentrations (µg/m3) Adjusted for bias | | |
|---|---|---|---|---|---|
| | | | 2006 (0.96) | 2007 (1.087) | 2008 (0.97) |
| Norwood Avenue | Alloa | N | 13 | 10.7 | 9.8 |
| Shaftesbury Street | Alloa | N | 17 | 10.9 | 10.4 |
| Stirling Road | Tullibody | N | 33 | 19.7 | 19.3 |
| Clackmannan Road | Alloa | N | 23 | 38.2 | 30.1 |
| High Street | Tillicoultry | N | 21 | 21.4 | 17.2 |
| Bus Station | Tillicoultry | N | 23 | 18.7 | 15.2 |
| Glasshouse Loan | Alloa | N | 36 | 21.4 | 21.7 |
| Bus Station | Alloa | N | 23 | 35.5 | 29.7 |
| Shillinghill/Bridge Terrace | Alloa | N | 25 | 36.5 | 28.0 |
| South Ring Road | Alloa | N | 39 | 27.1 | 22.8 |

### 2.2.2 $PM_{10}$

The $PM_{10}$ monitoring results for 2006, 2007 and 2008 at South Ring Road, Alloa are presented in Tables 2.5a and 2.5b. The predicted 2010 $PM_{10}$ concentrations are also presented in Tables 2.5a and 2.5b. The analyser at South Ring Road, Alloa is a TEOM automatic analyser, which does not meet the gravimetric equivalence criteria required for comparison with the $PM_{10}$ objectives. Therefore, the results require correction before being compared with the $PM_{10}$ objectives. Following updated guidance in TG(09) on correcting TEOM data, the VCM correction model was used.

The VCM correction model used results from Edinburgh St Leonards and Auchencorth Moss FDMS monitoring sites. The data from Edinburgh St Leonards included un-ratified data and the data capture rate at Auchencorth Moss was only 41%. The quality of the data used to correct the results may have affected the accuracy of the adjusted $PM_{10}$ concentration obtained; the final adjusted $PM_{10}$ concentration should therefore be treated with caution.

The 2007 and 2008 Progress Reports identified a risk of the 2010 $PM_{10}$ objective being exceeded. In 2007, two exceedences of the 24-hour mean $PM_{10}$ objective were also measured, which increased to nine exceedences once the 1.3 adjustment factor was applied. In 2006, ten exceedences were measured once the 1.3 adjustment factor was applied. The measured exceedences were attributed to construction works near the monitoring station. The construction works ceased during 2007 and there has been a corresponding decrease in measured concentrations.

For comparative purposes, the raw measured annual mean concentration in 2008 was 14.9 µg/$m^3$. If the 1.3 adjustment factor was applied, the equivalent annual mean concentration would be 19.4µg/$m^3$, which is approximately 3µg/$m^3$ less than measured annual mean concentration in 2007. It can therefore be concluded that the measured concentrations during 2006 and 2007 were higher than would ordinarily be expected due to the nearby construction works. The measured concentrations obtained using the VCM correction model for 2008 indicate that there is no risk of exceeding current or future $PM_{10}$ objectives.

**Table 2.5a Results of $PM_{10}$ Automatic Monitoring: Comparison with Annual Mean Objective**

| Site ID | Location | Within AQMA? | Data Capture 2008 (%) | Annual mean concentrations (µg/m3) | | | |
|---|---|---|---|---|---|---|---|
| | | | | 2006* | 2007 * | 2008 | 2010 + |
| South Ring Road | Alloa | N | 99 | 23.5 | 22.0 | 15.8 | 15.1 |
| * Result with 1.3 adjustment factor applied (raw – 16.9)<br>+ Predicted from 2008 data using the methodology in Box 2.1 of LAQM.TG(09). | | | | | | | |

**Table 2.5b Results of $PM_{10}$ Automatic Monitoring: Comparison with 24-hour Mean Objective**

| Site ID | Location | Within AQMA? | Data Capture 2008 (%) | Number of Exceedences of hourly mean (50 µg/m3) If data capture < 90%, include the 90th %ile of hourly means in brackets. | | | |
|---|---|---|---|---|---|---|---|
| | | | | 2006* | 2007 * | 2008 | 2010 + |
| South Ring Road | Alloa | N | 99 | 10 | 9 | 0 | 0 |
| * Result with the 1.3 adjustment factor applied<br>+ 2010 annual mean estimated from 2008 data using the methodology in LAQM.TG(09). | | | | | | | |

### 2.2.3 Other pollutants

No monitoring of ambient concentrations of any other pollutants is undertaken within the Clackmannanshire Council area.

# 3 Road Traffic Sources

Updated traffic count data was obtained from Clackmannanshire Council Roads Department. The data was compared against the criteria outlined in the Technical Guidance checklist for road traffic. In addition, previous Review and Assessment reports were consulted to determine if there are any new roads or roads that have not been previously assessed. Details of the requirements for assessment are discussed in each section below.

## 3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Narrow congested streets with residential properties close to the kerb can often experience air quality problems due to slow moving traffic and reduced dispersion of emissions. Any street with the following characteristics requires assessment for $NO_2$ air quality impacts:

- has a annual average daily traffic (AADT) flow of 5,000 vehicles per day or more;
- experiences traffic congestion, slow moving traffic with frequent stopping and starting and an average speed of less than 25 kph; and
- is a narrow street with residential properties within 2m of the kerb and buildings on both sides of the road.

Previous LAQM reports concluded that there is no risk of exceeding $NO_2$ air quality objectives due to road traffic emissions at narrow congested streets. In accordance with the updated Technical Guidance, road traffic count data were reviewed to identify the streets with an AADT flow in excess of 5,000 vehicles per day. There are several streets with AADT flows in excess of 5,000 vehicles per day; however, there are no streets meeting the aforementioned criteria.

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

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

Busy streets where people may spend 1-hour or more close to traffic require assessment for $NO_2$ air quality impacts. Busy streets are classified as such if there is a traffic flow of greater than 10,000 vehicles per day. Busy streets require assessment when individuals may be exposed within 5m of the kerb for 1-hour or more

Previous review and assessment reports identified streets in Alloa town centre as locations where people may spend 1-hour or more close to traffic. Diffusion tube monitoring is undertaken at relevant locations and there have been no exceedences of the $NO_2$ annual mean objective. No new streets have been identified which require assessment. It is considered unlikely that $NO_2$ objectives would be exceeded within Alloa town centre.

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

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

Roads with an unusually high flow of buses and/or heavy goods vehicles (collectively referred to as HDV's) require assessment for both $NO_2$ and $PM_{10}$ emissions. An unusually high flow of HDV's is taken to be greater than 20% of total Annual Average Daily Traffic (AADT) flow. Roads with an unusually high flow of HDV's require assessment if there is relevant exposure within 10m of the road and if there are greater than 2,500 HDV's per day.

Road traffic data were received from Clackmannanshire Council roads department. It was confirmed that there are no roads within the Council area with a high flow of HDV's.

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

## 3.4 Junctions and Busy Roads

Busy roads and junctions are taken to have a traffic flow of greater than 10,000 vehicles per day. Busy junctions require assessment only when there is relevant exposure within 10m of the kerb. The assessment should consider $NO_2$ and $PM_{10}$.

Busy roads and junctions in Scotland also require assessment against the 2010 $PM_{10}$ air quality objectives. Busy roads and junctions in Scotland require assessment if the location has not been considered in previous LAQM reports or where there is a significant increase in traffic flows. A significant increase in traffic flows is taken to be greater than 10%.

Busy roads and junctions, for comparison with the 2010 $PM_{10}$ objective are ones with more than 5,000 vehicles per day where the 2010 annual mean background is expected to be above 15 $\mu g/m^3$. Where the 2010 annual mean background is expected to be less than 15 $\mu g/m^3$, busy roads and junctions are classed as having a traffic flow of greater than 10,000 vehicles per day.

The busiest junction within the Clackmananshire Council area is the Alloa Ring Road. The Alloa Ring Road has been assessed in previous review and assessment reports and it was concluded that air quality objectives would not be exceeded at this locations. Traffic volumes on the Alloa Ring Road have only increased by 0.6% since 2006.

A busy road that has not been previously assessed is the A907 at Blackgrange. The A907 at Blackgrange has a traffic flow of approximately 20,000 vehicles per day. In order to assess the air quality impact at receptor locations within the vicinity of this road, a Design Manual for Roads and Bridges (DMRB) screening assessment was conducted. Traffic count data, percentage LGV and HGV, vehicles speed, background pollutant concentrations and the distance to the closest receptor were input into the DMRB spreadsheet to predict pollutant concentrations. The assessment was conducted for 2004 $NO_2$ and $PM_{10}$ objectives and for 2010 $PM_{10}$ objectives. The results of the DMRB assessment are presented in Appendix D.

The predicted concentrations for Blackgrange resulting from the DMRB assessment are substantially below the annual mean air quality objectives for both $NO_2$ and $PM_{10}$. No exceedences of the 24-hour mean $PM_{10}$ objective were predicted in either 2008 or 2010.

It is considered unlikely that air quality objectives would be exceeded at busy roads and junctions within the Clackmannanshire Council area.

Clackmannanshire Council has assessed new/newly identified junctions meeting the criteria in Section A.4 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

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

New roads constructed or proposed since the last round of review and assessment require assessment for $NO_2$ and $PM_{10}$. The assessment method differs depending on whether an air quality assessment has been conducted for the road(s) in question. If an air quality assessment has been conducted, it should be reviewed to determine the method of assessment and validity of the conclusions within it. If an air quality assessment has not been conducted, the risk of the new road exceeding the objectives should be identified by establishing if the daily traffic flow is greater than 10,000 vehicles per day and if there is relevant exposure within 10m of the road.

One new road (the Alloa Eastern Relief Road) was constructed during 2007 and was discussed in the 2008 Progress Report. It was concluded that there is no relevant exposure within 10m of the road and that no assessment was required. No other roads have been constructed since the previous assessment.

Clackmannanshire Council confirms that there are no new/proposed roads.

## 3.6 Roads with Significantly Changed Traffic Flows

Any roads with a traffic flow of greater than 10,000 vehicles per day that have experience an increase in traffic of more than 25% should be assessed for $NO_2$ and $PM_{10}$ if the road was previously identified as being at risk of exceeding the objectives. A DMRB assessment is required for any identified roads that have not been assessed in earlier sections.

Several roads within the Council area have traffic flows in excess of 10,000 vehicles per day. No roads, however, have had a 25% increase in traffic flows. Indeed, the majority of roads have had a slight decline in traffic flows in comparison to 2007.

Clackmannanshire Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

## 3.7 Bus and Coach Stations

Information on the daily bus movements at bus stations (that are not enclosed) should be gathered for assessment against the annual mean and 1-hour mean $NO_2$ objectives. If there are greater than 2,500 bus movements and relevant exposure within 10m of any part of the bus station where buses are present, a DMRB assessment should be conducted.

There are two bus stations within the Council area, one in Alloa and the other in Tillicoultry. However, bus movements at both locations are substantially below the 2,500 criterion for assessment. In addition, $NO_2$ concentrations are monitored using diffusion tubes at both locations and the monitoring results are substantially below the annual mean $NO_2$ objective of 40 $\mu g/m^3$.

It is concluded that it is unlikely that $NO_2$ objectives will be exceeded due to bus movements within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no relevant bus stations in the Local Authority area.

# 4 Other Transport Sources

## 4.1 Airports

Airports require assessment if there is relevant exposure within 1km of the airport boundary. As identified in previous LAQM reports, there are no airports within the Clackmannanshire Council area.

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

## 4.2 Railways (Diesel and Steam Trains)

In accordance with the technical guidance, it is necessary to assess emissions from stationary trains in relation to compliance with $SO_2$ objectives and moving trains for compliance with $NO_2$ objectives.

The new Alloa – Kincardine rail link opened in May 2008 and is approximately 21 km long, passing through Clackmannanshire. The rail line link connects Alloa to Stirling and facilitates freight movements to Longannet Power Station in Kincardine The rail link introduces a new emissions source into Clackmannanshire Council area. The new rail line supports approximately 20 passenger trains each way per day, travelling to and from Glasgow Queen Street, and approximately 15 goods trains delivering coal to Longannet Power Station each way per day. The line is serviced by a new railway station at Alloa.

An Environmental Impact Assessment (EIA) was conducted as part of the planning application for the rail link. As part of the EIA, an air quality impact assessment was undertaken. The assessment concluded that the rail link would have a negligible impact on local air quality.

### 4.2.1 Stationary Trains

Stationary trains require assessment for $SO_2$ emissions and moving trains require assessment for $NO_2$ emissions. Locations where diesel or steam locomotives are regularly stationary for 15 minutes or more should be identified. Possible locations include signals, goods loops, depots or stations. It should then be identified if there is relevant public exposure within 15m of the stationary locomotives.

Where this is the case, information on the number of trains per day that might be stationary for more than 15 minutes should be gathered. If there are more than 3 or more occasions when there may be a locomotive stationary with its engine running, a Detailed Assessment is required.

The passenger trains using the Alloa – Kincardine rail link terminate at Alloa train station and they occasionally sit for up to half an hour with the engines running. Some local residents have complained about the noise associated with the idling trains. However, the closest flats are approximately 26m from the location where the trains idle. Based on the separation distance between the closest receptors and the idling trains it is considered unlikely that $SO_2$ air quality objectives will be breached at locations of relevant public exposure within the vicinity of Alloa Railway station.

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

### 4.2.2 Moving Trains

Sections of track that may have a large number of movements of diesel locomotives should be identified. Further assessment of $NO_2$ concentrations is required where the background concentration is above 25 µg/$m^3$ and where there is the potential for long-term exposure within 30m of the tracks.

The Technical Guidance TG(09) identifies the rail line between Glasgow and Edinburgh as having a heavy traffic of diesel passenger trains. The rail lines within the Clackmannanshire Council area do not have as heavy traffic as the Glasgow to Edinburgh rail line. It is therefore unlikely that $NO_2$ air quality objectives would be exceeded as a result of train movements.

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

## 4.3 Ports (Shipping)

Ports require assessment for $SO_2$ concentrations resulting from fuel burning. Ports require assessment where there is relevant public exposure within 250m and 1 km of the berths and main areas of manoeuvring. Previous LAQM reports identified that there are no ports within the Clackmannanshire Council area.

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

# 5 Industrial Sources

## 5.1 Industrial Installations

The Scottish Environment Protection Agency (SEPA) was contacted to determine if there had been any new or significantly changed industrial process within the Clackmannanshire Council area since the previous LAQM assessment.

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

SEPA was contacted to determine if there were any new or proposed installations for which an air quality assessment has been carried out. It was confirmed that there are no new or proposed installations within the Clackmannanshire Council area with the potential to affect air quality.

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

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

Existing installations require further assessment if they have experienced a substantial increase in emissions. A substantial increase is categorised as more than 30% increase. Existing installations also require assessment if there is new relevant exposure since the previous LAQM assessment.

SEPA was contacted to determine if any existing installations had a substantial increase in emissions since the previous LAQM assessment. It was confirmed that three sites has undergone a change since the previous assessment; however, no sites demonstrated a substantial increase in emissions. The changes that were reported are:

- Kilbagie Mills, Alloa - Surrendered 06/03/2008.
- Benkert UK Ltd., Alva - Variation issued 07/08/2008.
- O-I Manufacturing, Alloa - Consolidated permit issued 24/06/08.

The locations of existing industrial installations were also reviewed and it was determined that there was no new relevant exposure within the vicinity of any site.

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

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

Due to the re-organisation of the regulatory framework, dry cleaners are now required to have a PPC Part B permit. There is one dry cleaner premises within the Clackmannanshire Council area, based within Wm Morrisons, Alloa. Since the dry cleaners is not a new installation, but rather now requires to be regulated, no air quality assessment is available. Considering the size of the installations and the activities undertaken, it is considered unlikely that air quality strategy objectives will be breached.

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

## 5.2 Major Fuel (Petrol) Storage Depots

As mentioned in previous review and assessment reports, there are no major fuel storage depots within the Clackmannanshire Council area.

There are no major fuel (petrol) storage depots within the Local Authority area.

## 5.3 Petrol Stations

Petrol stations require assessment where there is an annual throughput of more than 2000m$^3$ of petrol and with a busy road nearby. A busy road is taken to be one with more than 30,000 vehicles per day. In addition, should the aforementioned criteria be met, there should also be relevant exposure within 10m before proceeding to detailed assessment.

A list of petrol stations within the Clackmannanshire Council area was obtained from SEPA. The locations of the petrol stations were reviewed in relation to the proximity to busy roads within the Council area. There are no petrol stations currently located near a busy road with an annual average daily traffic flow of greater than 30,000 vehicles. It is therefore unlikely that air quality objectives for benzene would be exceeded due to emissions from petrol stations within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no petrol stations meeting the specified criteria**.**

## 5.4 Poultry Farms

Poultry farms are a new item requiring assessment. Any poultry farms meeting the following criteria will require detailed assessment:

- housing in excess of 400,000 birds if mechanically ventilated;
- housing in excess of 200,000 birds if naturally ventilated;
- housing 100,000 birds for any turkey unit; and
- if there is relevant exposure within 100m of the poultry unit.

A list of poultry farms within the Clackmannanshire Council area was sought from SEPA. There are two poultry farms within the Clackmannanshire Council area, Cambusview Poultry Farm, Alloa and Helensfield Poultry Farm, Clackmannan. It was confirmed by SEPA that only Cambusview Poultry Farm, Alloa exceeds the aforementioned criteria, with 1.2 million birds. The location of the poultry farm is presented in Figure 3.

The location of the Cambusview Poultry Unit was reviewed to determine if there is relevant exposure within 100m of the site. It was determined that there are residential properties located within 100m of the poultry unit. It is concluded that the Cambusview Poultry Unit exceeds the aforementioned criteria and therefore requires Detailed Assessment to determine if $PM_{10}$ objectives are likely to be exceeded.

Clackmannanshire Council has identified a poultry farm meeting the specified criteria, and **will need to proceed to a Detailed Assessment for $PM_{10}$.**

# 6 Commercial and Domestic Sources

## 6.1 Biomass Combustion – Individual Installations

Biomass boilers require assessment for $PM_{10}$ and $NO_x$ emissions. Any biomass plant with a capacity of between 50kW and 20MW should be identified. For any identified biomass plant, information on the stack height, stack diameter, dimensions of buildings within 5 times the stack height, and the maximum $NO_x$ and $PM_{10}$ emission rates is required. A method for calculating the potential air quality impact of the plant is described in detail in the Technical Guidance TG(09).

Clackmannanshire Council was contacted to determine if there are any biomass boilers meeting the aforementioned capacity. It was confirmed that there are no boilers within the Council area which require assessment.

Clackmannanshire Council confirms that there are no known biomass combustion plants in the Local Authority area.

## 6.2 Biomass Combustion – Combined Impacts

The combined impacts of several small biomass combustion installations may lead to high $PM_{10}$ concentrations. To assess the combined impacts of several small installations, it is necessary to identify areas 500m by 500m squares with the highest density of biomass combustion appliances. Within the identified areas, the types of appliance should then be obtained and counted. Further detailed information on the assessment method for combined impacts is provided in the Technical Guidance TG(09).

Previous Review and Assessment reports have addressed the issue of domestic solid fuel burning. The majority of towns and villages within the Clackmannanshire Council area are supplied with mains gas. Due to the extensive gas supply network, it is concluded that there are no areas of significant coal burning. In addition, most new housing estates are gas heated.

It is concluded that it is unlikely that the $PM_{10}$ objectives would be exceeded due to the combined impacts of biomass combustion and domestic solid fuel burning within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no known biomass combustion plants in the Local Authority area which may lead to cumulative impacts.

## 6.3 Domestic Solid-Fuel Burning

Areas where significant coal burning is carried out should be identified. Significant is defined as more than 50 houses in a 500m by 500m area. Information on the actual use pattern of domestic solid fuel burning should be obtained. Only areas where there are in excess of 100 premises burning solid fuel on a regular basis should be investigated further.

As discussed in the previous section, there are no significant areas of domestic solid-fuel burning within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

# 7 Fugitive or Uncontrolled Sources

Fugitive or uncontrolled $PM_{10}$ sources require to be assessed against $PM_{10}$ objectives. Only new sources or sources with new relevant exposure near to the source require assessment. 'Near' is defined in terms of the background concentration within the vicinity of the source. For sources within Clackmannanshire Council, near is defined as 200m from the source as the background $PM_{10}$ is estimated to be below 26 µg/m$^3$, in comparison with the 2004 $PM_0$ objectives, and below 16 µg/m$^3$ in comparison with the 2010 $PM_{10}$ objectives.

A list of sites with the potential to release uncontrolled or fugitive $PM_{10}$ emissions was obtained from SEPA. It was determined that there are no new sources of fugitive or uncontrolled $PM_{10}$ emissions since the previous round of review and assessment. In addition, the locations of the existing sources of fugitive emissions was reviewed and it was determined that there was no new relevant exposure within the vicinity of the sources.

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

# 8 Conclusions and Proposed Actions

## 8.1 Conclusions from New Monitoring Data

During 2008, Clackmannanshire Council undertook monitoring of ambient $NO_2$ and $PM_{10}$ concentrations at various locations. The results indicate that the $NO_2$ and $PM_{10}$ air quality objectives were met during 2008 at all monitoring locations.

Measured $NO_2$ concentrations during 2008 were lower than 2007 at most sites. Only one site, Glasshouse Loan, measured an increased concentration in 2008 compared with 2007. The measured annual mean $PM_{10}$ concentration also demonstrated a decrease in 2008 in comparison to 2007. No exceedences of any air quality objective were measured during 2008.

There are no existing AQMA's within the Council area. It is therefore concluded that no Detailed Assessment is required based on monitoring data.

## 8.2 Conclusions from Assessment of Sources

Assessment of local emission sources were conducted in accordance with the TG(09) Technical Guidance. Updated information of road, rail, industrial, domestic and fugitive emissions sources etc were obtained and compared against the criteria and conditions described in the Guidance.

It was determined that there it is unlikely that any air quality objectives would be exceeded due to road traffic, other transport, commercial and domestic or fugitive emissions sources within the Council area.

It is, however, possible that $PM_{10}$ objectives may be exceeded at locations of relevant exposure located within 100m of Cambusview Poultry Farm. Based on technical guidance requirements it is recommended that a Detailed Assessment of $PM_{10}$ emissions from the Cambusview Poultry Farm is undertaken.

It was identified that trains regularly sit at Alloa railway station for periods of up to half an hour with the engines running. The closest receptors to the location of the idling engines, however, are further than 15m the engines, therefore no further assessment is required..

## 8.3 Proposed Actions

The Updating and Screening Assessment identified the need to proceed to a Detailed Assessment for $PM_{10}$ within the vicinity of the Cambusview Poultry Farm, Alloa. The Council should, therefore, undertake an assessment of emissions from the poultry farm at the earliest opportunity.

# 9 References

Defra et al, 2009. Local Air Quality Management, Technical Guidance LAQM.TG(09).

# Appendices

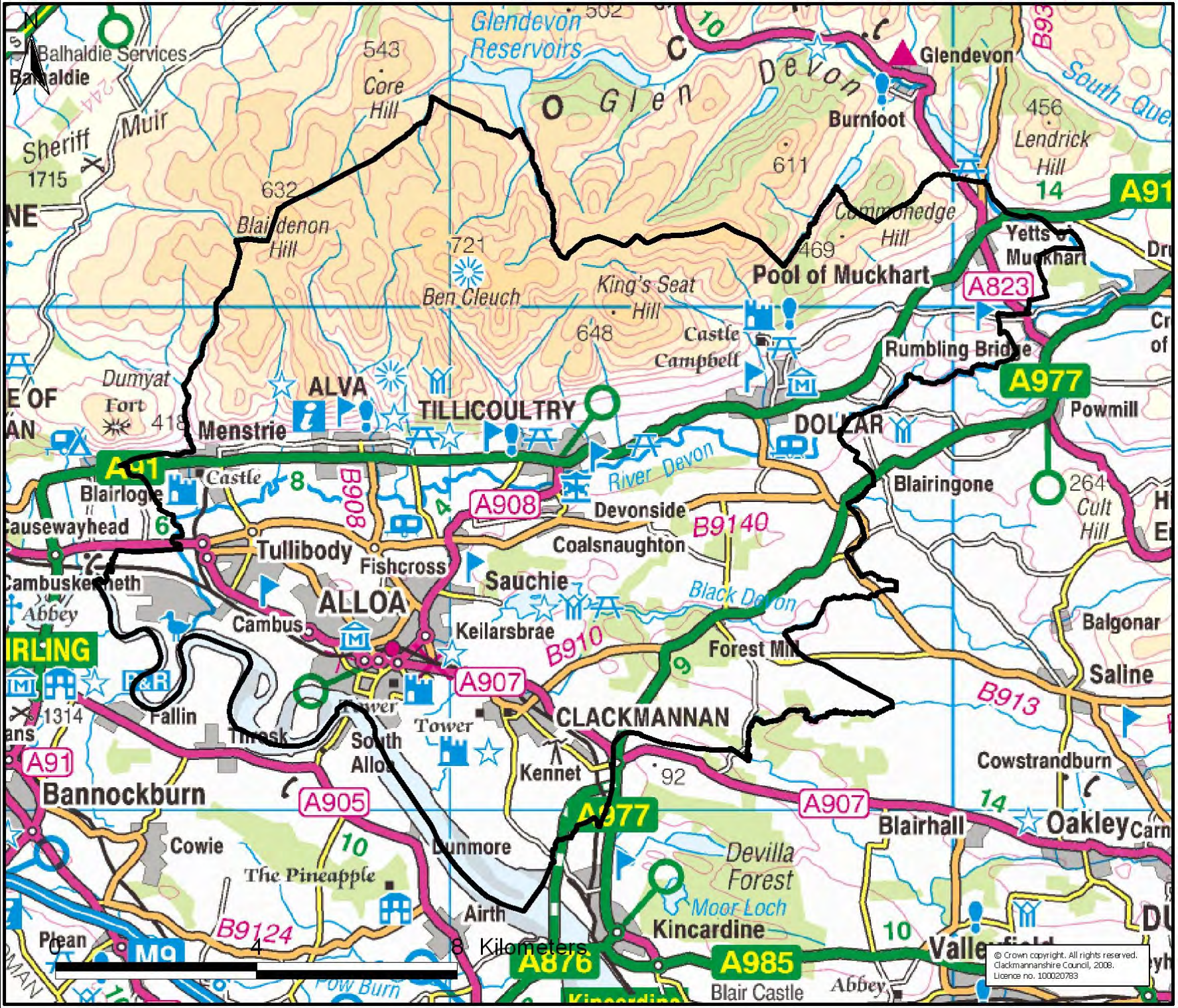
Appendix A: Figures

Appendix B: Diffusion tube data

Appendix C: Monthly diffusion tube results

Appendix D: DMRB Calculations

# Appendix A: Figures






CLACKMANNANSHIRE COUNCIL

LEGEND

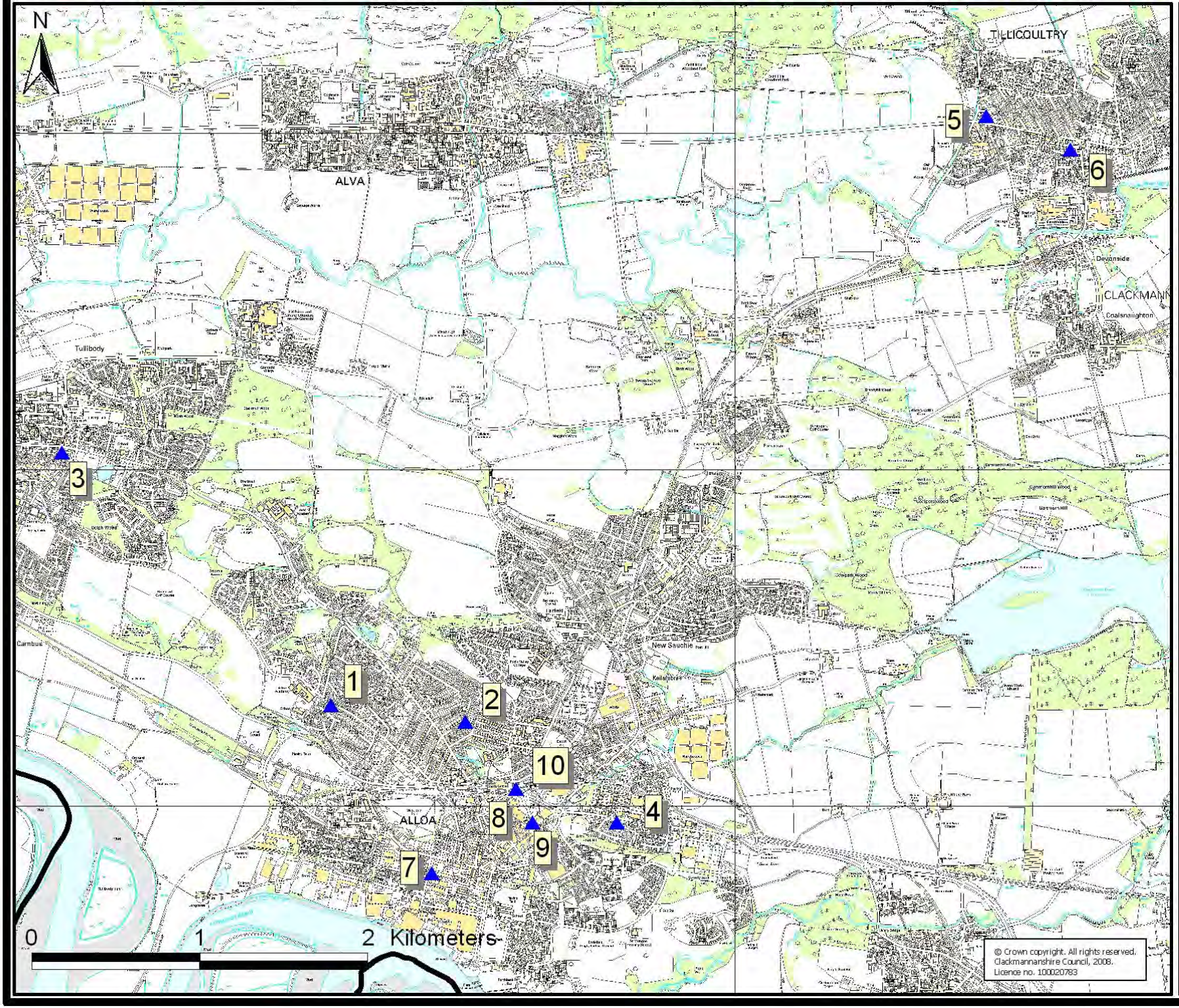
Clackmannanshire Council boundary

NOTES

| | |
|---|---|
| Project No. G_CLA_019 | |
| Project title<br>LAQM Updating and Screening Assessment 2009 | |
| Figure no. 1 | |
| Figure title<br>Clackmannanshire Council boundary | |
| Scale 1:100,000 | Projection GB NGR |
| Datum OS | View2 |

BMT Cordah Limited
Unit 119 Pentagon Business Centre
36 Washington Road, Glasgow, G3 8AZ
Website: http://www.bmtcordah.com
BMT Cordah Limited is a member of the BMT group of companies

BMT Cordah




CLACKMANNANSHIRE COUNCIL

LEGEND

Clackmannanshire Council boundary

Monitoring locations

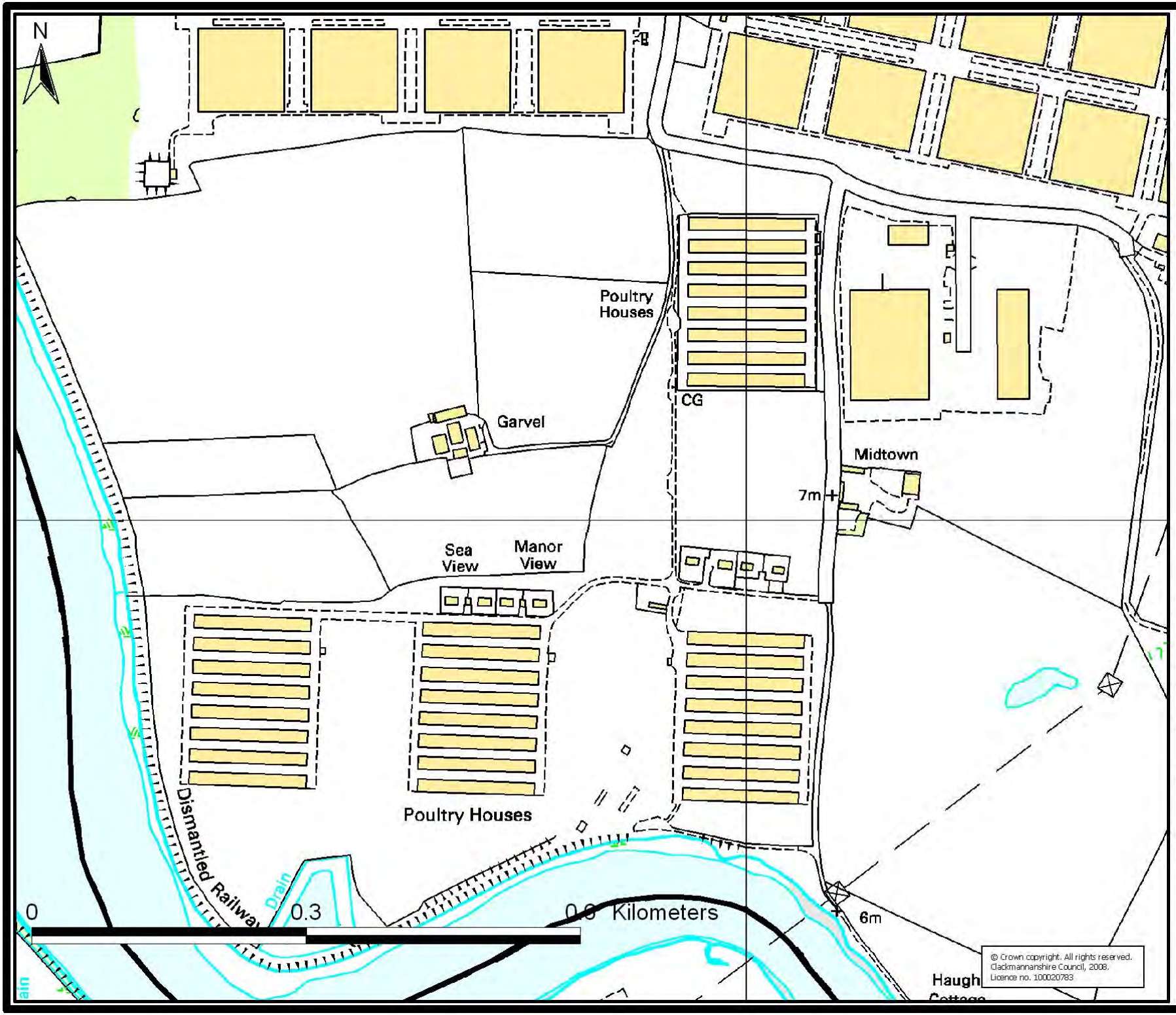
1. Norwood Ave, Alloa
2. Shaftesbury St, Alloa
3. Stirling Rd, Tullibody
4. Clackmannan Rd, Alloa
5. High St, Tillicoultry
6. Bus Station, Tillicoultry
7. Glasshouse Loan, Alloa
8. Bus Station, Alloa
9. Shillinghill/Bridge Terrace, Alloa
10. South Ring Rd, Alloa

NOTES

| | |
|---|---|
| Project No. G_CLA_019 | |
| Project title<br>LAQM Updating and Screening Assessment 2009 | |
| Figure no. 2 | |
| Figure title<br>Monitoring locations | |
| Scale 1:30,000 | Projection GB NGR |
| Datum OS | View2 |

BMT Cordah Limited
Unit 119 Pentagon Business Centre
36 Washington Road, Glasgow, G3 8AZ
Website: http://www.bmtcordah.com
BMT Cordah Limited is a member of the
BMT group of companies

BMT Cordah




CLACKMANNANSHIRE COUNCIL

LEGEND

Clackmannanshire Council boundary

NOTES

| | |
|---|---|
| Project No. | G_CLA_019 |
| Project title<br>LAQM Updating and Screening Assessment 2009 | |
| Figure no. | 3 |
| Figure title<br>Cambusview Poultry Farm | |
| Scale 1:5,500 | Projection GB NGR |
| Datum OS | View2 |

BMT Cordah Limited
Unit 119 Pentagon Business Centre
36 Washington Road, Glasgow, G3 8AZ
Website: http://www.bmtcordah.com
BMT Cordah Limited is a member of the BMT group of companies

BMT Cordah

# Appendix B: Diffusion tube Data

## Diffusion Tube Bias Adjustment Factors

Clackmannanshire Council does not currently undertake a local co-location study with a chemiluminescence automatic monitor. The results of the $NO_2$ diffusion tubes have therefore, been adjusted using the bias factor provided by Glasgow Scientific Services as reported on the Review and Assessment website. The bias adjustment factor is based on four co-location studies in a nearby local authority and is reported to be 0.97 for 2008. Two of the four co-location studies had good precision and two had poor precision. The reported bias adjustment factors on the Review and Assessment website are presented in Table B.1.

**Table B.1: Details of the 2008 bias correction factor for Glasgow Scientific Services**

| Site name | 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) |
|---|---|---|---|---|---|---|
| East Dunbartonshire Council | 10 | 29 | 31 | -6.7% | P | 1.07 |
| East Dunbartonshire Council | 11 | 42 | 45 | -5.3% | G | 1.06 |
| East Dunbartonshire Council | 11 | 40 | 35 | 12.8% | P | 0.89 |
| AEA Tech Intercomparison | 12 | 133 | 116 | 14.9% | G | 0.87 |
| Overall factor from four studies | | | | | | 0.97 |

## Discussion of Choice of Factor to Use

Due to the absence of a local co-location study, the average bias adjustment factor from four studies conducted by Glasgow Scientific Services was applied to the diffusion tube results for 2008.

## QA/QC of diffusion tube monitoring

During 2008, the diffusion tubes for Clackmannanshire Council were prepared and analysed by Glasgow Scientific Services using the 20% triethanolamine (TEA) in water method. Glasgow Scientific Services is a UKAS accredited laboratory and they have followed the procedures set out in the guidance document "Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance for Laboratories and Users" since January 2009.

The results of GSS WASP scheme are:

- Round 101 Z-scores -1.6; 0.2
- Round 102 Z-scores 0.2; 0.4
- Round 103 Z-scores 0.1; 0.5
- Round 104 Z-scores -0.1; 0.5

# Appendix C: Monthly $NO_2$ diffusion tube data

**Table C-1: Monthly $NO_2$ diffusion tube results – raw data**

| Site | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Norwood Avenue | <2 | <3 | <2 | <3 | 3 | 5 | <3 | 10 | 12 | 6 | 14 | 21 |
| Shaftesbury Street | 18 | <3 | 4 | 8 | 3 | 5 | 5 | 10 | 13 | 10 | 16 | 26 |
| Stirling Road, Tullibody | 33 | <3 | 18 | 18 | 16 | 3 | 14 | 18 | 25 | 13 | 21 | 40 |
| Clackmannan Road | 44 | 22 | 34 | 24 | 31 | 20 | 26 | 30 | 29 | 32 | 34 | 46 |
| High Street, Tillicoultry | 27 | 6 | 18 | 12 | 8 | 15 | 9 | - | 25 | 19 | 28 | 28 |
| Bus Station, Tillicoultry | 29 | 7 | 9 | 4 | 15 | 14 | 12 | 14 | 15 | 14 | 23 | 32 |
| Glasshouse Loan, Alloa | 31 | <3 | 20 | 9 | 14 | 18 | 10 | 18 | 24 | 23 | 42 | 37 |
| Bus Station, Alloa | 43 | <3 | 26 | 26 | 25 | 16 | 20 | 32 | 34 | 39 | 28 | 48 |
| Shillinghill/Bridge Terrace, Alloa | 38 | 11 | 22 | 27 | 37 | 24 | 27 | 34 | 25 | 34 | 39 | - |
| South Ring Road Alloa | 35 | 5 | 30 | 13 | 8 | 25 | 21 | 23 | 28 | 28 | 26 | 40 |

# Appendix D: DMRB Calculations

## Input Data

**Table D.1: Background concentrations**

| Location/ Receptor | Grid Ref | Background Concentrations | | | |
|---|---|---|---|---|---|
| | | Year | NOx | $NO_2$ | $PM_{10}$ |
| A Blackgrange | 284000 695000 | 2008 | 9.66 | 7.67 | 11.23 |
| | | 2010 | 8.81 | 7.12 | 10.99 |

**Table D.2: DMRB input data**

| Location/ Receptor | Link number | Distance from link centre to receptor (m) | Traffic flow & speed | | Traffic composition | | |
|---|---|---|---|---|---|---|---|
| | | | AADT (combined, veh/day) | Annual average speed (km/h) | Road type (A,B,C,D) | Total % LDV (<3.5t GVW) | Total % HDV (>3.5t GVW) |
| A Blackgrange | 1 | 5 | 23047 | 64 | A | 94 | 6 |

## Results

**Table D.3: DMRB results**

| Location/ Receptor | Year | Total $NO_x$ [1] | Rd NOx [2] | Adj Rd NOx [3] | Adj Total NOx [4] | Adj Rd $NO_2$ [5] | Adj Total $NO_2$ [6] | $PM_{10}$ | |
|---|---|---|---|---|---|---|---|---|---|
| | | Annual mean µg/m$^3$ | Annual mean µg/m$^3$ | Annual mean µg/m$^3$ | Annual mean µg/m$^3$ | Annual mean µg/m$^3$ | Annual mean µg/m$^3$ | Annual mean µg/m$^3$ | Days >50µg/m$^3$ |
| A Blackgrange | 2008 | 34.62 | 24.96 | - | - | 15.51 | 23.18 | 14.35 | 0 |
| A Blackgrange | 2010 | 28.67 | 19.86 | - | - | 13.28 | 20.40 | 13.44 | 0 |

[1] Total NOx = direct from DMRB local output sheet
[2] Rd NOx = Total NOx – Background NOx
[3] Adj Rd NOx = Rd NOx x verification factor (state verification factor used)
[4] Adj Total NOx = Adj Rd NOx + Background NOx
[5] Adj Rd $NO_2$ = from NOx to $NO_2$ calculator (available LAQM Tools)
[6] Adj Total $NO_2$ = Adj Rd $NO_2$ + Background $NO_2$