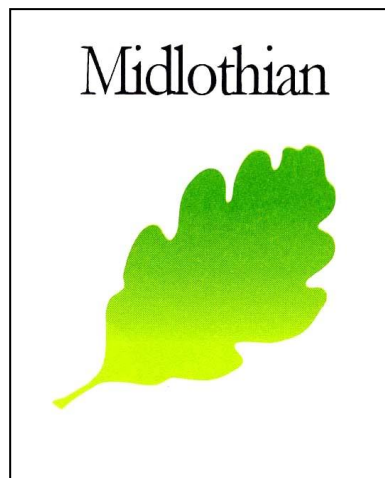


# **2012 Air Quality Updating and Screening Assessment**

**For**

***Midlothian Council***



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

**September 2012**

|                                |   |
|--------------------------------|---|
| <b>Local Authority Officer</b> | Lilianne Lauder, Principal Environmental Health Officer (Public Health) |
|--------------------------------|---|

|                   |  |
|-------------------|--|
| <b>Department</b> | Communities and Wellbeing  |
| <b>Address</b>    | Fairfield House<br>8 Lothian Road<br>Dalkeith<br>EH22 3ZN                                |
| <b>Telephone</b>  | 0131 271 3370  |
| <b>e-mail</b>     | <a href="mailto:Lilianne.Lauder@midlothian.gov.uk">Lilianne.Lauder@midlothian.gov.uk</a> |
|                   |  |
|                   |  |

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## Executive Summary

Midlothian Council has carried out a review of air quality within Midlothian which 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 report sets out the results of air quality monitoring carried out by Midlothian Council and considers the potential impacts from a range of sources such as road traffic and other transport emissions, industrial processes, commercial and domestic fuel use and fugitive emission sources.

It was found that there were no new issues identified in 2011 as requiring further assessment.

Prior to the opening of the A68 bypass, some measurements of nitrogen dioxide were reported between 2006 and 2008 as being above the annual mean objective at locations adjacent to the A68 in Dalkeith. Since the opening of the bypass in October 2008, monitoring data has shown that nitrogen dioxide concentrations have decreased significantly. A slight increase in nitrogen dioxide levels were recorded at some monitoring locations in Dalkeith during 2011. A refurbishment of Dalkeith High Street, including replacing the paving slabs, was carried out during 2011 and traffic diversions were in place during this period. The impact of these works on air quality is considered in Midlothian Council's 2012 Update and Screening Assessment Report.

Midlothian Council implemented some changes to monitoring stations during 2011. The air quality station in Dalkeith was removed following consultation with The Scottish Environment Protection Agency and Scottish Government as, since the opening of the Dalkeith Bypass, air quality in the centre of Dalkeith has improved and it was considered that there were no longer any significant air quality issues in Dalkeith. Nitrogen dioxide levels will continue to be monitored using the diffusion tube method. On removal of the automatic air monitoring station, the co-located triplicate diffusion tubes were no longer required and were removed.

The AQMA at Pathhead was declared in 2008 based on a predicted exceedence of the 2010 PM<sub>10</sub> objectives at Pathhead. The annual mean concentration of PM<sub>10</sub> measured by the TEOM and Partisol during 2009 was 17.0 µg/m<sup>3</sup> and 17.2 µg/m<sup>3</sup> respectively. In 2010 a PM<sub>10</sub> annual mean concentration of 18.0 µg/m<sup>3</sup> was measured. The annual mean PM<sub>10</sub> concentrations for the 2011 monitoring period measured using the Teom and a Partisol Gravimetric Analyser are 17µg/m<sup>3</sup> and 14.4 µg/m<sup>3</sup> respectively.

A gas main was installed into the village of Pathhead in mid 2011 and an increasing number of household gas mains connections have been made towards the latter part of 2011 and will continue into 2012. As a result, PM<sub>10</sub> levels from the burning of coal have decreased.

It is expected that PM<sub>10</sub> levels will decrease further in 2012 as more households switch to gas. If, after monitoring for another full year post installation of the gas mains and if able to demonstrate that PM<sub>10</sub> levels have reduced and that the reduction will be sustained then consideration be given to revoking the Pathhead AQMA.

An Action Plan has been prepared on this basis.

Bonnyrigg High Street was identified as a busy narrow congested street in 2008. As a result, additional diffusion tubes were deployed in this area to investigate potentially high

concentrations of nitrogen dioxide. The results of the Detailed Assessment completed in 2010 indicated that nitrogen dioxide levels at locations close to the road network in the centre of Bonnyrigg were within the air quality objective by some margin. Monitoring has continued at these locations and the results continue to remain well within the air quality objective.

The next course of action for Midlothian Council in the Review and Assessment process is summarised as:

- Submit a Progress Report by 30 April 2013

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# **1 Introduction**

## **1.1 Description of Local Authority Area**

Despite being relatively small in size, Midlothian occupies a key location on the southern boundary of Scotland's capital. All of Midlothian's main centres of population lie within 30 minutes drive from Edinburgh, while Dalkeith is only 6 miles from the city centre. Midlothian comprises a number of small and medium-sized towns, together with many villages and hamlets and it is not dominated by any single centre. Penicuik is the largest town with a population of around 17,000, followed in size by Bonnyrigg and Dalkeith with populations of about 14,000 and 11,000 respectively. Loanhead, Gorebridge, Mayfield and Newtongrange are smaller settlements. A schematic map of Midlothian showing villages, towns and roads within the district is shown in Figure 1.

Midlothian is largely a countryside setting. The area stretches from the Pentland Hills to the Moorfoots and Lammermuirs, and comprises a gently sloping plain, much of it intensively farmed, rising to moorland with upland country beyond. There are deeply incised river gorges of the Esk and Tyne with dense natural woodland. Much of this landscape is protected by policy designations such as the Green Belt.

There are no large industrial processes in Midlothian and the main issues with regards to air quality are due to road traffic emissions, particularly in the busy town and village centres where congestion occurs. Another issue is domestic solid fuel combustion due to the rural setting of Midlothian and limited mains gas supply to some villages, although this is currently being addressed in the village of Pathhead. There are also a number of open cast coal mining and landfill sites in Midlothian.

## **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.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.



### 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 microgrammes per cubic metre,  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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

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

## **1.4 Summary of Previous Review and Assessments**

### **1.4.1 First Round of Review and Assessment, 1998 – 2001**

The assessment of local air quality was undertaken initially as a three stage process using increasingly detailed levels of assessment. Midlothian Council has previously completed Stages 1 to 3 of the first round of the Review and Assessment process.

The Stage 1 report concluded that further assessment of nitrogen dioxide, PM<sub>10</sub>, sulphur dioxide and lead was required due to emissions from traffic, industrial and domestic sources. The Stage 2 report concluded that no further assessment was required for PM<sub>10</sub>, sulphur dioxide and lead. A more detailed assessment of nitrogen dioxide was recommended at Stage 3 for road traffic emissions in the centre of Dalkeith. On the basis of continuous analyser monitoring and dispersion modelling results, the Stage 3 report concluded that the air quality objectives for nitrogen dioxide were not at risk of being exceeded at sensitive receptor locations in Dalkeith centre and therefore the declaration of an air quality management area was not required.

### **1.4.2 Second Round of Review and Assessment, 2003 – 2005**

#### **Updating and Screening Assessment 2003**

Following completion of reports for the first phase of Review and Assessment, there were potentially a number of issues that needed to be addressed in terms of changes to the sources and emissions of pollutants that may have affected ambient air quality in local authority areas. Furthermore, new policy developments and revisions to published guidance required consideration within the on-going assessment of air quality.

The updating and screening assessment was based on a checklist approach, whereby sources identified in the first round of Review and Assessment and any new or altered emissions sources were reviewed with regard to their current significance and any requirement for further, more detailed, assessment.

The Updating and Screening Assessment completed in early 2004 concluded that a Detailed Assessment was required for nitrogen dioxide and PM<sub>10</sub> levels due to road traffic emissions in Dalkeith centre. The screening assessment indicated that a survey of domestic fuel use was required for two villages in Midlothian; Cousland and Pathhead.

#### **Detailed Assessment 2004**

The Detailed Assessment report completed in 2005 by Midlothian Council concluded that PM<sub>10</sub> levels in Dalkeith centre would comply with the air quality objectives for the target years of 2004 and 2010. Nitrogen dioxide levels were also predicted not to exceed the relevant air quality objectives. However, further monitoring was recommended to provide more data of improved reliability. The updated results of this survey are set out in this report.

The survey of domestic fuel use in Cousland and Pathhead indicated a more detailed assessment of PM<sub>10</sub> and sulphur dioxide levels was required in Pathhead. Midlothian Council committed to carry out the monitoring in the winter period of September 2005 to March 2006. The results of the monitoring were incorporated into the next round (the third

round) of the review and assessment process (i.e. the Updating and Screening Assessment 2006).

### **Progress Report 2005**

The Progress Report submitted in 2005, and updated in 2006, provided an update on local air quality issues in Midlothian and focused on the latest monitoring results and updates to industrial processes and developments. The report concluded that there were no areas of immediate concern. The proposed Dalkeith by-pass was anticipated to lead to a considerable decrease in pollution levels in the centre of Dalkeith. It was recommended that additional monitoring be undertaken to reinforce these findings in Dalkeith and also at the village of Pathhead following the recommendations in the Detailed Assessment 2004 report.

### **1.4.3 Third Round of Review and Assessment, 2006 – 2008**

#### **Updating and Screening Assessment 2006**

The Updating and Screening Assessment completed in 2006 concluded that measured concentrations of PM<sub>10</sub> at Pathhead were above the 2010 annual mean objective value. As the monitoring period was less than one year, it was concluded that further monitoring be carried out and the results reported in a Detailed Assessment in 2007. Although it was concluded that there had been no significant changes with regards to emissions and measurements of all other substances, it was recommended that the existing monitoring programme be continued to confirm the trend in pollution levels.

#### **Detailed Assessment 2007**

The Detailed Assessment completed in 2007 focused on PM<sub>10</sub> levels in Pathhead due to domestic coal burning and road traffic emissions. The results of the monitoring campaign indicated that the levels of PM<sub>10</sub> are predicted to exceed the annual mean air quality objective by the target date of 2010. Further analysis was undertaken using dispersion modelling which confirmed the monitoring results. On this basis, Midlothian Council committed to declaring an AQMA in Pathhead.

The AQMA in Pathhead came into force on 30 April 2008 and covers the entire village as shown in Figure 2. Midlothian Council aims to carry out a Further Assessment to confirm the original assessment, calculate the improvement required and refine its knowledge of the sources of pollution. Midlothian Council is also committed to preparing an Air Quality Action Plan, as necessary, once the Further Assessment is completed.

### **Progress Report 2008**

The Progress Report submitted in 2008, provided an update on local air quality issues in Midlothian and focused on the latest monitoring results and updates to industrial processes and developments. The monitoring data confirmed the declaration of the AQMA at Pathhead. Some diffusion tube measurements at locations in Dalkeith were above the annual mean nitrogen dioxide objective. However, these locations were not representative of long term human exposure locations. Midlothian Council committed to reviewing the diffusion tube monitoring locations and considering whether the survey also needs to be expanded to cover Loanhead and Bonnyrigg, where increased traffic congestion has occurred. Some minor changes to industrial processes and plans for developments such as Park and Rides, a new town and re-opening of a rail link were identified. It was concluded that a Detailed Assessment was not required.

#### **1.4.4 Fourth Round of Review and Assessment, 2009 – 2011**

##### **Air Quality Update Screening and Assessment 2009**

The Updating and Screening Assessment completed in 2009 concluded that measured concentrations of PM<sub>10</sub> at Pathhead in 2008 complied with the annual mean and 24-hour mean air quality objectives for 2004 but the annual mean concentration of 19.6 µg/m<sup>3</sup> was above the 2010 annual mean objective. When using the approach set out in Box 2.2 of LAQM.TG(09) (Ref.1) the predicted concentration for 2010 was 18.4 µg/m<sup>3</sup> and therefore above the annual mean objective. The 2009 Updating and Screening Assessment concluded that the air quality objective for PM<sub>10</sub> was forecast to be exceeded by a small margin in 2010. A gravimetric Partisol sampler was installed at Pathhead in early 2009 and the gravimetric results would be used to confirm if the 2010 annual mean objective would be exceeded in Pathhead.

Although measurements of nitrogen dioxide were above the annual mean objective value at three locations in Dalkeith, the opening of the Dalkeith Bypass in September 2008 (during the measurement period) was expected to reduce nitrogen dioxide concentrations in future years to below the objective value. This was demonstrated by comparing the period of measurement subsequent to the bypass opening with the same period in previous years.

It was identified that concentrations of nitrogen dioxide in the High Street, Bonnyrigg required a Detailed Assessment due to the identification of a narrow congested street with more than 5,000 vehicles per day. Additional monitoring has been carried out during 2009 in Bonnyrigg to inform the Detailed Assessment.

No issues were identified with regard to the other aspects addressed in the Updating and Screening Assessment. Although it was concluded that there had been no significant changes with regards to emissions and measurements of all other substances, it was recommended that the existing monitoring programme be continued to confirm the trend in pollution levels.

##### **Progress Report and Detailed Assessment Report 2010**

The Progress and Detailed Assessment Report completed in 2010 provides an update on the results of air quality monitoring in Midlothian. It focussed on measured PM<sub>10</sub> levels in Pathhead and confirms that the AQMA should remain in place as the measured PM<sub>10</sub> concentrations remain close to the 2010 air quality objective of 18 µg/m<sup>3</sup>.

Monitoring of nitrogen dioxide indicated that concentrations adjacent to busy roads were within the annual mean air quality objective and that there had been a measurable decrease in nitrogen dioxide concentrations at some of the locations within Dalkeith, adjacent to the A68.

The Update and Screening Assessment 2009 identified the need for a detailed Assessment of nitrogen dioxide levels at Bonnyrigg due to the identification of a narrow congested street with more than 5,000 vehicles per day. Additional diffusion tube monitoring was carried out in 2009 at relevant roadside locations in Bonnyrigg. The measured concentrations at these locations were significantly below the annual mean air quality objective and although no further assessment was necessary the new diffusion tube locations were maintained.

In addition to two new passive diffusion sites in Bonnyrigg, monitoring was also established at three new sites in Loanhead. The results of monitoring at the new sites are reported in the 2011 Progress Report. No concerns have arisen from any of the new monitoring locations.

## **Progress Report 2011**

The Progress Report submitted in 2011 provided an update on local air quality issues in Midlothian and focused on the latest monitoring results.

The monitoring data confirmed that air quality objectives for SO<sub>2</sub> had been met at both the Pathhead and Dalkeith automatic monitoring stations however, the measured SO<sub>2</sub> concentrations were higher at Pathhead suggesting that domestic solid fuel combustion is contributing to sulphur dioxide concentrations. The Report confirmed that measurements of sulphur dioxide would continue to input into the LAQM assessment although consideration would be given to ceasing monitoring of SO<sub>2</sub> as there is no risk of exceeding the air quality objectives for SO<sub>2</sub> in Midlothian.

Monitoring of nitrogen dioxide was carried out at several locations across Midlothian using diffusion tubes. The results indicated that concentrations measured adjacent to busy roads at all locations are within the annual mean air quality objective.

The Report confirmed that the measured PM<sub>10</sub> concentrations at Dalkeith and Pathhead complied with the annual mean and 24 hour mean air quality objectives.

The installation of a gas main to the village of Pathead was reported and based on the findings of the Further Assessment it was concluded that the gas mains is likely to make a significant improvement to air quality in Pathhead, provided a sufficient number of households connected to the new supply. To confirm trends monitoring would be continued throughout 2011.

Some minor changes were reported to industrial processes and plans for new development such as a proposed concrete batching plant at Newtongrange, re-opening of a rail link and a new town at Shawfair.

It was concluded that a Detailed Assessment was not required.

*Copies of the previous LAQM reports are available on request to Midlothian Council.*

## **2 New Monitoring Data**

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

Midlothian Council ceased monitoring levels of nitrogen dioxide, PM<sub>10</sub> and sulphur dioxide at the continuous monitoring station in Dalkeith centre at the end of June 2011 following consultation with the Scottish Environment Protection Agency and Scottish Government.

PM<sub>10</sub> and sulphur dioxide levels continue to be monitored at the continuous monitoring station in Pathhead. The Pathhead monitoring station is classified as a roadside location and is approximately 1 – 2m from the kerb of Main Street (A68). A Partisol gravimetric sampler was installed at the Pathhead monitoring station location in March 2009 and this was operated simultaneously with the existing TEOM analyser.

Following collection of a full year's data, the Partisol was decommissioned in February 2010. As measured PM<sub>10</sub> levels remained very close to the annual mean objective, the Partisol was re-commissioned again in August 2010 to continue to provide accurate data in relation to PM<sub>10</sub> levels in Pathhead.

The Council also measures nitrogen dioxide levels using passive diffusion tubes at several locations across Midlothian. These locations are in the towns of Dalkeith, Penicuik, Bonnyrigg and Loanhead and in the village of Pathhead. The location of the monitoring stations and diffusion tube measurements are shown in Figures 3(a) – 7.

The previous local air quality management reports showed that the air quality objectives for other specified pollutants are unlikely to be exceeded and, on this basis, no monitoring for other pollutants was considered necessary.

A summary of the Quality Assurance/Quality Control (QA/QC) procedures and the data management arrangements is provided in Appendix A.

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

Until June 2011 Midlothian Council operated two automatic monitoring stations. The automatic station in Dalkeith town centre was decommissioned at that time. The remaining station is located in the centre of Pathhead village. Further details of the monitoring stations are provided in Table 2.1. The locations of the Dalkeith monitoring station (decommissioned end June 2011) and the existing Pathhead monitoring stations are shown in Figure 3(a) and 4, respectively.

**Table 2.1 Details of Automatic Monitoring Sites**

| Site Name       | Site Type | OS Grid Ref          | Pollutants Monitored  | In AQMA? | Relevant Exposure ? | Distance to kerb of nearest road | Worst-case location? |
|-----------------|-----------|----------------------|---|----------|---------------------|----------------------------------|----------------------|
| Dalkeith Centre | Roadside  | X 333153<br>Y 667298 | NO <sub>2</sub><br>PM <sub>10</sub> (TEOM)<br>SO <sub>2</sub> (until June 2011)                         | N        | N (>10m)            | 3m                               | Y                    |
| Pathhead        | Roadside  | X 339585<br>Y 664203 | PM <sub>10</sub> (TEOM)<br>PM <sub>10</sub> (Grav.) -<br>re-commissioned<br>Aug 2010<br>SO <sub>2</sub> | Y *      | Y (4m)              | 1m                               | Y                    |

\* AQMA declared for PM<sub>10</sub>

The maintenance of the remaining monitoring station at Pathhead is carried out by Casella Monitor (which became Enviro Technology Services plc in April 2012). This involves two routine services per year and also provision for emergency callouts. Casella Monitor also has the data management contract and collects all the raw data from each of the monitoring stations. The data are checked to ensure that the data is being recorded correctly, the analysers are stable and there are no faults with the analysers. The data is then re-scaled by Casella Monitor using the results of calibration and span checks which are carried out by the analyser automatically or carried out manually by Midlothian Council every two weeks. The manual checks carried out by Midlothian Council include a span check in which a gas of known concentration is passed through the analysers and the measured concentrations and other operating parameters are recorded by the operator and sent to Casella Monitor. The raw and re-scaled data are sent by Casella Monitor to Midlothian Council at regular periods. The Partisol filter changes are carried out by Midlothian Council on a fortnightly basis and the analysis for weight gain is carried out by Environmental Scientifics Group.

Further work had also been carried out by AEA Technology with regards to the QA/QC procedures for the Dalkeith Monitoring Station (until decommissioned) and the Pathhead monitoring station to satisfy the requirements in LAQM.TG(09) (Ref. 1) and with a view to including the stations on the Air Quality in Scotland website ([www.scottishairquality.co.uk](http://www.scottishairquality.co.uk)). The work includes 6-monthly audits and servicing, and data ratification. Audits of the monitoring site consisted of a number of performance checks to identify any faults with the equipment. The calibration cylinder was also checked against another gas standard in order to confirm the gas concentration. Any identified faults were forwarded on to the service unit for repair. The final stage of the QA/QC process was to ratify the data. During ratification, all calibration, audit and service data are collated and the data is appropriately scaled. Any suspect data identified are deleted therefore ensuring that the data are of a high quality.

PM<sub>10</sub> is measured at the monitoring stations using Tapered Element Oscillating Microbalance (TEOM) units. The concentrations recorded during 2011 from these analysers were corrected using the Volatile Correction Model (VCM) by AEA Technology as part of the data management for the Air Quality in Scotland Website (Ref. 2). The model allows TEOM measurements to be corrected for the loss of volatile components that occur due to the high sampling temperatures employed by the TEOM instrument. The corrected measurements are considered to be equivalent to the gravimetric reference equivalent for PM<sub>10</sub> measurements. This method was also utilised by Casella Monitor under the data management contract. The VCM data provided by AEA Technology was utilised for this report. A summary of the ratified data produced by AEA for Pathhead and Dalkeith are given in Appendix C and D respectively.



### **2.1.2 Non-Automatic Monitoring**

Monitoring of nitrogen dioxide using passive diffusion tubes was undertaken at 14 separate locations in Midlothian until end January 2009, at which time the number of passive diffusion tubes increased to 20. The diffusion tube locations are shown in Figures 3 to 7. The diffusion tube locations are described in Table 2.2. As locations J2 and ED1 were not directly representative of relevant exposure locations, Midlothian Council committed to reviewing these monitoring locations by the end of 2008. It is confirmed that ED1 was moved in February 2009, as a result of the review, and measured concentrations reported for 2009 onwards are based on the updated location. On further assessment a better location could not be found for J2 and therefore this tube location was not altered.

**Table 2.2 Details of Nitrogen Dioxide Diffusion Tube Monitoring Locations**

| Site Name         | Location  | Site Type        | OS Grid Ref          | Pollutants Monitored | In AQMA ? | Relevant Exposure? | Distance to kerb of nearest road | Worst-case Location ? |
|-------------------|-----------|------------------|----------------------|----------------------|-----------|--------------------|----------------------------------|-----------------------|
| BR1               | Bonnyrigg | Roadside         | X 330890<br>Y 665222 | NO <sub>2</sub>      | N         | Y (0m)             | 2.5 m                            | Y                     |
| BR2               | Bonnyrigg | Roadside         | X 330973<br>Y 665213 | NO <sub>2</sub>      | N         | Y (0m)             | 2 m                              | Y                     |
| J1 (1, 2 and 3) * | Dalkeith  | Roadside         | X 333153<br>Y 667298 | NO <sub>2</sub>      | N         | N (>10m)           | 3 m                              | N/A                   |
| J2                | Dalkeith  | Roadside         | X 333180<br>Y 667283 | NO <sub>2</sub>      | N         | N (>10m)           | 0.5 m                            | N/A                   |
| E1 *              | Dalkeith  | Urban Background | X 333374<br>Y 667222 | NO <sub>2</sub>      | N         | Y (5m)             | N/A                              | N/A                   |
| BD1               | Dalkeith  | Roadside         | X 333049<br>Y 667177 | NO <sub>2</sub>      | N         | Y (1m)             | 1 m                              | Y                     |
| ED1               | Dalkeith  | Roadside         | X 333213<br>Y 667363 | NO <sub>2</sub>      | N         | Y (1m)             | 1 m                              | Y                     |
| ED2               | Dalkeith  | Roadside         | X 332995<br>Y 667118 | NO <sub>2</sub>      | N         | Y (0.5m)           | 2 m                              | Y                     |
| X1                | Dalkeith  | Roadside         | X 332963<br>Y 667389 | NO <sub>2</sub>      | N         | Y (1.5m)           | 1.5 m                            | Y                     |
| HD1               | Dalkeith  | Roadside         | X 333311<br>Y 667457 | NO <sub>2</sub>      | N         | Y (2m)             | 1.5 m                            | Y                     |
| ND1               | Dalkeith  | Roadside         | X 333409<br>Y 667057 | NO <sub>2</sub>      | N         | Y (2m)             | 1.5 m                            | Y                     |
| DL1               | Dalkeith  | Roadside         | X 333250<br>Y 667074 | NO <sub>2</sub>      | N         | Y (0m)             | 2 m                              | Y                     |
| LH1               | Loanhead  | Roadside         | X 328232<br>Y 665580 | NO <sub>2</sub>      | N         | Y (1.5m)           | 0.5 m                            | Y                     |
| SN1               | Loanhead  | Roadside         | X 327142<br>Y 666337 | NO <sub>2</sub>      | N         | Y (3m)             | 0 m                              | Y                     |
| SN2               | Loanhead  | Roadside         | X 327262<br>Y 666588 | NO <sub>2</sub>      | N         | Y (0m)             | 3.5 m                            | Y                     |
| P1 *              | Penicuik  | Urban Background | X 323146<br>Y 659818 | NO <sub>2</sub>      | N         | Y (0.5m)           | N/A                              | N/A                   |
| P2 *              | Penicuik  | Roadside         | X 323677<br>Y 661000 | NO <sub>2</sub>      | N         | Y (2m)             | 2.5 m                            | Y                     |
| P3                | Penicuik  | Roadside         | X 323551<br>Y 659725 | NO <sub>2</sub>      | N         | Y (0.5m)           | 1.5 m                            | Y                     |
| PD1               | Pathhead  | Roadside         | X 339601<br>Y 664172 | NO <sub>2</sub>      | Y         | Y (3.5m)           | 1.5 m                            | Y                     |
| PD2               | Pathhead  | Roadside         | X 339450<br>Y 664310 | NO <sub>2</sub>      | Y         | Y (3.5m)           | 2 m                              | Y                     |

\* tube results sent monthly to Netcen as part of the Nitrogen Dioxide Diffusion Tube Network reporting

\*\* J1 (2) and (3) were removed at end of June 2011.

The nitrogen dioxide diffusion tubes are placed at each location by Midlothian Council for a period of approximately one month, based on a pre-arranged timetable provided by Netcen. At the end of each monitoring period, the exposed tubes are replaced with new tubes and the exposed tubes are sent to the laboratory for analysis. The analysis is carried out by Edinburgh Scientific Services (ESS), part of the City of Edinburgh Council. ESS has confirmed that the procedures set out in the Harmonisation Practical Guidance are followed during the analysis. The laboratory is UKAS accredited for the analysis and also participates in the Workplace Analysis Scheme for Proficiency (WASP) scheme. ESS has reported that

the results from the WASP scheme confirm that the laboratory is performing satisfactorily and the bias has been close to zero for several years. The laboratory uses the 50% v/v triethanolamine (TEA) in acetone method where the adsorbent pads are dipped into this solution, dried and then inserted into the acrylic diffusion tubes. All exposure times and dates are recorded by Midlothian Council and sent to the laboratory with the exposed tubes. Midlothian Council also sends one unexposed tube with each batch to check that there has been no contamination during handling or analysis.

## 2.2 Comparison of Monitoring Results with Air Quality Objectives

This section sets out the results of all the monitoring carried out by Midlothian Council in 2011 and, where relevant, provides results from previous years to identify any trends.

### 2.2.1 Nitrogen Dioxide

The results of the nitrogen dioxide monitoring at the automatic station in Dalkeith (January to June only) and diffusion tube locations across Midlothian are presented below.

#### Automatic Monitoring Data

The results of the automatic monitoring are set out in Table 2.3a and Table 2.3b.

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

| Site ID         | Location | Within AQMA? | Data capture           | Annual mean concentration 2011 ( $\mu\text{g}/\text{m}^3$ ) |
|-----------------|----------|--------------|------------------------|---|
| Dalkeith Centre | Dalkeith | N            | 48.9% (6 month period) | 21.0  |

**Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-Hour Mean Objective**

| Site ID         | Location | Within AQMA? | Data capture          | Number of exceedences of hourly mean 2010 ( $200 \mu\text{g}/\text{m}^3$ ) |
|-----------------|----------|--------------|-----------------------|--|
| Dalkeith Centre | Dalkeith | N            | 48.9% (6month period) | 0  |

The annual mean concentrations and hourly exceedences recorded by the continuous monitoring station from 2004 – 2011 are shown in Table 2.3c.

**Table 2.3c Results of Automatic Monitoring for Nitrogen Dioxide at Dalkeith Centre 2004 – 2011**

| Parameter   | Unit                     | Value |      |      |      |      |      |      |       |
|---|--------------------------|-------|------|------|------|------|------|------|-------|
|   |                          | 2004  | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011* |
| Annual Mean   | $\mu\text{g}/\text{m}^3$ | 24    | 26   | 26   | 26   | 28   | 21   | 25   | 21    |
| Number of exceedences of hourly mean ( $200 \mu\text{g}/\text{m}^3$ ) | Days                     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0     |

\*Results for first 6 months of year only

The results presented in Table 2.3c indicate that, at the monitoring station, the annual mean concentrations of nitrogen dioxide show an increasing trend since 2004 and a sharp decrease in 2009. This increase from 2004 – 2008 is consistent with the trend recorded at the Edinburgh St Leonards monitoring station (the closest station with available data) over the same period. The drop in 2009 is attributed to the opening of the Dalkeith Bypass. An increase in the annual mean level is noted in 2010. A sharp decrease is noted again in the first 6 months data recorded for 2011, although this figure will have been affected by road works on the High Street in Dalkeith during this period and associated traffic diversions, diverting traffic away from the High Street onto adjacent routes eg B6373.

Following the opening of the Dalkeith Bypass there was a noted improvement in nitrogen dioxide levels and, following consultation with and agreement from the Scottish Environment Protection Agency and Scottish Government, automatic monitoring for nitrogen dioxide at this location ceased at the end of June 2011. Nitrogen dioxide levels in Dalkeith will continue to be monitored in subsequent years using the diffusion tube method and reported in terms of the LAQM process.

### Diffusion Tube Monitoring Data

The diffusion tube method is open to a degree of uncertainty in the method and, as such, the results of the survey should be treated with some caution and used as indicators of nitrogen dioxide levels only. Bias correction methods have been developed to reduce the error in the results of the diffusion tube survey. The most robust of these methods is co-location of diffusion tubes with a continuous monitor to calculate the tube bias. For this purpose, Midlothian Council co-located triplicate diffusion tubes at the Dalkeith Centre continuous monitoring station in 2005 although these were removed at the end of June 2011. The results of the co-location study for the 6 monthly period cannot be used to calculate the bias adjustment as a minimum of 10 months data is required.

The national bias adjustment factor reported in the Spreadsheet of Bias Adjustment Factors (version 07/12) produced by Defra and the Devolved Administrations (Ref. 3) for this laboratory and analysis method is 0.84. This is based on 8 co-location studies; West Lothian, Marylebone Road, Stirling and five Edinburgh Studies.

The bias adjustment factor was applied to the diffusion tube results situated at roadside locations only, as the co-location study is based on roadside measurements. Diffusion tubes located at urban background locations were not adjusted.

**Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes**

| Site ID | Location  | Within AQMA? | Data Capture | Annual mean concentration 2011 ( $\mu\text{g}/\text{m}^3$ ) Adjusted for bias * |
|---------|-----------|--------------|--------------|---|
| J2      | Dalkeith  | N            | 100%         | 33.0  |
| E1      | Dalkeith  | N            | 100%         | 14.9  |
| BD1     | Dalkeith  | N            | 100%         | 39.0  |
| ED1     | Dalkeith  | N            | 100%         | 37.9  |
| ED2     | Dalkeith  | N            | 100%         | 27.2  |
| X1      | Dalkeith  | N            | 91.7%        | 21.9  |
| HD1     | Dalkeith  | N            | 83.3%        | 19.6  |
| ND1     | Dalkeith  | N            | 83.3%        | 35.2  |
| DL1     | Dalkeith  | N            | 83.3%        | 34.9  |
| P1      | Penicuik  | N            | 100%         | 7.1   |
| P2      | Penicuik  | N            | 91.7%        | 25.1  |
| P3      | Penicuik  | N            | 100%         | 15.2  |
| PD1     | Pathhead  | Y            | 100%         | 20.1  |
| PD2     | Pathhead  | Y            | 91.7%        | 22.6  |
| BR1     | Bonnyrigg | N            | 100%         | 23.3  |
| BR2     | Bonnyrigg | N            | 100%         | 22.8  |
| LH1     | Loanhead  | N            | 100%         | 23.0  |
| SN1     | Loanhead  | N            | 83.3%        | 26.4  |
| SN2     | Loanhead  | N            | 100%         | 26.2  |

\* Bias adjustment factor of 0.84 applied to Roadside measurements (see Table 2.2)

The results set out in Table 2.4a indicate that the measured concentrations of nitrogen dioxide are within the annual mean air quality objective.

The measured nitrogen dioxide concentrations reported in the 2009 Update and Screening Assessment were above the annual mean air quality objective of  $40\mu\text{g}/\text{m}^3$  at three diffusion tube locations (ND1, J2 and ED1). All these tube locations are located adjacent to the A68 in Dalkeith and measured increasing concentrations of nitrogen dioxide since 2005 (see Table 2.4b). The Dalkeith Bypass opened in September 2008 resulting in reduced numbers of vehicles travelling through Dalkeith town centre. Consequently, measured concentrations of nitrogen dioxide within Dalkeith town centre have significantly decreased as a result.

Details on the trends and impact of the Dalkeith Bypass are set out in Table 2.4b. Measurements of nitrogen dioxide will continue, as normal, to evaluate the effects of the Dalkeith Bypass and the wider trends in nitrogen dioxide concentrations.

**Table 2.4b Results of Nitrogen Dioxide Diffusion Tubes 2005 – 2011**

| Site ID | Location  | Annual mean concentration<br>(µg/m³)    |      |      |      |       |      |      |
|---------|-----------|---|------|------|------|-------|------|------|
|         |           | Roadside measurements adjusted for bias |      |      |      |       |      |      |
|         |           | 2005                                    | 2006 | 2007 | 2008 | 2009  | 2010 |      |
| J2      | Dalkeith  | 34.3                                    | 38.6 | 43.4 | 43.6 | 33.5  | 26.4 | 33.0 |
| E1      | Dalkeith  | 11.5                                    | 12.3 | 14.4 | 14.0 | 13.3  | 15.2 | 14.9 |
| BD1     | Dalkeith  | 30.3                                    | 41.0 | 40.8 | 37.6 | 33.9  | 34.0 | 39.0 |
| ED1     | Dalkeith  | 35.8                                    | 40.4 | 43.0 | 40.8 | 37.1* | 35.2 | 37.9 |
| ED2     | Dalkeith  | 27.5                                    | 27.9 | 29.8 | 28.5 | 27.8  | 24.2 | 27.2 |
| X1      | Dalkeith  | 25.1                                    | 30.5 | 29.7 | 28.0 | 23.8  | 18.5 | 21.9 |
| HD1     | Dalkeith  | 16.4                                    | 17.9 | 19.8 | 18.2 | 18.1  | 15.4 | 19.6 |
| ND1     | Dalkeith  | 39.6                                    | 48.8 | 52.5 | 48.3 | 31.0  | 26.6 | 35.2 |
| DL1     | Dalkeith  | N/A                                     | N/A  | N/A  | N/A  | 35.7  | 27.1 | 34.9 |
| P1      | Penicuik  | 7.1                                     | 5.8  | 7.4  | 6.1  | 6.7   | 8.5  | 7.1  |
| P2      | Penicuik  | 22.6                                    | 28.6 | 27.0 | 23.8 | 25.5  | 22.3 | 25.1 |
| P3      | Penicuik  | 15.5                                    | 16.2 | 17.1 | 14.8 | 14.7  | 13.6 | 15.2 |
| PD1     | Pathhead  | 17.1                                    | 16.1 | 19.4 | 19.7 | 19.8  | 18.5 | 20.1 |
| PD2     | Pathhead  | 14.5                                    | 17.9 | 19.3 | 17.1 | 20.1  | 17.5 | 22.6 |
| BR1     | Bonnyrigg | N/A                                     | N/A  | N/A  | N/A  | 25.7  | 22.7 | 23.3 |
| BR2     | Bonnyrigg | N/A                                     | N/A  | N/A  | N/A  | 23.5  | 20.5 | 22.8 |
| LH1     | Loanhead  | N/A                                     | N/A  | N/A  | N/A  | 25.2  | 23.9 | 23.0 |
| SN1     | Loanhead  | N/A                                     | N/A  | N/A  | N/A  | 27.6  | 22.7 | 26.4 |
| SN2     | Loanhead  | N/A                                     | N/A  | N/A  | N/A  | 28.2  | 26.6 | 26.2 |

Sites marked N/A were new from February 2009

\* diffusion tube location moved during 2009 (see Figure 3)

The results presented in Table 2.4b are presented graphically in Figure 8 to illustrate any trends. The results indicate that concentrations of nitrogen dioxide measured across Midlothian were either relatively constant or slightly increasing up to 2007 with a decrease in 2008 at most diffusion tube locations. The table also indicates that there was a further decrease in concentrations in 2009 at diffusion tube locations in Dalkeith, due to the opening of the Dalkeith Bypass, with a small reduction in 2010. A slight increase in some locations is noted in 2011. These sites are thought to have been adversely affected by traffic diversions during the refurbishment of Dalkeith High Street.

## 2.2.2 PM<sub>10</sub>

PM<sub>10</sub> levels were monitored at Pathhead throughout 2011 and were monitored at Dalkeith until end June 2011 using TEOM analysers. In March 2009, monitoring of PM<sub>10</sub> levels at Pathhead commenced using a Partisol gravimetric sampler. This allowed a more accurate determination of the PM<sub>10</sub> concentration for comparison to the air quality objectives which are based on a gravimetric technique. It also allowed additional analysis of the collected particulate material to provide information for source apportionment. The Partisol measurement results and additional analysis of the PM<sub>10</sub> fraction was reported in detail in the 2010 Further Assessment. The use of the Partisol was discontinued after one full year of monitoring. Monitoring using the Partisol in Pathhead resumed in August 2010 as the monitoring VCM corrected results using the TEOM were borderline with regard to the air quality objective and it was agreed with Scottish Government that continued monitoring using the Partisol would be useful. The results for the 2011 monitoring period are reported in the 2012 Update and Screening Assessment Report (Table 2.5c).

The results of the automatic monitoring using the TEOM analysers are set out in Table 2.5a and Table 2.5b. The TEOM measurements were corrected by AEA Technology using the VCM correction method as discussed in Section 2.1.1.

**Table 2.5a Results of PM<sub>10</sub> Automatic Monitoring: Comparison with Annual Mean Objective**

| Site ID         | Location | Within AQMA? | Data Capture for full calendar year 2011 | Annual mean concentrations (µg/m <sup>3</sup> ) |      |      |      |      |
|-----------------|----------|--------------|--|---|------|------|------|------|
|                 |          |              |  | 2007  | 2008 | 2009 | 2010 | 2011 |
| Dalkeith Centre | Dalkeith | N            | 43.9%                                    | 16.1  | 15.0 | 14.4 | 16.0 | 18.0 |
| Pathhead        | Pathhead | Y            | 84.9%                                    | 19.9  | 19.6 | 17.2 | 18.0 | 17.0 |

**Table 2.5b Results of PM<sub>10</sub> Automatic Monitoring: Comparison with 24-hour Mean Objective**

| Site ID         | Location | Within AQMA? | Data Capture for full calendar year 2011 | Number of Exceedences of daily mean objective (50 µg/m <sup>3</sup> ) |      |      |      |      |
|-----------------|----------|--------------|--|---|------|------|------|------|
|                 |          |              |  | 2007  | 2008 | 2009 | 2010 | 2011 |
| Dalkeith Centre | Dalkeith | N            | 43.9%                                    | 2   | 0    | 1    | 0    | 1    |
| Pathhead        | Pathhead | Y            | 85.9%                                    | 3   | 2    | 2    | 3    | 0    |

The results indicate that the measured concentrations of PM<sub>10</sub> at Dalkeith and Pathhead do not exceed the annual mean and 24-hour mean air quality objective for 2011.

It is considered that the PM<sub>10</sub> levels in Dalkeith were adversely affected by the extensive works to relay the footpaths and roadway in the immediate vicinity of the air quality station. Stone cutting of the replacement paving slabs resulted in dust complaints being made to Midlothian Council.

**Table 2.5c Results of PM<sub>10</sub> Monitoring using the Partisol, 2009 to 2011: Comparison with Annual Mean Objective**

| Site ID  | Location | Within AQMA? | Data Capture for full calendar year 2011 | Annual mean concentrations (µg/m <sup>3</sup> ) |         |      |
|----------|----------|--------------|--|---|---------|------|
|          |          |              |  | 2009*   | 2010 ** | 2011 |
| Pathhead | Pathhead | Y            | 90.4%                                    | 17.0  | N/A     | 14.4 |

\* Monitoring period 5 March 2009 to 4 March 2010

\*\*Monitoring ceased following 12 month period of monitoring and recommenced in August 2010

The 2010 Further Assessment estimated that within the AQMA at Pathhead the contribution of domestic solid fuel burning to the annual mean PM<sub>10</sub> concentrations is approximately 3 – 4 µg/m<sup>3</sup>.

A gas mains supply has been provided to the village of Pathhead. A reduction in PM<sub>10</sub> level has been noted. It is expected that PM<sub>10</sub> levels will reduce further as more households switch from domestic solid fuel to gas and the installation works are complete. If further periods of monitoring confirm a sustained reduction in PM<sub>10</sub> then it may be possible to revoke the AQMA.

### 2.2.3 Sulphur Dioxide

The results of the automatic monitoring are set out in Table 2.6.

**Table 2.6 Results of SO<sub>2</sub> Automatic Monitoring: Comparison with Objectives**

| Site ID         | Location | Within AQMA? | Data capture | Number of exceedences of                     |   |  |
|-----------------|----------|--------------|--------------|--|---|--|
|                 |          |              |              | 15-minute Objective (266 µg/m <sup>3</sup> ) | 1-hour Objective (350 µg/m <sup>3</sup> ) | 24-hour Objective (125 µg/m <sup>3</sup> ) |
| Dalkeith Centre | Dalkeith | N            | 49.9%        | 0  | 0   | 0  |
| Pathhead        | Pathhead | N            | 93.7%        | 0  | 0   | 0  |

The results indicate that the air quality objectives for sulphur dioxide are complied with at both monitoring stations.

Following submission of Midlothian Council's 2010 Progress Report, the Scottish Environment Protection Agency commented that as the measured levels of SO<sub>2</sub> were low and exceedance of the air quality objective was unlikely, continued monitoring of this pollutant was no longer necessary. It was reported that consideration would therefore be given to ceasing monitoring of SO<sub>2</sub> at the end of the 2011 monitoring period. It is proposed to cease monitoring of SO<sub>2</sub> at the end of 2012.



#### **2.2.4 Summary of Compliance with Air Quality Objectives**

##### **Summary**

The continuous monitoring indicates that the concentrations of nitrogen dioxide, PM<sub>10</sub> and sulphur dioxide are below the relevant air quality objectives and therefore there is no need to proceed to a Detailed Assessment.

##### **Proposed Further Monitoring**

Midlothian Council will continue to monitor nitrogen dioxide and PM<sub>10</sub> as described above. This information will be fed into Midlothian Council's 2013 Progress Report. Monitoring of SO<sub>2</sub> will cease at the end of the 2012.

Midlothian Council will continue gravimetric PM<sub>10</sub> monitoring in Pathhead throughout 2012 and in collaboration with SEPA and Scottish Government a decision will be made at end of 2012 as to whether this should continue.

### **3 Road Traffic Sources**

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

Midlothian 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**

Midlothian 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.**

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

#### **3.4 Junctions**

The junctions in Bonnyrigg (junction of A6094 and B704) and Loanhead (junction of A768 and B702) were previously assessed using the DMRB and results reported in the 2009 Update and Screening Assessment. The predicted results were below the annual mean concentration of NO<sub>2</sub>. NO<sub>2</sub> continues to be measured at both junctions using the diffusion tube method, with no issues identified.

Midlothian Council confirms that there are no new/newly identified busy junctions/busy roads.

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

Planning permission has been granted for a 'relief' road between Edgefield Road in Loanhead and Straiton roundabout, near Straiton Retail Park. The purpose of the road is to divert traffic from Edgefield Industrial Estate towards the city Bypass thereby avoiding the need to pass through a residential area, The impact of the proposed new road will be reported in future LAQM reports.

Midlothian Council has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment at this stage.

### **3.6 Roads with Significantly Changed Traffic Flows**

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

### **3.7 Bus and Coach Stations**

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

## **4 Other Transport Sources**

### **4.1 Airports**

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

### **4.2 Railways (Diesel and Steam Trains)**

#### **4.2.1 Stationary Trains**

Midlothian 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**

Midlothian 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)**

Midlothian 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**

Information on installations regulated under the Pollution Prevention and Control (Scotland) Regulations 2000 as either Part A or Part B processes was obtained from SEPA. The list of authorised processes is set out in Appendix B.

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

Planning permission has been granted for a new concrete batching plant at land adjacent to Lady Victoria Business Park, Newtongrange, although this use has yet to be taken up.

The application for 'planning permission in principal' submitted for a Zero Waste facility at Millerhill Marshalling Yards, described in Progress Report 2011 has been granted. The site is likely to contain an anaerobic digestion facility for food waste, an MBT facility and energy from waste facility.

Consideration of the potential impacts will be incorporated into future LAQM assessments, if the operator demonstrates to SEPA that appropriate control techniques will be utilised through application of Best Available Techniques (BAT) and the appropriate respective permit applications are successful

Midlothian Council confirms that there are no new or proposed industrial installations for which planning and permitting 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**

Information on any installations where emissions have increased substantially was obtained from SEPA.

Midlothian 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**

Information on any new installation or installations which have changed significantly was obtained from SEPA.

Midlothian 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**

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

## **5.3 Petrol Stations**

A new petrol station opened at Asda, Loanhead in 2011 with a throughput of greater than 2000 m<sup>3</sup> petrol per annum. The procedure in Section C.3 of Box 5.5 of LAQM TG(09) was followed in determining whether the emission of benzene from the petrol station was likely to put the 2010 objective at risk of being exceeded. As there is no relevant exposure within 10 meters of the petrol station there is no need to proceed to a detailed assessment.

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

## **5.4 Poultry Farms**

Information on any poultry farms which meets the criteria specified in Section C4 of LAQM TG(09) was obtained from SEPA.

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

## **6 Commercial and Domestic Sources**

### **6.1 Biomass Combustion – Individual Installations**

Emissions from the biomass boiler at Pentland Plants, near Loanhead were previously assessed in terms of the biomass plant screening tool available at [www.airquality.co.uk](http://www.airquality.co.uk). The results were reported in the 2009 Update and Screening Assessment Report and indicated that no further assessment was required.

Midlothian Council has assessed the biomass combustion plant and concluded that it will not be necessary to proceed to a Detailed Assessment.

### **6.2 Biomass Combustion – Combined Impacts**

Midlothian Council confirms that there are no new combined biomass combustion impacts in the Local Authority area.

### **6.3 Domestic Solid-Fuel Burning**

No issues with regard to sulphur dioxide emissions have been identified. Monitoring at the Pathhead automatic monitoring station (and Dalkeith station until end June 2011) has confirmed that there is no risk of exceeding the sulphur dioxide air quality objectives in Midlothian.

A gas mains has been installed in Pathhead and it is expected that SO<sub>2</sub> levels will reduce as more households connect to the gas supply with a resultant decrease in coal burning.

Midlothian Council confirms that there are no areas of significant domestic fuel use in the Local Authority area (except Pathhead).

## 7.0 Fugitive or Uncontrolled Sources

Auchencorth Moss open cast mine was granted a permit. This site borders the boundary between Scottish Borders Council and Midlothian. This facility is not operating, as yet, as it is scheduled to take over, in part, from the Shewington open cast coal mine, which is in Midlothian but still operational at present.

Using the background maps of air quality produced by Defra and the Devolved Administrations, the background PM<sub>10</sub> concentration in 2011 at the location of the site is estimated to be 9.9 µg / m<sup>3</sup>.

Other potential sources of fugitive emissions of PM<sub>10</sub> are landfills. Whilst there are no new landfills in Midlothian, the formerly used site at Drummond Moor re-opened following closure of Oatslie Landfill Site. There have been no complaints relating to dust emissions.

Scottish Coal are due to submit a scoping report in respect of proposal for a new surface mine at Cauldhall Moor, south of the existing open cast site as Shewington. Any full application in respect of this site will include an air quality assessment.

Some clearance / demolition works have taken place in relation to the Waverley Railway Line, which was described in the 2008 Progress Report, as has some work to strengthen bridges along the route of the railway. This will be a rolling project with an estimated completion date of end of 2014. Any detrimental impacts at receptor locations during construction works will be considered in future LAQM reports.

Midlothian Council confirms that there are no potentially significant sources of fugitive particulate matter emissions in the Local Authority area.



## 8 Conclusions and Proposed Actions

The conclusions and proposed actions from this Update and Screening Assessment report are set out below.

### 8.1 Conclusions from New Monitoring Data

#### Monitoring inside the Pathhead AQMA

Monitoring of PM<sub>10</sub> was carried out in 2011 by the Pathhead automatic monitoring station using a TEOM and a Partisol gravimetric sampler. The results of 17 µg/m<sup>3</sup> and 14.4 µg/m<sup>3</sup> respectively comply with the 2010 annual mean objective value.

It is proposed to retain the AQMA and continue to monitor trends throughout 2012. It is anticipated that the new gas mains at Pathhead will continue to make a significant improvement to PM<sub>10</sub> levels as more households connect to the new supply. PM<sub>10</sub> results will continue to be monitored throughout 2012 and will be discussed in more detail in the 2013 Progress Report. If, as anticipated, levels remains below the objective value in 2012 it is proposed that the AQMA will be revoked.

Monitoring of sulphur dioxide was also carried out by the Pathhead automatic monitoring station. The results are well below the air quality objective values and a significant reduction in SO<sub>2</sub> levels was noted in 2011 (average daily mean of 6µg/m<sup>3</sup>; figure for 2010 is 9 µg/m<sup>3</sup>). Measurements of sulphur dioxide will continue to input into the LAQM assessment during 2012 although it is proposed to cease monitoring of sulphur dioxide at the end of the 2012 LAQM period.

#### Monitoring outside the Pathhead AQMA

Monitoring of nitrogen dioxide, PM<sub>10</sub> and sulphur dioxide was carried out at the Dalkeith automatic monitoring station for the first 6 month period of 2011. The results were within the relevant air quality objectives.

Monitoring of nitrogen dioxide was carried out at several locations across Midlothian using diffusion tubes. The results indicated that concentrations measured adjacent to busy roads at all locations are within the annual mean air quality objective.

The opening of the Dalkeith Bypass at the end of 2008 resulted in a significant decrease in nitrogen dioxide concentrations at locations within Dalkeith adjacent to the A68.

A slight increase in NO<sub>2</sub> levels has been noted at some diffusion tube locations in the centre of Dalkeith during the 2011 monitoring period. This is considered to be as a result of traffic diversions which were in place during the refurbishment of Dalkeith High Street to divert traffic away from the High Street to alternative routes.

A Detailed Assessment was undertaken in 2009 in relation to nitrogen dioxide levels at Bonnyrigg town centre. The results were within the air quality objective by some margin. The additional NO<sub>2</sub> tubes installed at this location continue to show levels well below the air quality objective.

No other issues have been identified which would warrant a Detailed Assessment at this time.

## **8.2 Conclusions from Assessment of Sources**

### **Road Traffic Sources**

Considerations of road traffic sources indicates that a Detailed Assessment is not required.

### **Other Transport Sources**

No issues were identified in relation to other transport sources.

### **Industrial Sources**

No issues were identified in relation to industrial sources. Consideration of the potential impacts of the proposed Zero Waste Facility at Millerhill Marshalling Yards and any impact on the proposed new town of Shawfair will be incorporated into future LAQM assessments.

### **Commercial and Domestic Sources**

Measured PM<sub>10</sub> levels for 2011 are below the annual air quality objective (Teom value 17 µg/m<sup>3</sup> and Partisol 14.4 µg/m<sup>3</sup>). Monitoring of PM<sub>10</sub> levels in Pathhead using the Partisol and automatic monitoring station will continue throughout 2012 to assess improvements in air quality as a result of an increasing numbers of households connecting to the new gas supply and an associated reduction in the number of households burning coal.

A reduction in SO<sub>2</sub> levels in Pathhead was noted in 2011 when compared to data from the 2010 monitoring period. It is considered that this reduction in SO<sub>2</sub> is due to less burning of coal. It is anticipated that a further reduction in SO<sub>2</sub> may be observed in 2012 as more households switch from coal to gas.

The biomass plant at Pentland Plants has previously been assessed and it was concluded that emissions from the plant were not significant. No other issues have been identified in relation to commercial and domestic sources.

### **Fugitive and Uncontrolled Sources**

No issues were identified in relation to fugitive and uncontrolled sources.

## **8.3 Proposed Actions**

The next course of action for Midlothian Council in the Review and Assessment process is summarised as:

- Submit Progress Report by the end of April 2013.

## 9 References

1. Defra and the Devolved Administrations, Local Air Quality Management, Technical Guidance LAQM.TG(09), February 2009.
2. Defra and the Devolved Administrations, Volatile Correction Model, July 2008, correction on 2011 data carried out by AEA Technology under data management contract to the Scottish Government.
3. Defra and the Devolved Administrations, Spreadsheet of Bias Adjustment Factors, version 07/12, accessed at [www.uwe.ac.uk/aqm](http://www.uwe.ac.uk/aqm), September 2012.

## **Appendices**

Appendix A QA/QC Data

Appendix B Industrial Processes in Midlothian

Appendix C Ratified Data for Pathhead

Appendix D Ratified Data for Dalkeith

## **Appendix A: QA:QC Data**

### **Diffusion Tube Bias Adjustment Factors**

The diffusion tubes are analysed by Edinburgh Scientific Services using the 50% triethanolamine (TEA) in acetone method. The bias adjustment factor for this laboratory and method for the year 2011 listed in the Spreadsheet of Bias Adjustment Factors v.07/11 (Ref. 3) is 0.84. This is based on a co-location study at a roadside site carried out by West Lothian Council, a kerbside co-location study at Marylebone Road, a roadside site at Stirling and five studies carried out at Edinburgh (4 roadside and 1 kerbside)

### **Discussion of Choice of Factor to Use**

The results of the diffusion tube measurements were adjusted using the National bias adjustment factor based on 8 separate studies. This was chosen as insufficient data was captured by the Dalkeith Monitoring Station before the station was decommissioned.

### **TEOM Data Correction Using the Volatile Correction Model - 2011**

The TEOM PM<sub>10</sub> measurements for the Dalkeith Centre and Pathhead automatic monitoring stations were adjusted using the Volatile Correction Method (VCM) as recommended in LAQM.TG(09). These adjustments were carried out by AEA Technology.

A description of the data correction method used by AEA Technology for the 2011 data period was provided by AEA Technology and is set out below:-

AEA has been funded by The Scottish Government to provide Volatile Correction Model (VCM) corrected TEOM (Tapered Element Oscillating Microbalance) data to Local Authorities under the Scottish Air Quality Database and Website (SAQD) project.

The VCM uses reference (volatile) particulate matter measurements provided by FDMS (Filter Dynamics Measurement System) instruments located within 130 km of the TEOM in question to assess the loss of particulate matter (PM<sub>10</sub>) from the TEOM. The TEOM measurements, without the applied USEPA correction factors of  $1.03 \times 10^3$  (where x is the raw TEOM measurement), are then corrected to ambient pressure and temperature using meteorological data from met monitoring sites within 260 km of the TEOM. The volatile fraction is then added back onto the TEOM measurements to give Gravimetric Equivalent mass concentrations.

This is a short summary outlining the method used by AEA for correcting the 2011 Scottish TEOM data in the Scottish database.

### **Method**

The following data have been used as inputs to the VCM:

- Hourly average temperatures (°C)
- Hourly average pressures (mbar)
- Hourly average TEOM concentrations (g m<sup>-3</sup>)
- Hourly average FDMS purge concentrations (g m<sup>-3</sup>)

For the 2011 corrections, temperature and pressure data from both Aberdeen Dyce Airport and Edinburgh Gogarbank meteorological monitoring stations were utilised. These two sites

were selected as a good representation weather conditions in Aberdeen and the central belt of Scotland, respectively.

Hourly average purge measurements from all Scottish FDMS monitoring sites within the Scottish Government-run network (SAQD) and the UK national network (AURN) were used for the correction. Table 1 lists the sites used for correcting hourly TEOM data from Central Scotland and Aberdeen. A total of 3 FDMS sites were used for correcting Aberdeen TEOM data and 27 FDMS sites used for correcting data from TEOM sites located in the central belt of Scotland.

Any outliers in the FDMS purge measurements were identified using Grubbs' Test<sup>1</sup> on daily average data. All hourly data within a day identified as an outlier were then removed from the data set and the average of each hourly purge measurement from the FDMS sites was calculated and used in the VCM calculations.

---

Grubbs' Test is a statistical method for identifying outliers within a dataset. For more information visit the Engineering Statistics Handbook at:

<http://www.itl.nist.gov/div898/handbook/eda/section3/eda35h.htm>

**Table 1** FDMS Monitoring Sites used in VCM Correcting TEOM Data from Aberdeen and Central Scotland Monitoring Sites

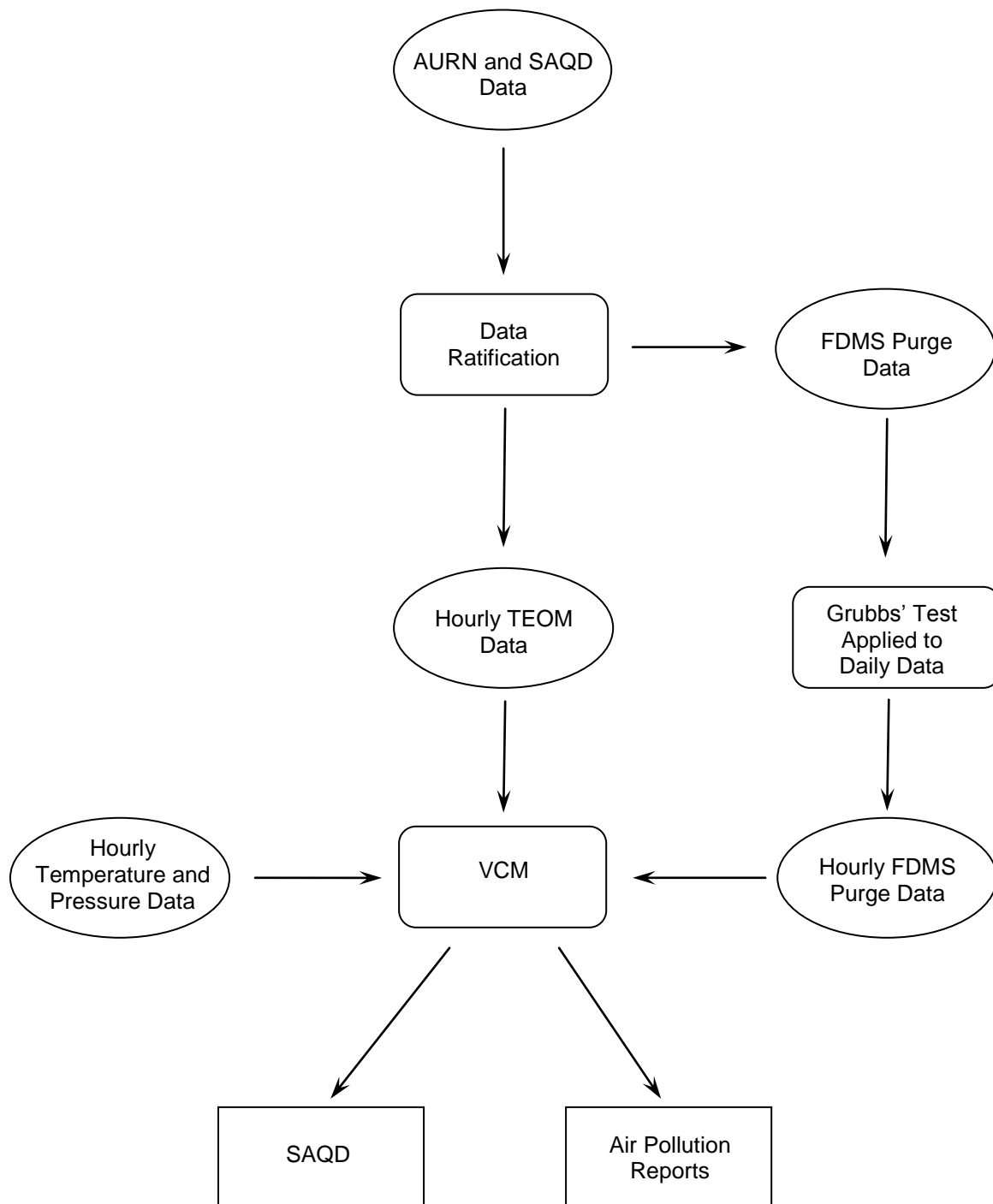
| TEOM Locations   | FDMS Sites used in VCM              | Monitoring Network |
|------------------|-------------------------------------|--------------------|
| Aberdeen         | Aberdeen                            | AURN               |
|                  | Angus Forfar                        | SAQD               |
|                  | Fife Cupar                          | SAQD               |
| Central Scotland | Angus Forfar                        | SAQD               |
|                  | Auchencorth Moss                    | AURN               |
|                  | East Dunbartonshire Kirkintilloch   | SAQD               |
|                  | East Dunbartonshire Milngavie       | SAQD               |
|                  | East Renfrewshire Sheddens          | SAQD               |
|                  | Edinburgh St Leonards               | AURN               |
|                  | Fife Cupar                          | SAQD               |
|                  | Fife Dunfermline                    | SAQD               |
|                  | Fife Kirkcaldy                      | SAQD               |
|                  | Glasgow Anderson                    | SAQD               |
|                  | Glasgow Broomhill                   | SAQD               |
|                  | Glasgow Burgher Street              | AURN               |
|                  | Glasgow Byres Road                  | AURN               |
|                  | Glasgow Centre                      | AURN               |
|                  | Glasgow Kerbside                    | AURN               |
|                  | Glasgow Nithsdale Road              | SAQD               |
|                  | Grangemouth                         | AURN               |
|                  | Paisley Gordon Street               | SAQD               |
|                  | Paisley St James St                 | SAQD               |
|                  | South Lanarkshire East Kilbride     | SAQD               |
|                  | South Lanarkshire Raith Interchange | SAQD               |
|                  | West Dunbartonshire Clydebank       | SAQD               |
|                  | West Lothian Broxburn               | SAQD               |
|                  | West Lothian Linlithgow High Street | SAQD               |
|                  | West Lothian Whitburn               | SAQD               |

### VCM and the SAQD

All 2011 VCM corrected data will be made available on the SAQD website via an additional selection option in the data download pages in March 2012.

A flow chart showing the overall process employed for VCM correcting 2011 SAQD TEOM data is shown below

**Process used for VCM Correcting SAQD TEOM Data**



**QA/QC of automatic monitoring**

Details of the QA/QC of automatic monitoring are provided in Chapter 2.

**QA/QC of diffusion tube monitoring**

Details of the QA/QC of diffusion tube monitoring are provided in Chapter 2.



### **QA/QC of diffusion tube monitoring**

Details of the QA/QC of diffusion tube monitoring are provided in Chapter 2.

## Appendix B: List of Industrial Processes

| License Number | Operator                       | Site  | Regulation Category | Schedule 1 Activity           | Section                   |
|----------------|--------------------------------|---|---------------------|-------------------------------|---------------------------|
| PPC/E/0020007  | Waste Recycling Group Ltd      | Drummond Moor (No2) Landfill Site, Penicuik   | Part A              | Chapter 5: Waste Management   | 5.2.a                     |
| PPC/E/0020034  | Interflex Ltd                  | Peggy's Mill, Edinburgh                       | Part A              | Chapter 6: Other Activities   | 6.4.b                     |
| PPC/E/0020082  | Deans Foods                    | Loanhead Processing Plant                     | Part A              | Chapter 6: Other Activities   | 6.8.d.(i)                 |
| PPC/B/1003133  | N.C.R.C Heggie (Edinburgh) Ltd | Unit C, Pentland Industrial Estate            | Part B              | Chapter 6: Other Activities   | 6.4.b                     |
| PPC/B/1003236  | Brand and Rae Ltd              | Bonnyrigg Ready Mix Concrete Plant, Bonnyrigg | Part B              | Chapter 3: Mineral Industries | 3.1.a.(ii)                |
| PPC/B/1004347  | Scottish Coal                  | Millerhill Disposal Point, Edinburgh          | Part B              | Chapter 3: Mineral Industries | 3.5.b.(i)                 |
| PPC/B/1004359  | Hanson Premix                  | Nivensknowe Rd, Loanhead                      | Part B              | Chapter 3: Mineral Industries | 3.1.a.(ii)                |
| PPC/B/1009121  | Tarmac Northern                | Old Pentland, Midlothian                      | Part B              | Chapter 3: Mineral Industries | 3.5.e                     |
| PPC/B/1010425  | W & J Short                    | Dalkeith                                      | Part B              | Chapter 1: Energy Industries  | 1.2.c.(ii)                |
| PPC/B/1010428  | Sainsbury's                    | Petrol filling station                        | Part B              | Chapter 1: Energy Industries  | 1.2.c.(ii)                |
| PPC/B/1010582  | Esso                           | Fordel Service Station, Lauder Road, Dalkeith | Part B              | Chapter 1: Energy Industries  | 1.2.c.(ii)                |
| PPC/B/1010585  | Hay's of Penicuik              | Penicuik                                      | Part B              | Chapter 1: Energy Industries  | 1.2.c.(ii)                |
| PPC/B/1012932  | Johnsons                       | Sainsburys Loanhead                           | Part B              | Chapter 7: SED Activities     | Chapter 7: SED Activities |
| PPC/B/1013309  | Shell                          | Newtonloan                                    | Part B              | Chapter 1: Energy Industries  | 1.2.c.(ii)                |
| PPC/B/1014758  | Crawford Drycleaning Services  | Bonnyrigg                                     | Part B              | Chapter 7: SED Activities     | Chapter 7: SED Activities |
| PPC/B/1014928  | Drycleaning & Laundry Services | Dalkeith                                      | Part B              | Chapter 7: SED Activities     | Chapter 7: SED Activities |
| PPC/B/1015551  | RFA-em Co. Ltd                 | Bilston Glen, Loanhead                        | Part B              | Chapter 7: SED Activities     | Chapter 7: SED Activities |
| PPC/B/1016238  | Leiths (Scotland) Ltd          |   | Part B              | Chapter 3: Mineral Industries | 3.5.e                     |
| PPC/B/1016238  | Leiths (Scotland) Ltd          |   | Part B              | Chapter 3: Mineral Industries | 3.1.a.(ii)                |
| PPC/B/1018366  | Q4 Drycleaning                 | Penicuik                                      | Part B              | Chapter 7: SED Activities     | Chapter 7: SED Activities |

**Table of industrial processes (continued)**

| <b>License Number</b> | <b>Operator</b>            | <b>Site</b>                                | <b>Regulation Category</b> | <b>Activity</b>               | <b>Section</b> |
|-----------------------|----------------------------|--|----------------------------|-------------------------------|----------------|
| PPC/E/0030016         | Esso                       | Lothianburn Service Station                | Part B                     | Chapter 1: Energy Industries  | 1.2.c.(ii)     |
| PPC/E/0030019         | Shell                      | Easthouses                                 | Part B                     | Chapter 1: Energy Industries  | 1.2.c.(ii)     |
| PPC/E/0030068         | Tarmac Northern Ltd        | Catewell Quarry - Dalkeith                 | Part B                     | Chapter 3: Mineral Industries | 3.1.a.(ii)     |
| PPC/E/0030073         | Howie Minerals Ltd         | Middleton Limeworks                        | Part B                     | Chapter 3: Mineral Industries | 3.5.a          |
| PPC/E/0030122         | Scottish Coal Company Ltd  | Newbigging OCCS - Rosewell                 | Part B                     | Chapter 3: Mineral Industries | 3.5.b.(ii)     |
| PPC/E/0030122         | Scottish Coal Company Ltd  | Newbigging OCCS - Rosewell                 | Part B                     | Chapter 3: Mineral Industries | 3.5.b.(i)      |
| PPC/E/0030122         | Scottish Coal Company Ltd  | Newbigging OCCS - Rosewell                 | Part B                     | Chapter 3: Mineral Industries | 3.5.b.(iii)    |
| PPC/E/0030147         | Tesco                      | Tesco Filling Station                      | Part B                     | Chapter 1: Energy Industries  | 1.2.c.(ii)     |
| PPC/E/0030154         | The Moredun Foundation     | Pentlands Science Park, Penicuik           | Part B                     | Chapter 5: Waste Management   | 5.1.a          |
| <i>PPC/B/1033591</i>  | Scottish Coal Company Ltd. | Auchencorth OCCS - Harlawmuir, NR Penicuik | <i>Part B</i>              | Chapter 3: Mineral Industries | 3.5.b.(ii)     |
| PPC/B/1096128         | Asda                       | Loanhead                                   | Part B                     | Chapter 1: Energy Industries  | 1.2.c.(ii)     |

## APPENDIX C Ratified Data for Pathhead

Produced by AEA on behalf of the Scottish Government

### MIDLOTHIAN PATHHEAD 1<sup>st</sup> January to 31<sup>st</sup> December 2011

These data have been fully ratified by AEA

| POLLUTANT                         | PM <sub>10</sub> +     | SO <sub>2</sub>        |
|-----------------------------------|------------------------|------------------------|
| Maximum 15-minute mean            | 527 µg m <sup>-3</sup> | 128 µg m <sup>-3</sup> |
| Maximum hourly mean               | 258 µg m <sup>-3</sup> | 90 µg m <sup>-3</sup>  |
| Maximum running 24-hour mean      | 65 µg m <sup>-3</sup>  | 24 µg m <sup>-3</sup>  |
| Maximum daily mean                | 61 µg m <sup>-3</sup>  | 24 µg m <sup>-3</sup>  |
| 98.08th percentile of daily means | 43 µg m <sup>-3</sup>  | -                      |
| Average                           | 17 µg m <sup>-3</sup>  | 6 µg m <sup>-3</sup>   |
| Data capture                      | 84.9 %                 | 93.7 %                 |

+ PM<sub>10</sub> as measured by a TEOM using the VCM for Gravimetric Equivalent

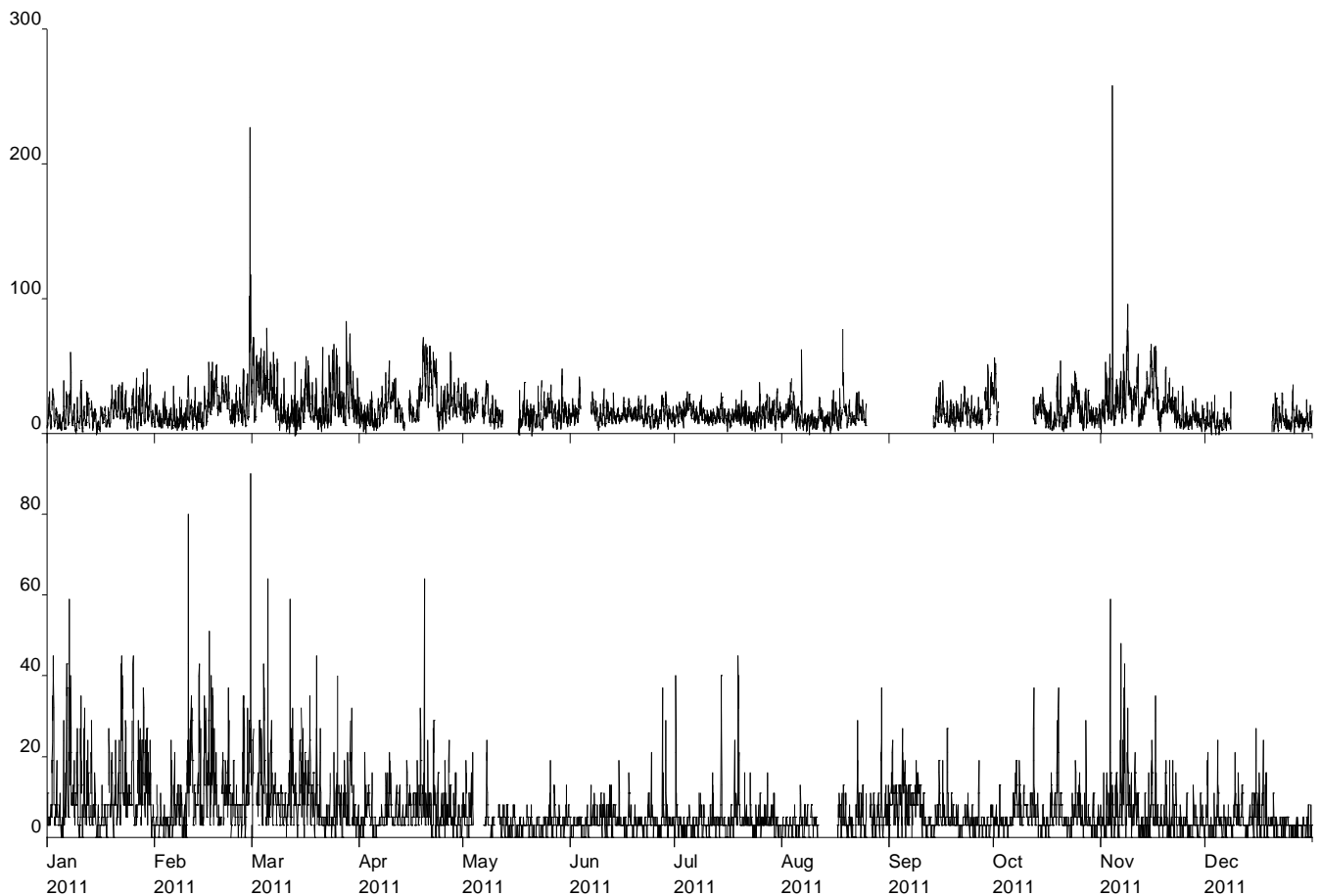
All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.

| Pollutant   | Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002 | Exceedences | Days |
|---|--|-------------|------|
| PM <sub>10</sub> Particulate Matter (Gravimetric) | Daily mean > 50 µg m <sup>-3</sup>   | 1           | 1    |
| PM <sub>10</sub> Particulate Matter (Gravimetric) | Annual mean > 18 µg m <sup>-3</sup>  | -           | -    |
| Sulphur Dioxide                                   | 15-minute mean > 266 µg m <sup>-3</sup>  | 0           | 0    |
| Sulphur Dioxide                                   | Hourly mean > 350 µg m <sup>-3</sup>   | 0           | 0    |
| Sulphur Dioxide                                   | Daily mean > 125 µg m <sup>-3</sup>  | 0           | 0    |

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by AEA on behalf of the Scottish Government

**Midlothian Pathhead  
Hourly Mean Data for 1<sup>st</sup> January to 31<sup>st</sup> December 2011**



Date Created: 27/03/2012

Stephen Stratton  
Ambient Air Quality Monitoring  
AEA Group PLC  
Glengarnock Technology Centre  
Caledonian Road  
Lochshore Business Park  
Glengarnock  
Ayrshire  
KA14 3DD

Email: [Stephen.Stratton@aeat.co.uk](mailto:Stephen.Stratton@aeat.co.uk)  
Tel: 0870 190 5203  
Mob: 07968 707 276  
Fax: 0870 190 5151

## APPENDIX D      Ratified Data for Dalkeith

Produced by AEA on behalf of the Scottish Government

### MIDLOTHIAN DALKEITH 1<sup>st</sup> January to 31<sup>st</sup> December 2011

These data have been fully ratified by AEA

| POLLUTANT                            | NO <sub>2</sub>        | NO <sub>x</sub>        | PM <sub>10</sub> +     | SO <sub>2</sub>       |
|--------------------------------------|------------------------|------------------------|------------------------|-----------------------|
| Maximum 15-minute mean               | 128 µg m <sup>-3</sup> | 726 µg m <sup>-3</sup> | 352 µg m <sup>-3</sup> | 51 µg m <sup>-3</sup> |
| Maximum hourly mean                  | 99 µg m <sup>-3</sup>  | 367 µg m <sup>-3</sup> | 190 µg m <sup>-3</sup> | 43 µg m <sup>-3</sup> |
| Maximum running 24-hour mean         | 60 µg m <sup>-3</sup>  | 136 µg m <sup>-3</sup> | 54 µg m <sup>-3</sup>  | 27 µg m <sup>-3</sup> |
| Maximum daily mean                   | 57 µg m <sup>-3</sup>  | 133 µg m <sup>-3</sup> | 45 µg m <sup>-3</sup>  | 27 µg m <sup>-3</sup> |
| 99.9th percentile of 15-minute means | -                      | -                      | -                      | 40 µg m <sup>-3</sup> |
| 99.7th percentile of hourly means    | -                      | -                      | -                      | 29 µg m <sup>-3</sup> |
| 99.8th percentile of hourly means    | 90 µg m <sup>-3</sup>  | -                      | -                      | -                     |
| 98.08th percentile of daily means    | -                      | -                      | 42 µg m <sup>-3</sup>  | -                     |
| 99.2nd percentile of daily means     | -                      | -                      | -                      | 13 µg m <sup>-3</sup> |
| Average                              | 21 µg m <sup>-3</sup>  | 36 µg m <sup>-3</sup>  | 18 µg m <sup>-3</sup>  | 2 µg m <sup>-3</sup>  |
| Data capture                         | 48.9 %                 | 48.9 %                 | 43.9 %                 | 49.9 %                |

+ PM<sub>10</sub> as measured by a TEOM using the VCM for Gravimetric Equivalent

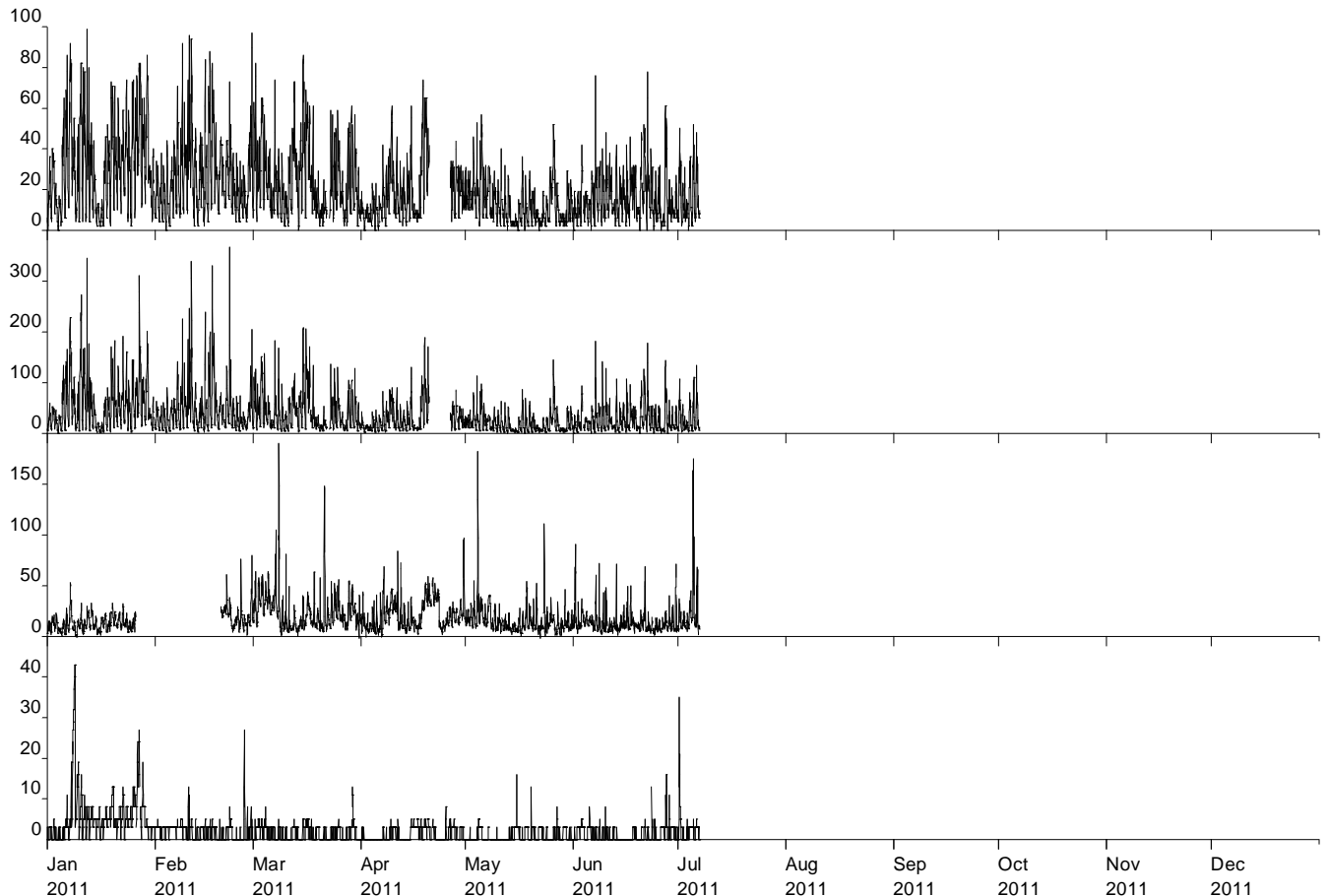
All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.

NO<sub>x</sub> mass units are NO<sub>x</sub> as NO<sub>2</sub> µg m<sup>-3</sup>

| Pollutant   | Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002 | Exceedences | Days |
|---|--|-------------|------|
| Nitrogen Dioxide                                  | Annual mean > 40 µg m <sup>-3</sup>  | -           | -    |
| Nitrogen Dioxide                                  | Hourly mean > 200 µg m <sup>-3</sup>   | 0           | 0    |
| PM <sub>10</sub> Particulate Matter (Gravimetric) | Daily mean > 50 µg m <sup>-3</sup>   | 0           | 0    |
| PM <sub>10</sub> Particulate Matter (Gravimetric) | Annual mean > 18 µg m <sup>-3</sup>  | -           | -    |
| Sulphur Dioxide                                   | 15-minute mean > 266 µg m <sup>-3</sup>  | 0           | 0    |
| Sulphur Dioxide                                   | Hourly mean > 350 µg m <sup>-3</sup>   | 0           | 0    |
| Sulphur Dioxide                                   | Daily mean > 125 µg m <sup>-3</sup>  | 0           | 0    |

Produced by AEA on behalf of the Scottish Government

**Midlothian Dalkeith  
Hourly Mean Data for 1<sup>st</sup> January to 31<sup>st</sup> December 2011**



Date Created: 27/03/2012

Stephen Stratton  
Ambient Air Quality Monitoring  
AEA Group PLC  
Glengarnock Technology Centre  
Caledonian Road  
Lochshore Business Park  
Glengarnock  
Ayrshire  
KA14 3DD

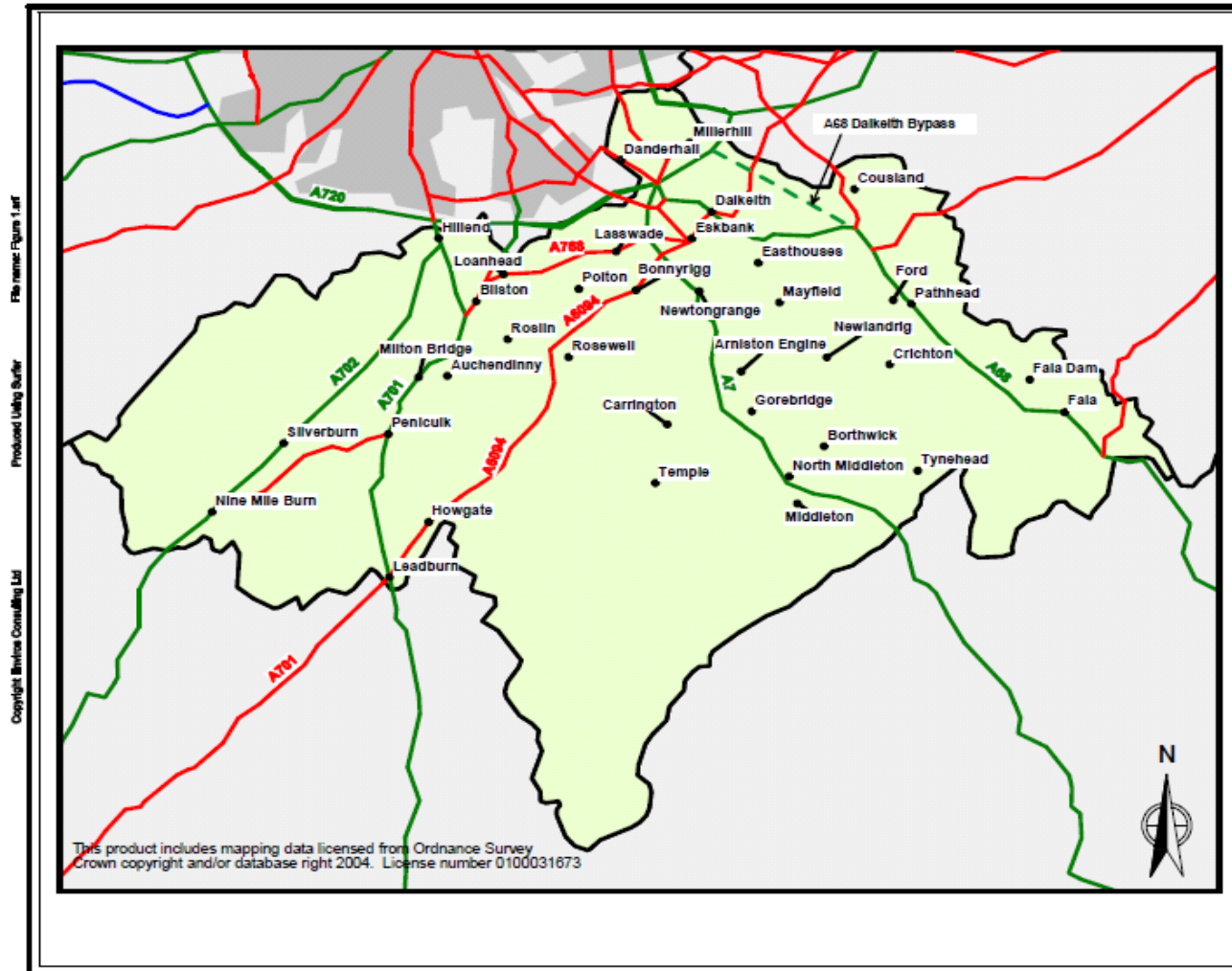
Email: [Stephen.Stratton@aeat.co.uk](mailto:Stephen.Stratton@aeat.co.uk)  
Tel: 0870 190 5203  
Mob: 07968 707 276  
Fax: 0870 190 5151

## Figures

- Figure 1 Schematic showing boundary of Midlothian, including towns, villages and significant roads
- Figure 2 Air Quality Management Area, Pathhead
- Figure 3(a) Location of automatic monitoring station and passive diffusion tubes in Dalkeith(January to end June 1011).
- Figure 3(b) Location of passive diffusion tubes in Dalkeith (July to December 2011).
- Figure 4 Location of automatic monitoring station and passive diffusion tubes in Pathhead
- Figure 5 Location of passive diffusion tubes in Penicuik
- Figure 6 Location of passive diffusion tubes in Bonnyrigg
- Figure 7 Location of passive diffusion tubes in Loanhead
- Figure 8 Annual mean nitrogen dioxide diffusion tube concentrations in Midlothian 2003 – 2011



Figure 1 - Schematic showing boundary of Midlothian, including towns, villages and significant roads



**Figure 2 Air Quality Management Area, Pathhead**

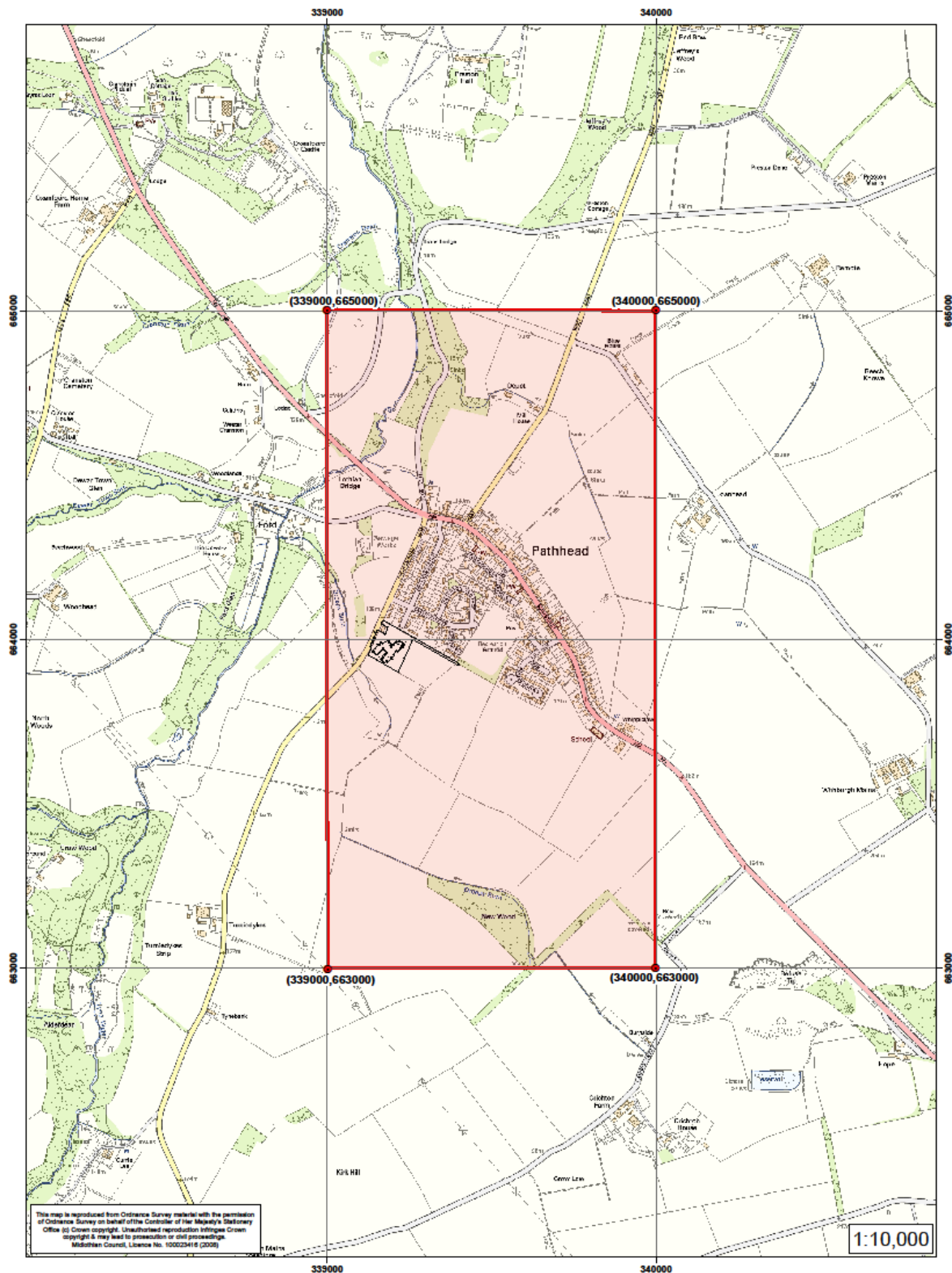




Figure 3a Location of automatic monitoring station and passive diffusion tubes in Dalkeith

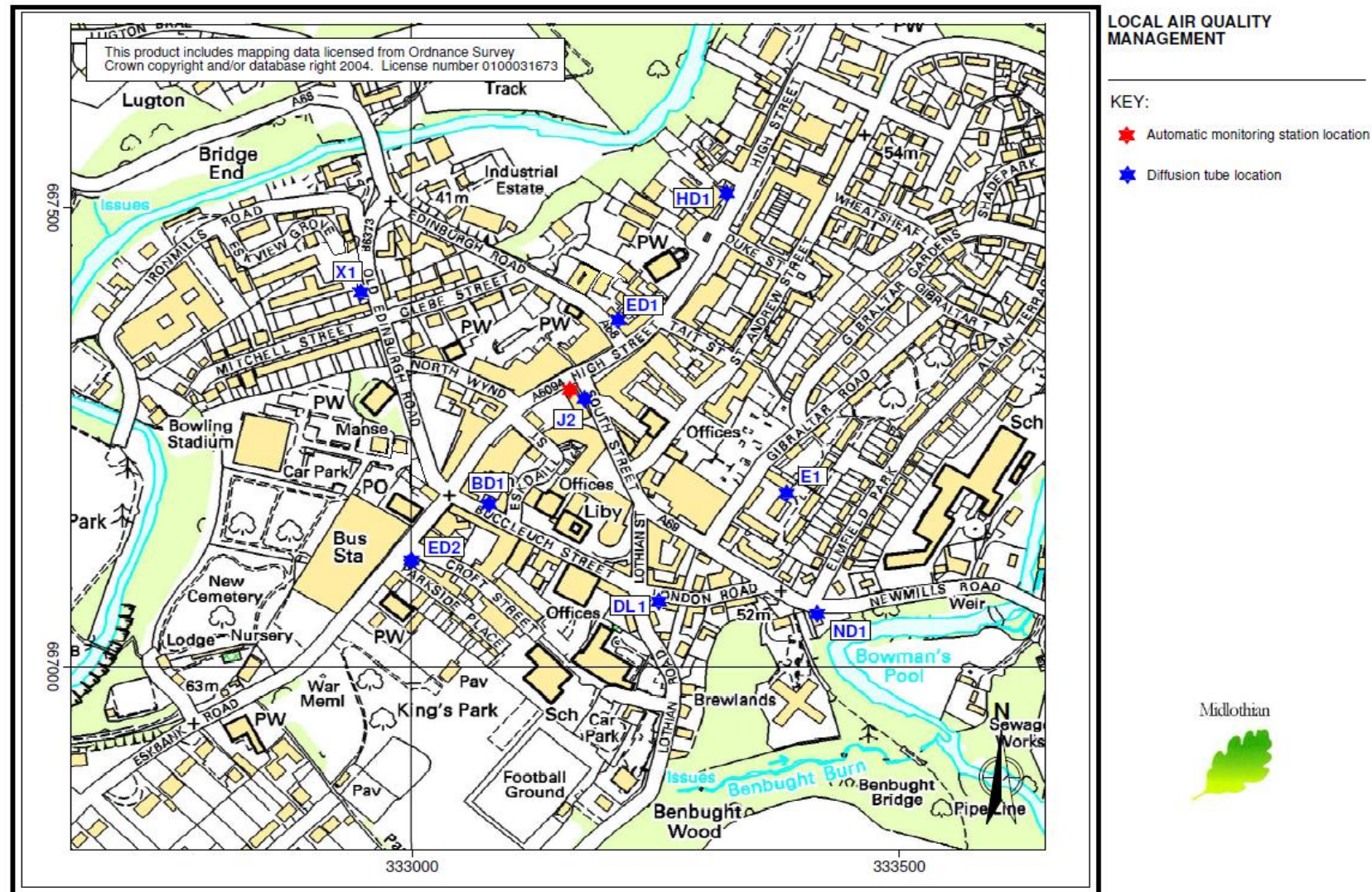




Figure 3b Location of passive diffusion tubes in Dalkeith

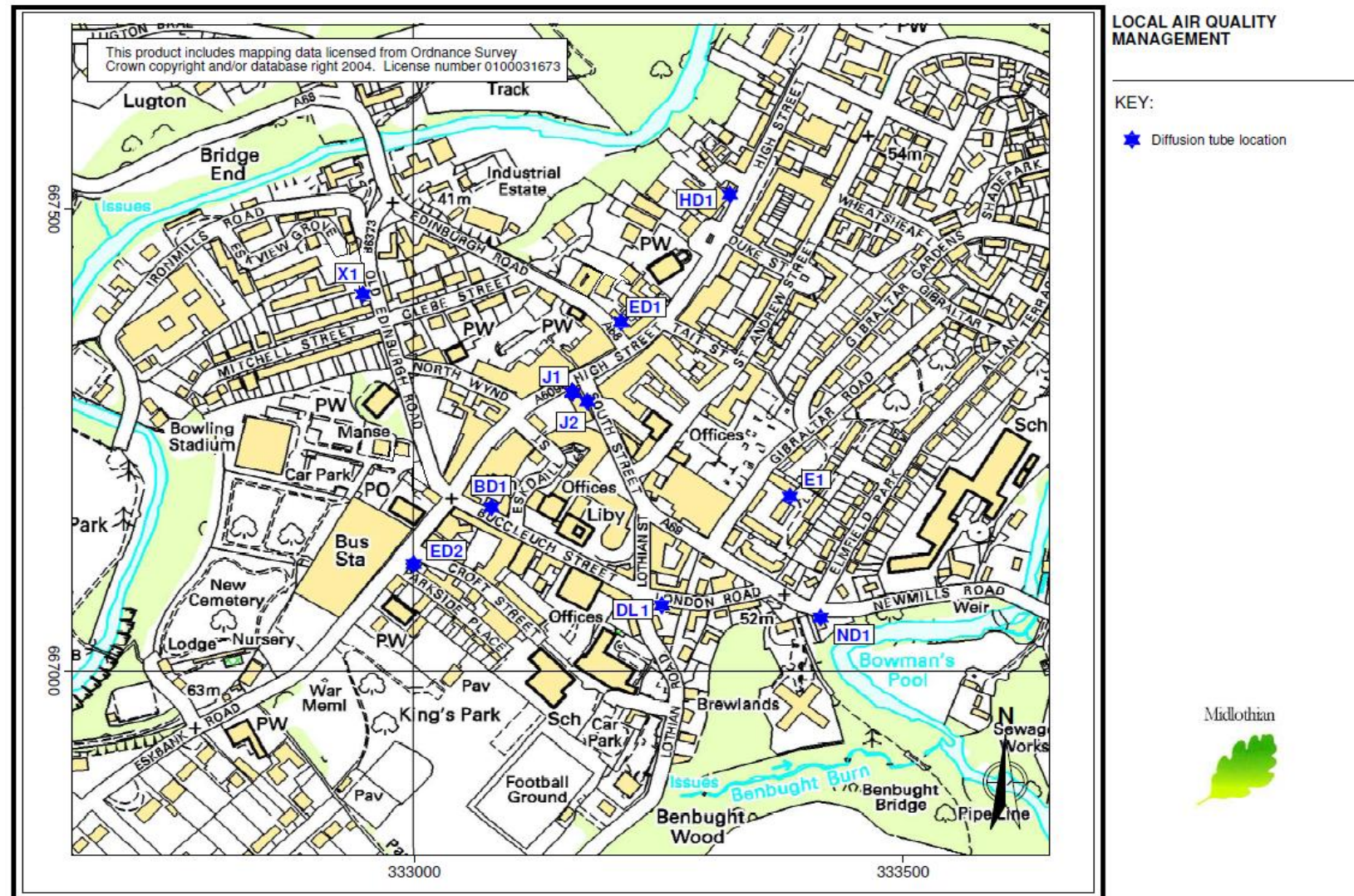
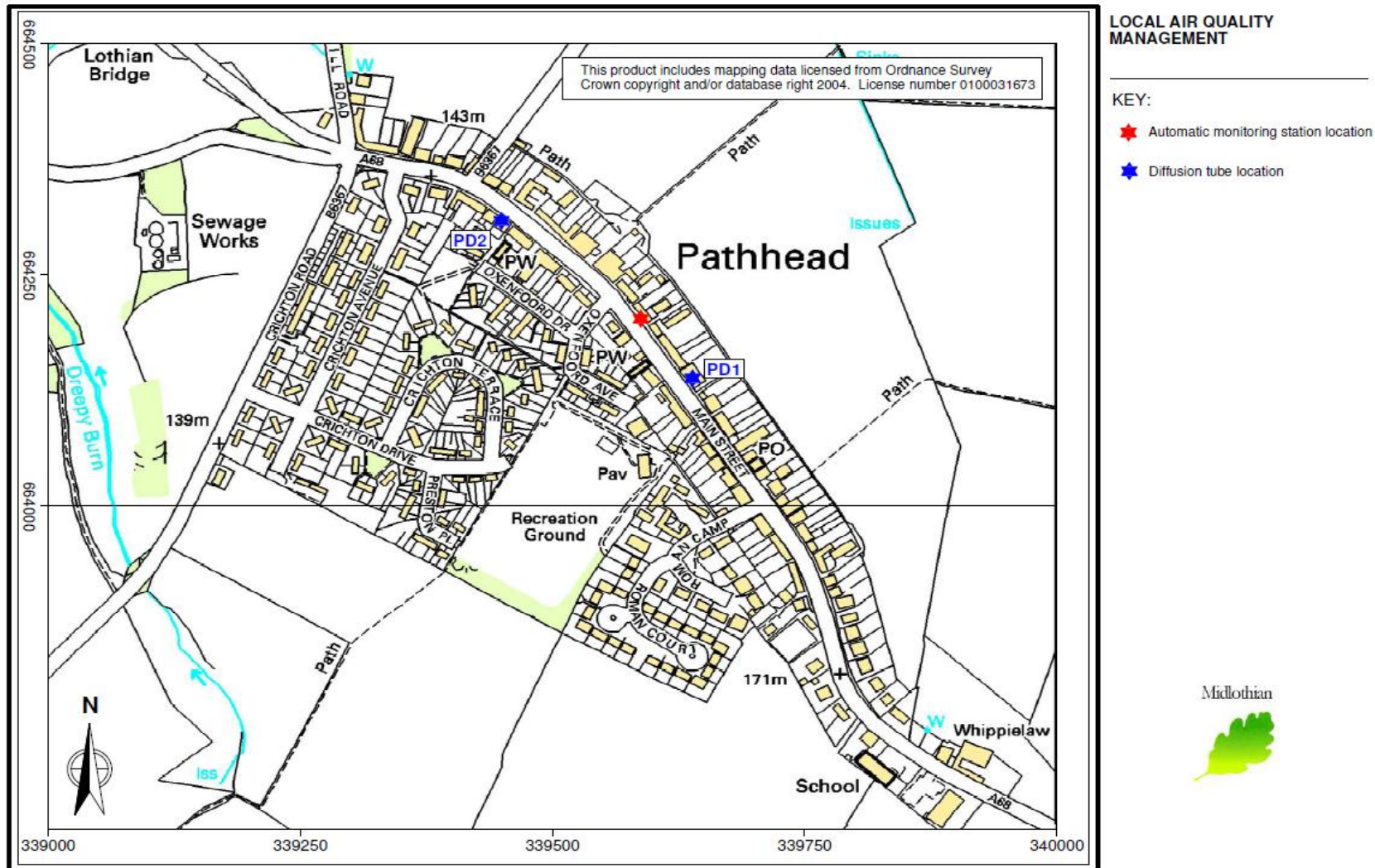
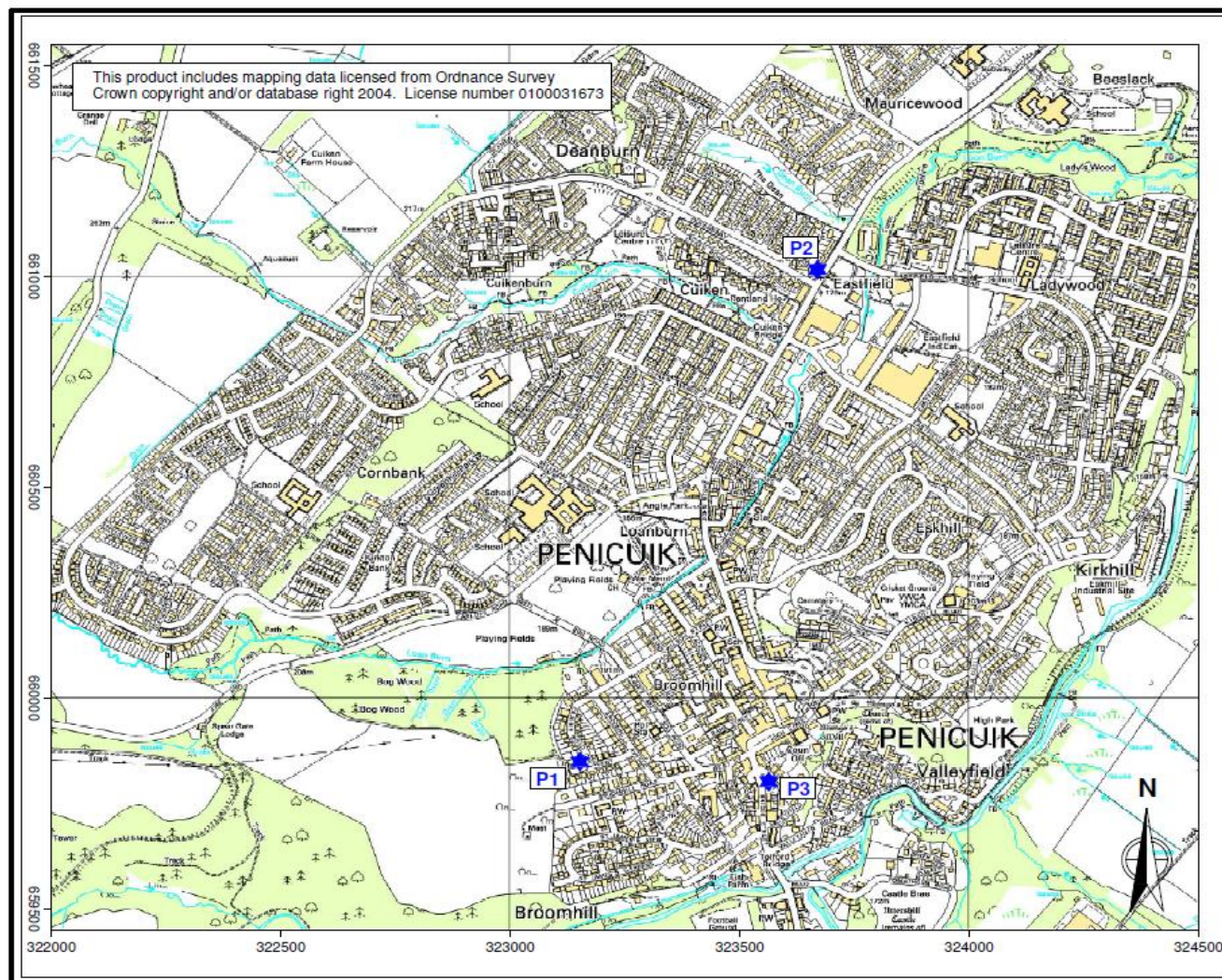


Figure 4 Location of automatic monitoring station and passive diffusion tubes in Pathhead





**Figure 5**      **Location of passive diffusion tubes in Penicuik**



**LOCAL AIR QUALITY  
MANAGEMENT**

KEY:

★ Diffusion tube location





**Figure 6** Location of passive diffusion tubes in Bonnyrigg

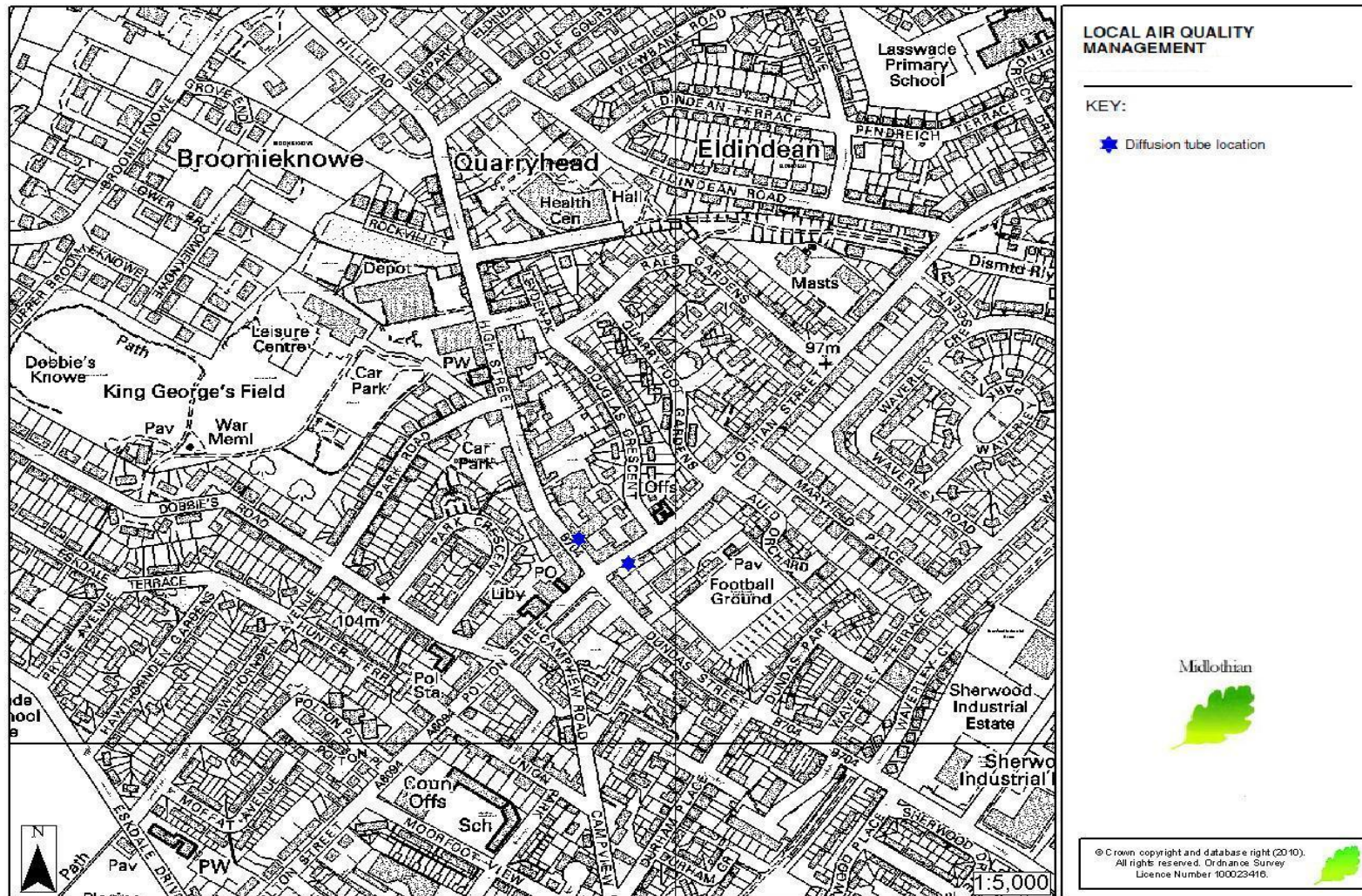




Figure 7 Location of passive diffusion tubes in Loanhead

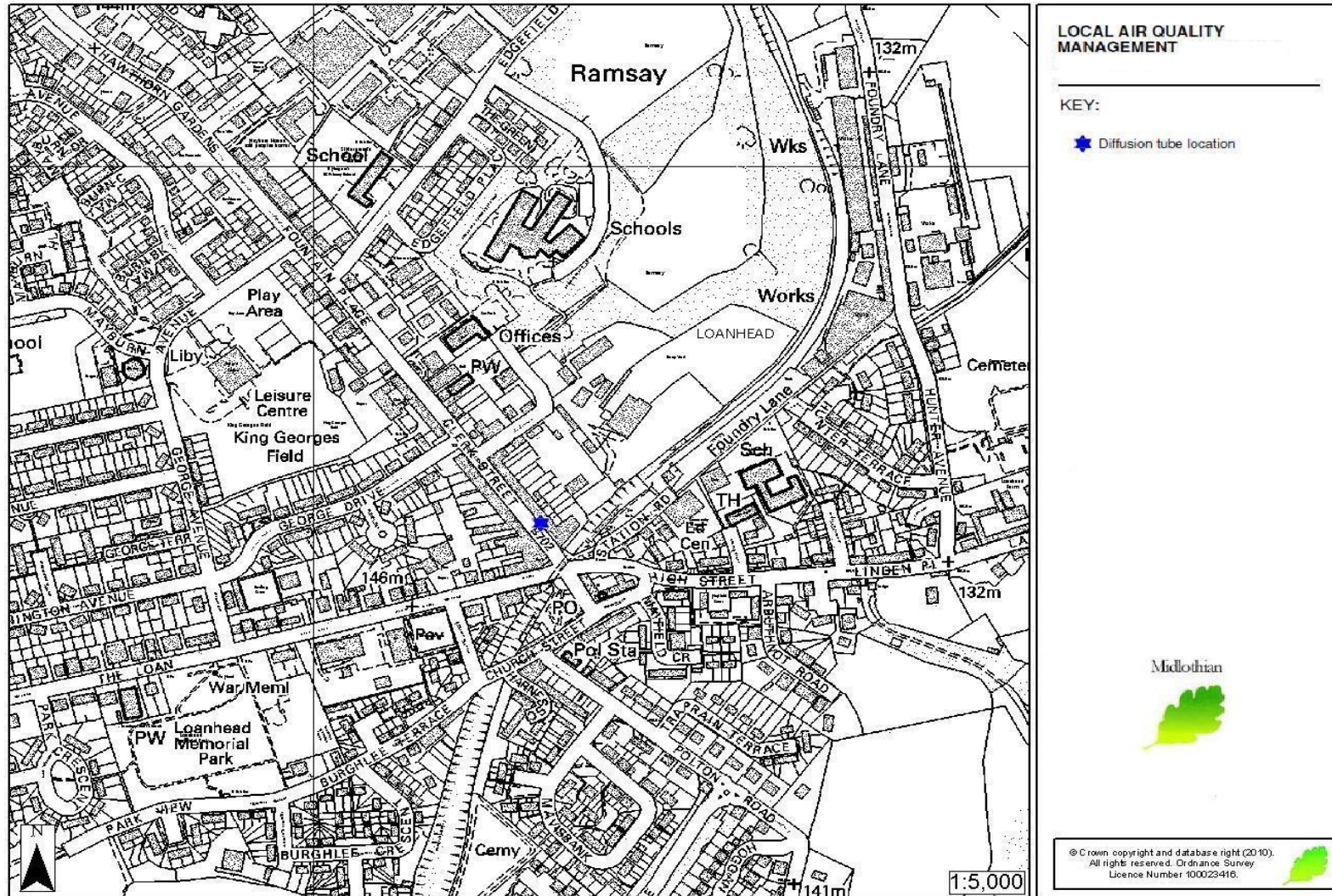




Figure 8 Annual mean nitrogen dioxide diffusion tube concentrations in Midlothian 2003 – 2011

