# 2010 Air Quality Progress Report for *Perth & Kinross Council*

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

Date : 04/2010

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| **Local Authority Officer** | Tom Brydone |

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| **Department** | The Environment Service |
| **Address** | Pullar House<br>35 Kinnoull Street<br>Perth<br>PH1 5GD |
| **Telephone** | 01738 476457 |
| **e-mail** | tjbrydone@pkc.gov.uk |

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| **Report Reference number** | |
| **Date** | |

# Executive Summary

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 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

Perth & Kinross Council declared the whole of Perth an AQMA in May 2006 after the Detailed Assessment in 2004 found that there would be areas of exceedences for $NO_2$ and $PM_{10}$ where relevant exposure occurred. The 2007 Further Assessment confirmed the conclusions of the Detailed Assessment and recommended that Perth & Kinross Council retain their city wide Air Quality Management Area for $NO_2$ and $PM_{10}$ and exceedences of these pollutants are due mainly to queuing and congested traffic specifically HDV traffic. The 2007 and 2008 Progress Reports showed that all sites in Perth which are above or close to the objectives lie within the city centre or close to it on the main through routes and are within the existing AQMA, showing that there is a trend of a slight increase year on year at these sites.

This Progress Report considered the following new monitoring data for calendar year 2009. During 2009, Perth & Kinross Council undertook ambient monitoring of NO2 tubes at 54 sites within Perth and Kinross.

When assessing the 2009 annual mean nitrogen dioxide concentrations (bias adjusted) against the AQS objective of 40ug/$m^{3,}$ exceedences are evident at 16 of the diffusion tube monitoring sites within AQMA and 1 site out with the AQMA, in Crieff.

The 16 diffusion tube sites that showed exceedences are all sites within Perth & Kinross Council's AQMA and our Air Quality Action Plan addresses these exceedences through the measures.

The exceedence in Crieff is at a kerbside site, therefore not representative of exposure for the annual $NO_2$ objective, a nearby tube on a building façade is below the objective so a detailed assessment is not required at this time. Further monitoring is required here, therefore from April an automatic monitor has been in place to give a more accurate picture of air quality in Crieff.

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# 1 Introduction

## 1.1 Description of Local Authority Area

The Perth & Kinross local authority area is made up of Perthshire and Kinross-shire,collectively the Perth and Kinross area was formerly known as Perthshire.Perth and Kinross is one of the 32 unitary council areas into which Scotland has been divided since 1996. Perth and Kinross is the 5th largest council area in Scotland, but it is only the 14th largest in terms of population, reflecting its extensive rural and upland areas. Important settlements in Perth and Kinross include Perth, Kinross, Auchterarder, Aberfeldy, Blairgowrie, Blair Atholl, Pitlochry, Coupar Angus and Crieff. The 'Fair City' Perth lies to the east, on the banks of the Tay, the largest river in Britain. Blairgowrie and East Perthshire have quiet glens, peaceful lochs and the mountains of Glenshee.

Known as the'big county', Perth & Kinross, is the gateway to the Highlands and home to around 140,000 people. The 'big county refers to not only its physical area, but to the diversity of towns and countryside. Perth and Kinross feature everything you associate with Scotland including lochs, mountains, forests and casltes.

Perth and Kinross is bordered on its north by Highland and Aberdeenshire; on its east by Angus and the City of Dundee; and on its south by Fife, Clackmannanshire and Stirling

It covers 5,406 sq km (includes fresh and tidal waters), land area is 5,311 sq km.

Perth is a hub for employment , commerce, leisure and tourism for the wider area of Perth and Kinross and this contributes to the traffic issues within our designated Air Quality Management Area.
The main and strategic roads within Perth & Kinross include the A90, A9, M90, A85 and A827 and four rail lines converge in the city of Perth.

## 1.2 Purpose of Progress Report

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

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

## 1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in Scotland are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre, $\mu g/m^3$ (milligrammes per cubic metre, $mg/m^3$ for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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

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

## 1.4 Summary of Previous Review and Assessments

Perth and Kinross Council has completed the following Review and Assessments of air quality to date:

- Stage 1 March 1999, Stage 1 (Revised)
- Stage 2 (September 2002)
- Upgrading and Screening Assessment (2003)
- Detailed Assessment (2004) $NO_2$ & $PM_{10}$
- Progress Report (2005)
- Air Quality Management Area Declared (May 2006) for $NO_2$ &$PM_{10}$
- Updating and Screening Assessment (2006)
- Progress Report (2007)
- Further Assessment (2007) $NO_2$ & $PM_{10}$
- Progress Report (2008)
- Updating and Screening Assessment (2009)
- Air Quality Action Plan adopted by council and approved by Scottish Government (2009)

The previous assessments of the air quality in Perth and Kinross concluded that there were likely exceedences of the annual mean objectives for $NO_2$ as a result of traffic sources in Perth. Projections also indicated likely exceedences of the annual mean objectives for $PM_{10}$ in 2010.

Perth & Kinross Council declared the whole of Perth City centre an Air Quality Management Area (AQMA) for both pollutants in May 2006. Figure 1.4 shows the extent of the AQMA. The decision to designate the whole of Perth an AQMA was made to ensure that areas that are close to, but do not at present exceed, the objectives are covered and also it allows the Action Plan to take in a wider area, thus avoiding moving problems to other parts of the city, while dealing with the areas which are exceeding the objectives. It also helped to ensure that the Air Quality Action Plan (AQAP) would be integrated with other council policies.

Perth & Kinross Council has taken account of the effect of the proposed Air Quality Action Plan on greenhouse gas emissions in accordance with Scottish Government guidance. To inform this process, AEA Energy & Environment was commissioned to undertake a study in terms of the effect of the Air Quality Action Plan on greenhouse gas emissions (GHG) for the whole of the Perth & Kinross Council area, rather than just the AQMA, this assessment was completed in May 2007.

The 2007 Progress Report, using 2006 data, concluded that nitrogen dioxide concentrations at 17 sites were breaching the 2005 annual mean objective of 40ug/$m^3$, and at 8 sites were between 35 – 39 ug/$m^3$, all close to Perth city centre, and levels of $PM_{10}$ at both High Street and Atholl Street monitoring sites appear to be increasing by a small margin year on year.

The 2008 further assessment confirmed the conclusions of the 2007 detailed assessment and to test the city centre traffic management (CCTMR) scenarios to assess the likely impact they may have on pollutant concentrations. The report included an assessment of source apportionment and identified emissions from heavy duty vehicle and congested traffic as the main local contributors to elevated levels of nitrogen dioxide and $PM_{10}$ in Perth.

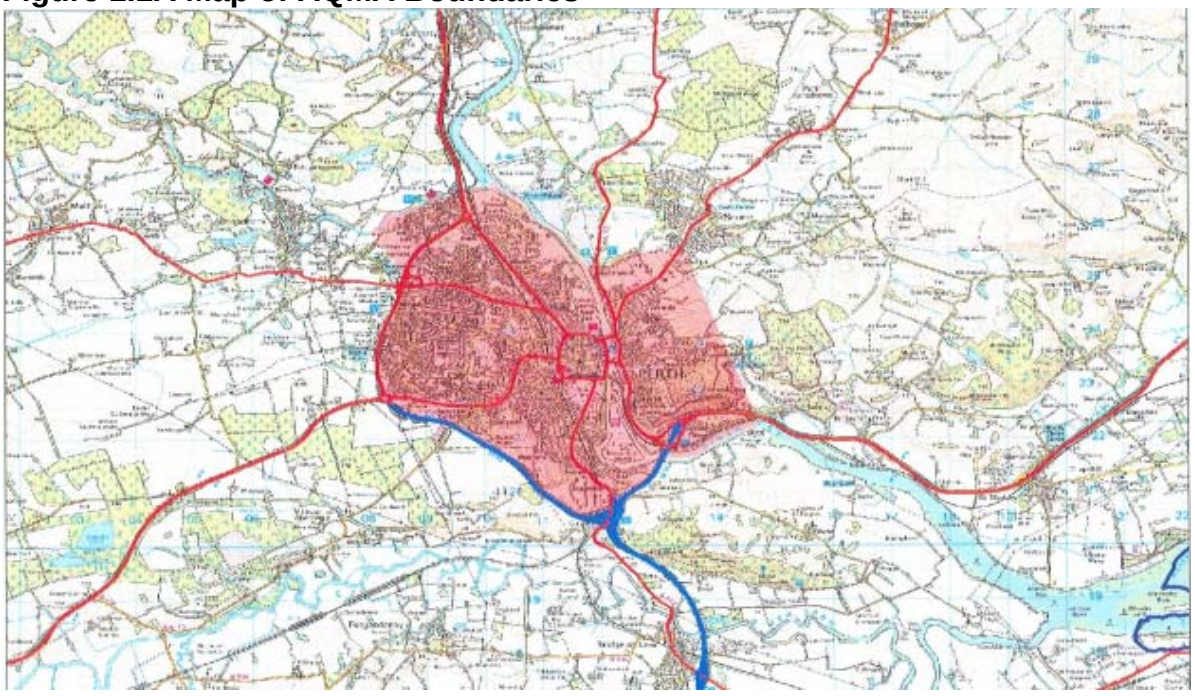
The 2008 Progress Report, using 2007 data, concluded that nitrogen dioxide concentrations at 19 sites in Perth are above the annual mean objective of 40ug/$m^3$ and 4 are between 35-40ug/$m^3$. Also in Crieff, 1 site is now above 40ug/$m^3$ and 2 sites are between 35 – 40 ug/$m^3$. As the sites which are exceeding the standard are kerbside, and not representative of exposure for the annual standard and the façade level tubes are below 40 ug/m3, it was decided not to proceed to a Detailed Assessment this year, but instead to undertake automatic monitoring in Crieff.

Draft Air Quality Action Plan, Strategic Environmental Assessment Environmental Report (2008), Climate Change Implication of the Draft Air Quality Action Plan (2008) and the Further Assessment (2008) all went out for consultation June (2008).

The 2009 Updating and Screening Assessment, using 2008 data, concluded that nitrogen dioxide concentrations at 23 sites within Perth's AQMA are above the annual mean objective of 40ug/$m^3$ and two sites in Crieff out with Perth's AQMA. Two additional monitoring sites at the façade of buildings were introduced at Crieff.

Perth & Kinross Council's Air Quality Action Plan was approved by The Scottish Government and Adopted as Council Policy in August 2009.

**Figure 1.1A Map of AQMA Boundaries**



# 2 New Monitoring Data

## 2.1 Summary of Monitoring Undertaken

### 2.1.1 Automatic Monitoring Sites

Perth and Kinross Council has an on going commitment to quality assurance and quality control, and accordingly ensure that all measurements fully comply with relevant guidance.

Two automated monitoring stations within Perth provide air quality data. Each site samples and records the continuous, real –time concentrations of nitrogen dioxide and small particulate matter with an API M200A chemiluminescent analyser for Oxides of Nitrogen and an R&P TEOM analyser for $PM_{10}$. Site details for, and current real time data from, these monitors are available in the Scottish Air Quality Website.

All automatic monitoring data has been collected, ratified and supplied to the Council by Energy & Environment (AEA). AEA ensure monitoring instrumentation, methodologies and data conform to consistent and traceable national and international standards, TEOM data for PM10 is corrected using the Volatile Correction Model (VCM). This includes full measurements traceability through the use of UKAS-accredited calibration gases.

**Figure 2.1. A Map of Automatic Monitoring Sites**

**Table 2.1 Details of Automatic Monitoring Sites**

| Site Name | Site Type | OS Grid Ref | | Pollutants Monitored | Monitoring Technique | In AQMA? | Relevant Exposure? (Y/N with distance (m) to relevant exposure) | Distance to kerb of nearest road (N/A if not applicable) | Does this location represent worst-case exposure? |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| Perth 1-High Street | Roadside | 311680 | 723624 | $NO_2$ & $PM_{10}$ | AP1 M200A chemiluminescent analyser for Oxides of Nitrogen & R&P TEOM analyser for $PM_{10}$ | Y | Y (20.4m) | 4.8m | Y |
| Perth 2- Atholl Street | Roadside | 311575 | 723917 | $NO_2$ & $PM_{10}$ | AP1 M200A chemiluminescent analyser for Oxides of Nitrogen & R&P TEOM analyser for $PM_{10}$ | Y | Y (22.3m) | 2.3m | Y |

### 2.1.2 Non-Automatic Monitoring

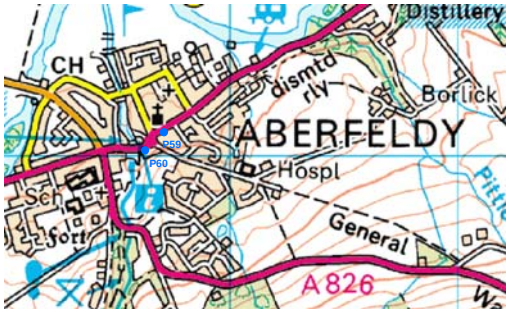
Perth & Kinross Council also maintains a network of passive diffusion tubes to monitor levels of nitrogen dioxides. The vast majority of these 54 sites are in Perth, although there are also 2 sites in Glencarse (just off the A90 Perth to Dundee), 6 sites in Crieff, the two new sites in Crieff at 19 West High Street and 43 High Street were installed in January 2009 at the building facades, and 2 sites in Aberfeldy.

A list of site details is provided in Table 2.2 and site location maps are provided in Figure 2.2, of this report.

Dundee City Council Scientific Services provide and analyse passive diffusion tubes for monitoring $NO_2$ in Perth & Kinross. This laboratory takes part in and meets QA/QC Field Inter comparison standards specified for the National $NO_2$ Network. The Summary of Precision Results for Nitrogen Dioxide Diffusion Tubes Collocation Studies, by Laboratory which is published on the review and assessment helpdesk operated by Air Quality Consultants/University of the West of England classes precision for Dundee CCSS to be “good”. Tube preparation utilises a 20% v/v triethanolamine (TEA) in water methodology. Analysis using colorimetric techniques typically follows four/five week exposure period in accordance with the National $NO_2$ Monitoring Network schedule.

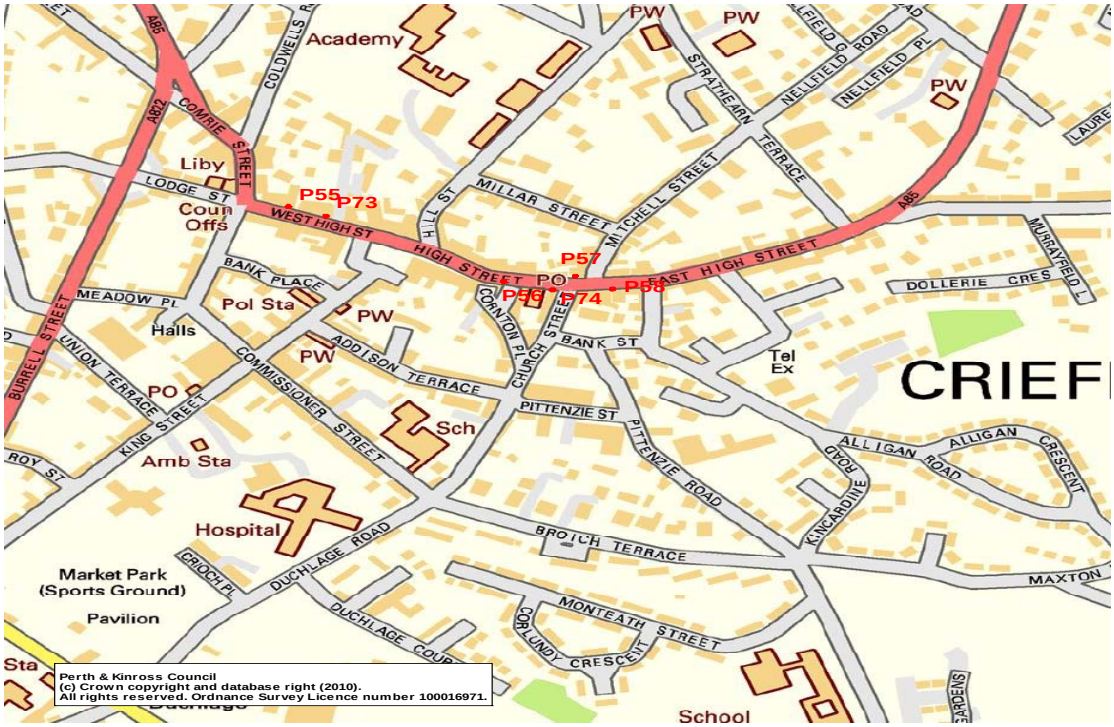
The statistical tool created by AEA Energy & Environment and provided for LAQM assistance on the UK National Air Quality Archive website was used to confirm good precision and accuracy of data from co-located tubes in Perth & Kinross.

**Figure 2.2a Map(s) of Non-Automatic Monitoring Sites Diffusion tube locations out with AQMA**




**Aberfeldy**

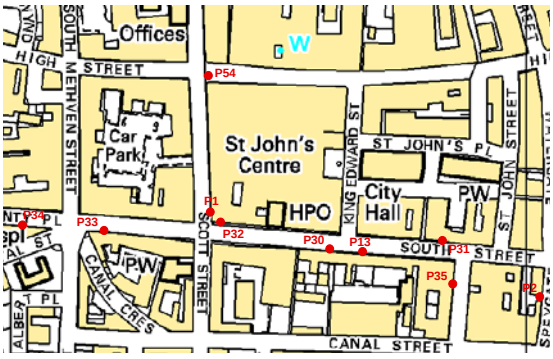

**Glencarse**



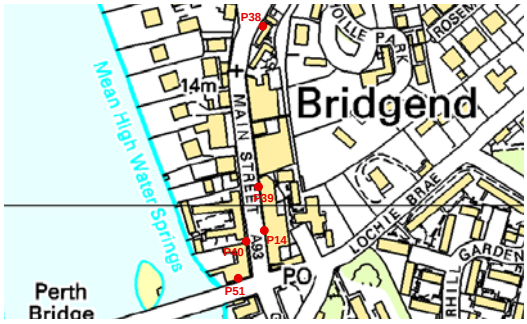

**Crieff**

## Figure 2.2b Map(s) of Non-Automatic Monitoring Sites Diffusion tube locations within AQMA

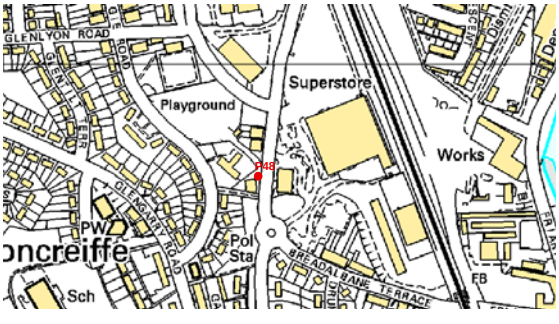

**Atholl Street Area**



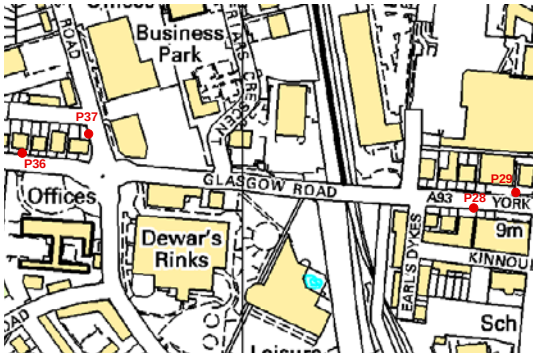

**High Street Area**




**Bridgend Area**

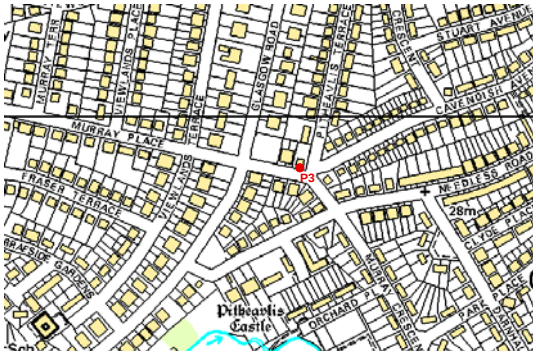



**Edinburgh Road Area**

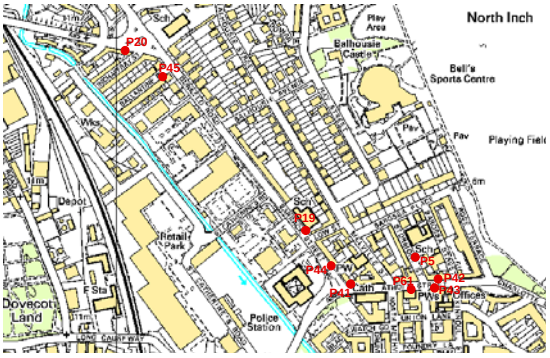



**Lower Glasgow Road Area**

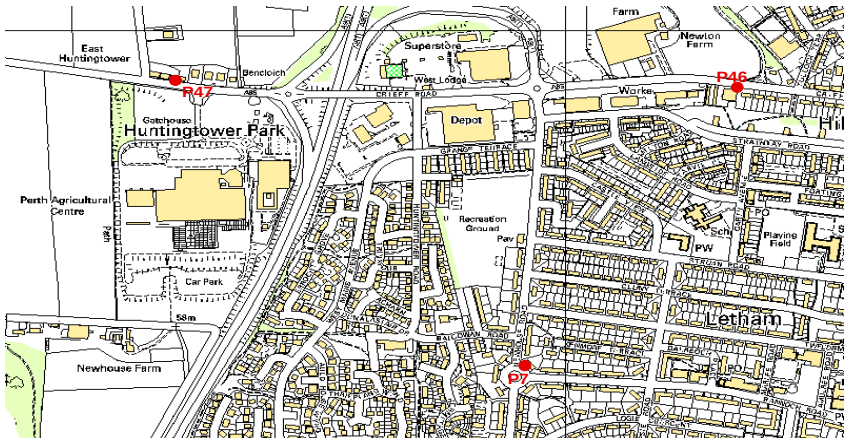

**Muirton Area**




**Murray Crescent**




**North Centre Perth**




**NW Perth Area**

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

| | 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? |
|---|---|---|---|---|---|---|---|
| 42 Scott St, Perth, PH1 5PH | R | NO117235 | NO2 | Y | Y(3) | 2.5 | Y |
| 17 Speygate, Perth, PH2 8PJ | UC | NO120234 | NO2 | Y | Y(2.9) | 2.05 | Y |
| 15 Murray Crescent, Perth, PH2 0HU | UB | NO105228 | NO2 | Y | Y(2.9) | 2.05 | N |
| 8 Stormont Street, Perth, PH1 5NW | UC | NO116239 | NO2 | Y | Y(10) | 1.7 | Y |
| 41 Mull Place, Perth, PH1 3DP | UB | NO105257 | NO2 | Y | Y(6) | 1.7 | N |
| 257 Rannoch Rd/ Newhouse Rd Roundabout,Perth,PH1 2DW | UC | NO089244 | NO2 | Y | Y(8.3) | 2.1 | Y |
| 86/88 South Street, Perth,PH2 8PD | R | NO118234 | NO2 | Y | Y(1) | 2.6 | Y |
| 9 Main Street, Bridgend, Perth, PH2 7HD | R | NO122239 | NO2 | Y | Y(1) | 2.3 | Y |
| St Ninian's School, Dunkeld Rd, Perth,PH1 5RF | R | NO113241 | NO2 | Y | Y(3.4) | 3.2 | Y |
| 2 Crieff Road, Perth, PH1 5RT | R | NO110243 | NO2 | Y | Y(1) | 1.9 | Y |
| 28 York Place, Perth, PH2 8EH | R | NO111234 | NO2 | Y | Y(12) | 2.4 | Y |
| 37 York Place, Perth, PH2 8EH | R | NO112235 | NO2 | Y | Y(8) | 4.1 | Y |
| 104 South Street, Perth, PH2 8PA | R | NO117234 | NO2 | Y | Y(1) | 2.4 | Y |
| 45-47 South Street, Perth, PH2 8PD | R | NO119234 | NO2 | Y | Y(5) | 3.5 | Y |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 135 South Street, Perth, PH2 8PA | R | NO117234 | NO2 | Y | Y(23) | 4.6 | Y |
| 216 South Street, Perth, PH2 8NY | R | NO116234 | NO2 | Y | Y(5) | 2.5 | Y |
| 10 County Place, Perth,PH2 8EE | R | NO115234 | NO2 | Y | Y(2) | 3 | Y |
| 17 Princes Street, Perth, PH2 8NG | R | NO119234 | NO2 | Y | Y(1.5) | 1.8 | Y |
| 51 Glasgow Road, Perth, PH2 0PE | R | NO107235 | NO2 | Y | Y(7.2) | 2.6 | Y |
| Riggs Road, Perth, PH1 1PR | R | NO108236 | NO2 | Y | Y(10) | 1.9 | Y |
| 93-109 Main Street, Bridgend, Perth, PH2 7HE | R | NO122241 | NO2 | Y | Y(1) | 7 | Y |
| 39 Main Street, Bridgend, Perth, PH2 7HD | R | NO122240 | NO2 | Y | Y(7) | 2.1 | Y |
| 18 Main Street, Bridgend, Perth, PH2 7HB | R | NO122239 | NO2 | Y | Y(18) | 2.4 | Y |
| 76 Atholl Street, Perth, PH1 5NL | R | NO114239 | NO2 | Y | Y(1) | 2.5 | Y |
| 26-28 Atholl Street, Perth, PH1 6NP | K | NO116239 | NO2 | Y | Y(2) | 0.3 | Y |
| 17 Atholl Street, Perth, PH1 5NH | R | NO116239 | NO2 | Y | Y(2) | 3 | Y |
| 22 Barrack Street, Perth, PH1 5RD | K | NO114239 | NO2 | Y | Y(2.7) | 0.3 | Y |
| Ballantine Place, Perth, PH1 5RD | UC | N0110243 | NO2 | Y | Y(4) | 1.7 | Y |
| 204 A Crieff Road, Perth, PH1 2PE | R | N0093248 | NO2 | Y | Y(11.5) | 2 | Y |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 East Huntingtower, Perth, PH1 3JJ | R | NO083248 | NO2 | Y | Y(5.5) | 1.8 | Y |
| 30 Edinburgh Road, Perth, PH2 8BX | R | NO083248 | NO2 | Y | N(37) | 2.5 | Y |
| 2 West Bridge Street, Perth, PH2 7HA | R | NO122239 | NO2 | Y | Y12.5) | 3.7 | Y |
| Real Time Monitor adjacent to 176 High Street, Perth,PH1 5EW | R | NO115239 | NO2 | Y | Y(20.4) | 4.8 | Y |
| Real Time Monitor, Atholl Street, Perth,PH1 5NH | R | NO117235 | NO2 | Y | Y(22.3) | 2.3 | Y |
| 84 Dundee Road, Perth, PH2 7BA | R | NO125229 | NO2 | Y | Y(1) | 1.7 | Y |
| 30 Dundee Road, Perth, PH2 7AQ | R | NO124232 | NO2 | Y | Y(1.3) | 1.4 | Y |
| The Lodge, Isla Road Bridgend PH2 7HG | R | NO122241 | NO2 | Y | Y(1) | 1.4 | Y |
| 5-7 Charlotte Street, Perth, PH1 5LW | R | NO119238 | NO2 | Y | Y(3.3) | 2 | Y |
| 1 Atholl Street, Perth, PH1 5NH | R | NO116239 | NO2 | Y | Y(1) | 2.3 | Y |
| 2 Atholl Street, Perth, PH1 5NP | R | NO116239 | NO2 | Y | Y(2.5) | 0.8 | Y |
| United Free Church of Scotland, Kinnoull Street Perth PH1 5EZ | R | NO116239 | NO2 | Y | Y(3) | 2.6 | Y |
| Leith Buildings, 28 Dunkeld Road, Perth, PH1 5AJ | R | NO110244 | NO2 | Y | Y(5.1) | 2.1 | Y |
| 134-140 Dunkeld Road Perth PH1 5AS | R | NO106249 | NO2 | Y | Y(7.8) | 1.5 | Y |
| 82 Crieff Road, Perth PH1 2RP | R | NO103240 | NO2 | Y | Y(1) | 2.4 | Y |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Opp Wood'n Garden, Glencarse, PH2 7XL | R | NO173235 | NO2 | N | Y(2.8) | 2.8 | Y |
| Linden Garden Centre, Glencarse, PH2 7LX | R | NO173235 | NO2 | N | Y(6) | 2.1 | Y |
| 7 West High Street, Crieff PH7 3AF | UC | NN866215 | NO2 | N | Y(10) | 0.4 | N |
| 39, High Street, Crieff PH7 3HT | UC | NN865215 | NO2 | N | Y(18) | 1.2 | N |
| The Highland Trading Company, 62, High Street, Crieff PH7 3BS | UC | NN865215 | NO2 | N | Y(1) | 1 | Y |
| 9 East High Street, Crieff PH7 3AF | UC | NN866215 | NO2 | N | Y(5) | 0.3 | Y |
| 12 Dunkeld Street, Aberfeldy PH15 2DA | UC | NN857491 | NO2 | N | Y(1) | 2.3 | Y |
| Highland Gift Shop, Bridgend, Aberfeldy PH15 2DF | UC | NN856490 | NO2 | N | Y(1.5) | 2.3 | Y |
| 19 West High Street Crieff, PH7 4AU | O | NN8629921649 | NO2 | N | Y(0) | 2.5 | Y |
| 43 High Street Crieff, PH7 3HT | O | NN8666721571 | NO2 | N | Y(0) | 1.4 | Y |

## 2.2 Comparison of Monitoring Results with Air Quality Objectives

### 2.2.1 Nitrogen Dioxide

**Automatic Monitoring Data**

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

| Site ID | Location | Within AQMA? | Data Capture for full calendar year 2009 [b] % | Annual mean concentrations (μg/m$^3$) | | |
|---|---|---|---|---|---|---|
| | | | | 2007 [c, d] | 2008 [c,d] | 2009 [c] |
| Perth 1 | High Street | Y | 97 | 29 | 27 | 25 |
| Perth2 | Atholl Street | Y | 98 | 60 | 60 | 56 |

**Figure 2.3a Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Automatic Monitoring Sites.**

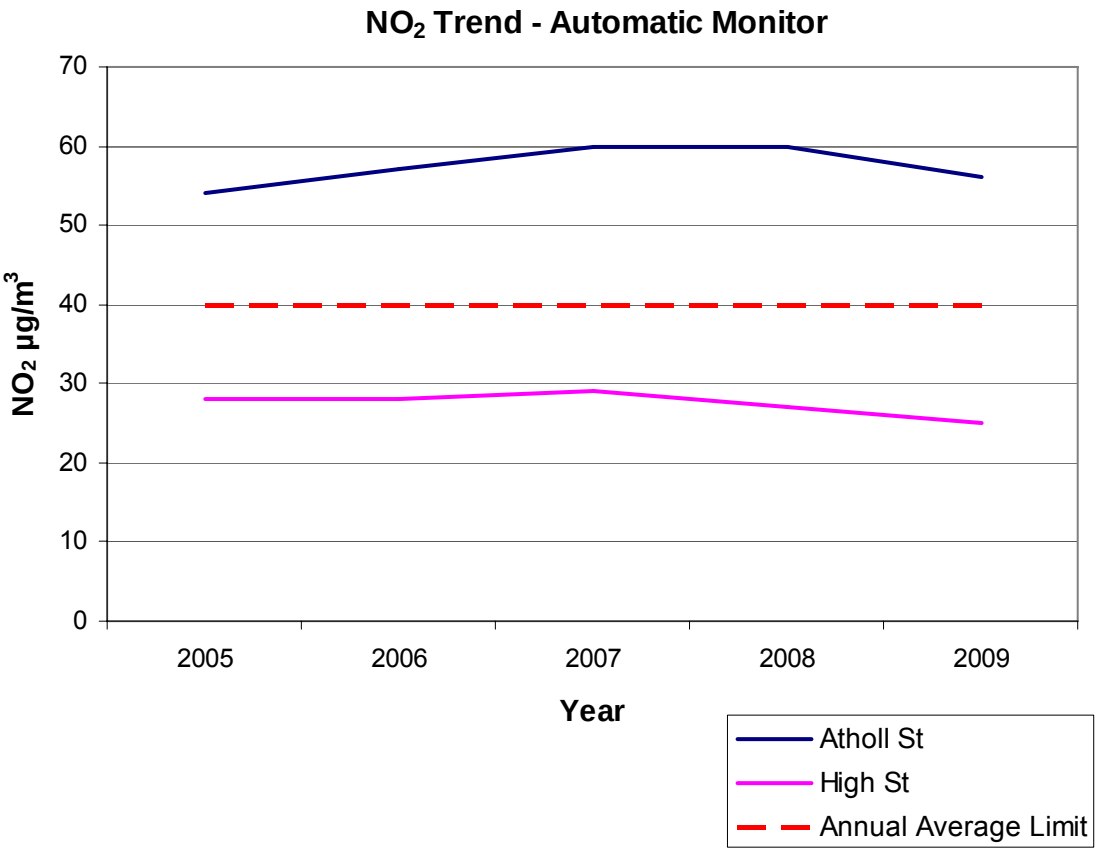
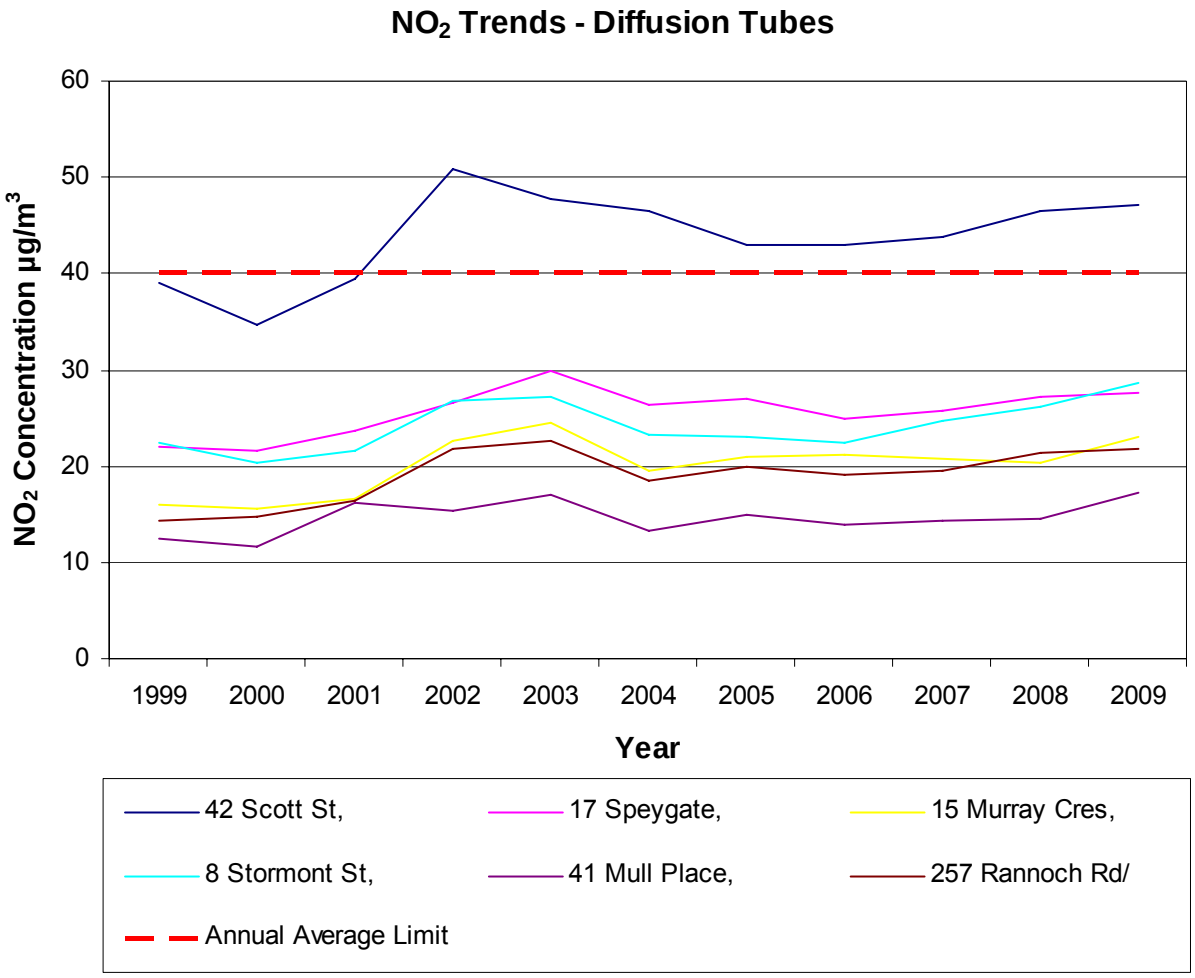



**Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective**

| Site ID | Location | Within AQMA | Data Capture for full calendar year 2009 [b] % | Number of Exceedences of Hourly Mean (200 µg/m$^3$) | | |
|---|---|---|---|---|---|---|
| | | | | 2007 [c] | 2008 [c] | 2009 |
| Perth 1 | High Street Perth | Y | 97 | 0 | 1 | 0 |
| Perth 2 | Atholl Street Perth | Y | 98 | 0 | 25 | 3 |

**Diffusion Tubes**

**Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.**




The 6 tubes used here are the original 6 tubes installed by Perth and Kinross Council, still in use today, allowing a 10 year trend to be plotted.

## Diffusion Tube Monitoring Data

### Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes Perth

| Site ID | Location | Within AQMA | Data Capture 2009 % | Annual mean concentrations 2009 (mg/m3) Adjusted for bias (1) |
|---|---|---|---|---|
| 1 | 42 Scott St,* | Y | 100 | **41** |
| 2 | 17 Speygate, | Y | 100 | 24 |
| 3 | 15 Murray Crest,* | Y | 100 | 20 |
| 5 | 8 Stormont St,* | Y | 100 | 25 |
| 6 | 41 Mull Place, | Y | 92 | 15 |
| 7 | 257 Rannoch Rd/ | Y | 92 | 19 |
| 13 | 86/88 South Street* | Y | 100 | 37 |
| 14 | 9 Main St, Bridgend,* | Y | 100 | 39 |
| 19 | St Ninian's School ,Dunkeld Rd, | Y | 100 | 36 |
| 20 | 2 Crieff Road | Y | 100 | 29 |
| 28 | 28 York Place | Y | 100 | **44** |
| 29 | 37 York Place | Y | 100 | 38 |
| 30 | 104 South St,* | Y | 100 | **40** |
| 31 | 45-47 South St, | Y | 100 | 30 |
| 32 | 135 South St, | Y | 100 | 37 |
| 33 | 216 South Street | Y | 92 | **42** |
| 34 | 10 County Place,* | Y | 100 | **49** |
| 35 | 17 Princes St | Y | 100 | 29 |
| 36 | 51 Glasgow Rd, | Y | 100 | 33 |
| 37 | Riggs Rd, Perth, | Y | 100 | 30 |
| 38 | 93-109 Main St Bridgend, | Y | 100 | 30 |
| 39 | 39 Main St, Bridgend,* | Y | 100 | **47** |
| 40 | 18 Main St, Bridgend,* | Y | 100 | **46** |
| 41 | 76 Atholl St,* | Y | 100 | **49** |
| 42 | 26-28 Atholl St, | Y | 100 | **44** |
| 43 | 17 Atholl St,* | Y | 100 | **53** |
| 44 | 22 Barrack St* | Y | 100 | **43** |
| 45 | Ballantine Place, | Y | 100 | 23 |
| 46 | 204 A Crieff Rd | Y | 100 | 30 |
| 47 | 5 East Huntingtower, | N | 100 | 28 |
| 48 | 30 Edinburgh Rd | Y | 100 | 25 |
| 51 | 2 West Bridge St, Bridgend | Y | 100 | 23 |
| 54 | RTM 176 High St* | Y | 100 | 26 |
| 61 | RTM Atholl St* | Y | 100 | **55** |
| 62 | 84 Dundee Rd | Y | 100 | 36 |
| 63 | 30 Dundee Rd, | Y | 100 | **41** |
| 64 | The Lodge, Isla Rd, Bridgend* | Y | 100 | **49** |
| 65 | 5-7 Charlotte Street | Y | 100 | 30 |
| 67 | 1 Atholl Street | Y | 100 | **40** |
| 68 | 2 Atholl Street | Y | 100 | 32 |

| | | | | |
|---|---|---|---|---|
| 69 | Church of Scotland, Kinnoull Street | Y | 100 | **41** |
| 70 | Leith Buildings, 28 Dunkeld Rd | Y | 100 | 32 |
| 71 | 134-140 Dunkeld Road | Y | 100 | 18 |
| 72 | 82 Crieff Road, | Y | 100 | 38 |

[1]Bias adjustment factor 0.87 used (see Appendix A)
* Shows where an average value is used for multiple tubes

### Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes Out with Perth

| Site ID | Location | Within AQMA | Data Capture 2009 % | Annual mean concentrations 2009 (μg/m$^3$) Adjusted for bias[(2)] |
|---|---|---|---|---|
| 49 | Opp Wood'n Garden, Glencarse, | N | 100 | 23 |
| 50 | Linden Garden Centre, Glencarse | N | 100 | 24 |
| 55 | 7 West High St, Crieff | N | 100 | **45** |
| 56 | 39, High St, Crieff | N | 100 | 35 |
| 57 | 62, High St, Crieff | N | 100 | 32 |
| 58 | 9 East High St, Crieff * | N | 100 | 38 |
| 59 | 12 Dunkeld Street, Aberfeldy | N | 100 | 27 |
| 60 | Highland Gift Shop, Bridgend, Aberfeldy * | N | 100 | 20 |
| 73 | 19 West High St Crieff | N | 92 | 36 |
| 74 | 43 High St Crieff | N | 92 | 33 |

[2]Bias adjustment factor 0.87 used (see Appendix A)
* Shows where an average value is used for multiple tubes

### 2.2.2 $PM_{10}$

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

| Site ID | Location | Within AQMA | Data Capture for full calendar year 2009 [b] % | Annual Mean Concentrations (μg/m$^3$) | | |
|---|---|---|---|---|---|---|
| | | | | 2007 | 2008 | 2009 |
| Perth1 | High Street | Y | 96 | 20 | 20 | 16 |
| Perth2 | Atholl Street | Y | 91 | 27 | 26 | 21 |

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

| Site ID | Location | Within AQMA | Data Capture 2009 [b] % | Number of Exceedences of Daily Mean Objective (50 μg/m$^3$) | | |
|---|---|---|---|---|---|---|
| | | | | 2007 | 2008 | 2009 |
| Perth1 | High Street | Y | 96 | 5 | 0 | 2 |
| Perth2 | Atholl Street | Y | 91 | 6 | 5 | 3 |

### 2.2.3 Summary of Compliance with AQS Objectives

Perth & Kinross Council has examined the results from monitoring in the district. Concentrations outside of the AQMA are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

# 3 New Local Developments

## 3.1 Road Traffic Sources

There are no newly identified road traffic sources within our area.

## 3.2 Other Transport Sources

There are no newly identified other transport sources within our area.

## 3.3 Industrial Sources

There are no newly identified other industrial sources within our area.

## 3.4 Commercial and Domestic Sources

Planning was approved for the erection of a particulate filter room and installation of a wood chip boiler (in retrospect) Alyth Primary School Albert Street Alyth for Perth and Kinross Council. Information was submitted from the installers of the biomass boiler indicating that the inclusion of a ceramic filter yields a reduction of more than 90% in emissions of particulate matter, flue 7meters high with a 0.35meter diameter. The application was in accordance to TG.09 therefore Perth & Kinross Council was satisfied that the operation of the boiler would not lead to an exceedence of the air quality objectives.

## 3.5 New Developments with Fugitive or Uncontrolled Sources

There are no newly identified other fugitive or uncontrolled sources within our area.

Perth & Kinross Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

# 4 Local / Regional Air Quality Strategy

Perth & Kinross Council declared the whole of Perth an Air Quality Management Area in May 2006 and our Air Quality Action Plan was approved by Scottish Government and adopted by the Council in 2009. However Perth & Kinross Council had started to implement some of the measures within our AQAP before it was actually adopted by the Council, measures such as Park and Ride Schemes, Healthy Living Campaign, Considering Air Quality in Planning Decisions, School Travel Plans and Car and Lift Share Schemes.

# 5 Planning Applications

## 5.1 Murray Royal Hospital

Planning application 09/01691/AMM for the erection of a new mental health facility to replace existing hospital was approved 20/01/2010, a Green Travel Plan, Report ref. 6034/RMcD/06-06/1319A and Transport Assessment, Report ref. 6034/RMcD/06-06/1300A were submitted in connection with this application. An Air Quality Assessment report ref 6034/NH/01-07/1594/RevA was submitted at the outline stage of this application 08/02078/OUT.

The Scoping Report concluded that with regards to the Bridgend linked signals the residential and hospital traffic will have a marginal impact and the changes to the hospital will not significantly alter the number of administrative staff and therefore a significant increase in peak hour traffic is not predicted. It also concluded that based on the Transport Assessment it appears that there are no significant traffic or transport related reasons why the proposed hospital redevelopment should not go ahead.

The Air Quality Assessment concluded that “Perth experiences localised areas with high levels of $NO_2$ and $PM_{10}$ resulting from congested traffic producing pollution unable to diffuse to the atmosphere due to the height and distance between the surrounding buildings. The calculations carried out for this report show that the proposed development will have no noticeable effect on these locations,” and “The conclusion of this report is that the proposed development will not cause a significant reduction in air quality in these areas of Perth currently experiencing acceptable air quality. The proposed development will not have a measurable effect on those areas in Perth where air quality is currently below NAQS objectives. There is therefore no reason in terms of air quality why the proposed development should proceed.”
The green travel plan produced in connection with this application ties in with Travel Planning measure within our Action Plan and should lead to no increase in traffic on balance.

## 5.2 Perth Mart

Planning application 08/01513/IPM mixed use development (in principle) and 09/02126/FLM the erection of a retail superstore (open class1) and petrol filling station with associated landscape treatment and engineering are pending consideration. Perth and Kinross Council requested that air quality and noise be included in any Environmental Impact Assessment as the outline application is for mixed use development at East Huntingtower, which includes, car parking for 1201 vehicles. This is the second proposed large development in the Huntingtower area, the first being 08/00678/OUT, which is also pending consideration for up to 1800 new

houses and associated leisure and retail. Each of these developments has the potential to introduce a large number of motor vehicles to this area and thus have a detrimental effect on air quality. Although this development is out with the AQMA, it is close enough to impact on air quality due to an increase in traffic and runs the risk of leading to an extension of the AQMA.

## 5.3 Shore Road Energy from Waste Plant

Planning application 09/00348/REM, Relocation of existing waste recycling centre and formation of a waste to energy facility (reserved matters) Shore Road Perth was, refused at Perth & Kinross Council's development committee and an appeal is in progress case reference PPA-340-2036. The applicant submitted an Environmental Statement ref SAE 1463/SN/RDJ concluded "the EfW facility will be designed to minimise emissions from the stack via a flue gas treatment system to limits specified within Directive 200-/76/EC.Residual emissions will be dispersed from an 80 m high stack. This height was determined as the optimum for the effective dispersion of pollutants taking into account local building heights." It further stated "the results of dispersion modelling reported in this assessment indicate that predicted contributions and resultant environmental concentrations of all pollutants considered are well within the relevant air quality objectives and limit values." A summary table of effects within the report states that at the "operational phase air quality effects from stack emissions will have a slight adverse effect."

The air quality assessment was carried by RPS, however The Environmental Health Manager had reservations regarding the methodology and findings so Bureau Veritas were employed to appraise the assessment. Bureau Veritas identified inadequacies and made some recommendations to the original Air Quality Assessment, which were implemented and led to the acceptance of the reports findings.

With regards to traffic increase within AQMA the report stated" the effect on air quality due to the additional emissions from operational traffic is considered as neutral."

The Environmental Statement's over all conclusions were "Overall the effects of the proposed EfW facility are not considered significant either by way of the design and location of the EfW or by virtue of the proposed mitigation measures. The impacts which could be considered to be contentious (landscape and visual, air quality/human health) have been fully mitigated as a result of the iterative design process and through careful consideration of emissions control and abatement techniques, and high quality architectural design."

# 6 Local Transport Plans and Strategies

Perth & Kinross Council's Local Transport Strategy 2000 and Roads Development Guide are both being reviewed.

At present Perth and Kinross Council are at Stage 2 STAGs for the following:

- Cross Tay Link (this is a measure within the AQAP)
- Perth's North- Western Edge (this part of the city has been identified in the Perth & Kinross Structure plan as the area where future expansion will be focused)
- Perth's Wider Transport Issues.

A comprehensive study of transport issues in and around Perth has been taking place over the last two years to assess the local network's current and future capacity. This has been funded and taken forward through the Council's links with the Tayside and Central Scotland Transport Partnership (TACTRAN). Transport provision was examined while taking into account other significant issues including the potential growth and expansion of Perth, and the environment and climate change.

Perth & Kinross Council is a member of the TACTRAN Regional Partnership which also includes Stirling and Kinross, Dundee and Angus Councils. Further details of the Regional and National Strategies are available from the links on this page.

RegionalTransportPartnership
National Transport Strategy

# 7 Climate Change Strategies

The Council signed up to Scotland's Climate Change Declaration (SCCD) in January 2007. In June 2008, the Council produced its first annual progress report on delivering the commitments made in the Declaration - Perth & Kinross Council: Scotland's Climate Change Declaration - Annual Report 2008. The Council has made progress on all seven commitments, particularly in relation to reducing greenhouse gas emissions from its own operations, through the Council's Carbon Management Strategy & Implementation Plan 2007-2017. This has been recognized by the Council achieving certification of the Carbon Trust Standard in January 2009.

The Council has also recently produced a Local Climate Impacts Profile (LCLIP) to increase the awareness of local climate change and adaptation that is likely to be required in Perth & Kinross. Perth & Kinross Council - LCLIP

# 8 Implementation of Action Plans

**Table 8.1 Action Plan Progress**

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | Cross Tay Link | New crossing of the Tay linking the A9 to the A94 north of Scone, including a package of associated bus priority, cycle and pedestrian measures 'locking in the benefits' to Perth city centre | PKC<br><br>TACTRAN<br><br>Transport Scotland | | 2009- ongoing to circa 2018 | It is not possible at this stage to assign a quantitative indicator.<br><br>We will report outputs of feasibility work/ air quality assessments as they arise and update timescales as appropriate. | High | Development work has been ongoing over the past three years funded through the joint Tactran programme and previous years Capital Budgets. An allocation is included in the 2010/11 Capital Programme for further development work.<br><br>A full environmental appraisal has been carried out in accordance with STAG and a SEA scoping report revised version 2010 | A full environmental appraisal has been carried out in accordance with STAG and a SEA scoping report revised version 2010 | **2018** | |
| **2** | Integrate AQ into Regional Transport Strategy | Ensure that this AQAP is integrated into the delivery of the Regional | PKC<br><br>TACTRAN | | 2009/10 and as RTS is delivered | We will report annually on our meetings with TACTRAN, | Medium-High | AQ considerations are influencing RTS delivery in the past year | AQ considerations are influencing RTS delivery in the past year | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Transport Strategy | | | | and provide a discussion as to how the AQAP is influencing delivery of the RTS. | | particularly through the commission of a study into feasibility of a freight consolidation centre for Perth | particularly through the commission of a study into feasibility of a freight consolidation centre for Perth | | |
| **3** | Integrate AQ into Local Transport Strategy | Ensure that this AQAP is integrated into the delivery of the Local Transport Strategy. A new strategy is being developed so there is an opportunity to integrate AQ fully into this. | PKC | | LTS published by year 3 of this AQAP, then ongoing implementation of schemes | This is a strategic option but we will report on development of the new LTS and comment on specific air quality provisions contained in it. As the Strategy unfolds we may need to reassess this measure and make it more specific. | Medium-High | | | **Ongoing** | |
| **4** | Park and Ride | Operate existing Park and Ride schemes and maintain high levels of usage.<br>We will carry out intermittent surveys to assess vehicles using the | PKC | | 2009- Ongoing | Annual usage statistics. A calculation of avoided $NO_x$/$PM_{10}$ will be provided annually. | Medium | Bus passenger numbers are taken annually for Broxden P&R | Bus passenger numbers are taken annually for Broxden P&R | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | site. | | | | | | | | | |
| | | Investigate a new Park and Ride/ Park and Choose site at Walnut Grove, Perth | TACTRAN<br>PKC | | 2009- ongoing to circa 2018<br>A feasibility study is underway and will report during year 1 of this plan.<br>More specific timescales are available in TACTRAN RTS Delivery Plan | We will report outputs of feasibility work/ air quality assessments led by TACTRAN as they arise and update timescales as appropriate | High | Further Investigations of the scope for implementing the project are under way | Tactran, in partnership with PKC, commissioned consultants to provide a technical appraisal of the proposed P&R facility. This has been concluded | **2018** | |
| | | Programme of improvements to existing P+R sites (e.g. better waiting areas, lighting etc). | PKC | | 2009- ongoing | Report of any improvements made, tied into occupancy rates | Small | A passenger waiting facility was due to be constructed at Broxden, but due to a series of problems has been delayed however this should be constructed this year. | A passenger waiting facility was due to be constructed at Broxden, but due to a series of problems has been delayed however this should be constructed this year. | **Ongoing** | |
| **5** | Bus quality improvements | Bus Strategy and Quality Bus Partnerships.<br>PKC- Work with TACTRAN, operators and other relevant | TACTRAN<br>PKC | | 2009- ongoing to 2024<br>More specific timescales are available in TACTRAN RTS Delivery Plan/ | Shift to alternative modes- this will be monitored by TACTRAN as part of the evaluation | Medium | Consultation on the possibility of fitting particulate traps to school buses has been undertaken and the possibility | Consultation on the possibility of fitting particulate traps to school buses has been undertaken and the possibility | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | stakeholders to create a bus strategy for the region.<br><br>TACTRAN- Work in partnership with Councils, bus operators and other relevant stakeholders to identify and deliver improvements to the quality and accessibility of vehicles, services and associated facilities across the Region, particularly maximising funding and grant opportunities in support of these measures. | | | capital and revenue programmes | process of their RTS Delivery Plan. | | of grant funding for this will be investigated.<br><br>Tactran have provided upgraded bus stop and shelter facilities on the A90 Dundee – Perth Corridor funded from the 2009/10 Capital Programme | of grant funding for this will be investigated.<br><br>Tactran have provided upgraded bus stop and shelter facilities on the A90 Dundee – Perth Corridor funded from the 2009/10 Capital Programme | | |
| | | Ensure air quality is formally considered in future public transport procurement decisions (i.e. for subsidised public services, school buses, school taxis | PKC | | 2009 then Ongoing<br><br>(as contracts are renewed | Outcome of any procurement decisions. As cleaner vehicles come on stream, an annual calculation of the avoided $NO_x$ and $PM_{10}$ will be provided. | Medium | | | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | Freight improvements | Establish a TACTRAN-wide Freight Quality Partnership, in liaison with freight interests and Councils drawing upon established guidance, to help deliver cost-effective packages of freight related interventions across the region. | TACTRAN<br>PKC | | Ongoing to 2024<br>More specific timescales are available in TACTRAN RTS Delivery Plan/ capital and revenue programmes | PKC will seek regular updates from TACTRAN on progress and report on these annually | High | A Tactran-wide freight quality partnership has been formed including interest from PKC, Scottish Enterprise, and private sector freight interests. It has met twice during the course of 2009/10 | A Tactran-wide freight quality partnership has been formed including interest from PKC, Scottish Enterprise, and private sector freight interests. It has met twice during the course of 2009/10 | **2024** | |
| | | Development of a freight consolidation scheme or commercial delivery strategy. | TACTRAN<br>PKC | | Feasibility work, subject to funding, will be carried out in Years 1 and 2 of this AQAP. | Initially we will report on feasibility work as and when it is carried out.<br>If developed we could use the number of vehicle km avoided to calculate emissions savings. | Medium-High | Freight Consolidation Feasibility Study has been completed and a draft feasibility report was published in January 2010 recommending a trial period scheme for 6-12 months | Freight Consolidation Feasibility Study has been completed and a draft feasibility report was published in January 2010 recommending a trial period scheme for 6-12 months | | |
| **7** | Travel Planning | PKC Staff Travel Plan; including encouraging flexible working, car/lift sharing/alternative modes, salary | PKC | | Initiated year 2 of this AQAP then ongoing. | Activity data will be collected by survey to support the working of the PKC GTP. A | Medium | Staff Travel Plan has been prepared and grant funding obtained for the purchase of resources | Staff Travel Plan has been prepared and grant funding obtained for the purchase of resources | **Ongoing** | Monitoring will take place 1-2 years after launch |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | sacrifice bicycle scheme. | | | | base survey of staff travel habits will also be carried out.<br>We will estimate vehicle km avoided in the AQMA and report reduced emissions of $NO_x$ and $PM_{10}$. | | pertaining to the plan. The plan is due to be approved at SP&R Committee in June with a planned launch in September | pertaining to the plan. The plan is due to be approved at SP&R Committee in June with a planned launch in September | | |
| | | We will work with our regional partners to further encourage development and employee use of Green Travel Plans in our large employers. | TACTRAN (through the green travel group)<br>PKC | | 2009 then ongoing | Activity data will be sought from the main employers as to the journeys avoided from their GTPs. If this is provided will estimate vehicle km avoided in the AQMA and report reduction in emissions of $NO_x$ and $PM_{10}$. | Medium | Tactran was represented on SSE's Travel Plan Steering group and provided advice and promotional material. Perth college was also given information and support of use of liftshare. PRI and Murray Royal given advice and guidance in travel planning process and PRI and community hospital provided with grants for travel | Tactran was represented on SSE's Travel Plan Steering group and provided advice and promotional material. Perth college was also given information and support of use of liftshare. PRI and Murray Royal given advice and guidance in travel planning process and PRI and community hospital provided with grants for travel | **Ongoing** | A baseline is still being developed |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | planning measures. | planning measures. | | |
| | | We will continue to support schools in developing Green Travel Plans through our school co-ordinator and collect activity data to assess their use through our school co-ordinators. | PKC | | 2009 then ongoing | Survey data will be requested from PKC schools as to the journeys avoided from their GTPs.<br>We will estimate vehicle km avoided in the AQMA and report reduction in emissions of $NO_x$ and $PM_{10}$. | Medium | A number of schools have developed or are developing Green Travel Plans grant funding was awarded last year to support schools with travel plans and funding will be sought for further measures this year. 89.9% of schools have STPs with 100% working on STP activities | A number of schools have developed or are developing Green Travel Plans grant funding was awarded last year to support schools with travel plans and funding will be sought for further measures this year. 89.9% of schools have STPs with 100% working on STP activities | **Ongoing** | School Hands Up Survey (current travel modes) will be carried out in September again with last years results due next in June |
| | | Regional/ PKC Car and Lift Share schemes- there is both a wider scheme, and one specific to PKC employees.<br>We will improve use of the PKC scheme through our own GTP | TACTRAN<br>PKC | | 2009 then ongoing | Activity data will be collected annually from both schemes and we will estimate vehicle km avoided in the AQMA and report reduction in emissions of $NO_x$ and $PM_{10}$. | Small-Medium | Further promotion was undertaken of the liftshare- total numbers increased by 23% | Further promotion was undertaken of the liftshare- total numbers increased by 23% | **Ongoing** | A baseline is still being developed |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Green Travel Plans for new developments. We will continue to seek travel plans from large developments under existing planning arrangements. | PKC | | 2009 then ongoing | Number of GTPs and estimation of effect specified in reporting year. | Low | This is a continual process through planning developments e.g. Murray Royal Hospital had to provide travel plans at the application stage. | This is a continual process through planning developments e.g. Murray Royal Hospital had to provide travel plans at the application stage. | **Ongoing** | |
| **8** | Traffic management | Keep "City Centre Traffic Management Review" under continual review. Our Traffic and Environmental teams will liaise regularly to discuss the effects of component measures of the CCTMR on air quality. | PKC | | Ongoing as required | We will report annually on any changes to the CCTMR and how we anticipate this affecting air quality. | Medium | Ongoing | Ongoing | **Ongoing** | |
| **9** | Planning and air quality | Consider air quality as an issue for the Local Development Plan | PKC | | 2009-12 | It is not possible to assign a quantitative indicator.<br>We will report on delivery of Local Development Plan, and | Medium | PKC are holding workshops, Environmental Health is a stakeholder, for discussion on Air Quality an issue for the 1st stage main issues report. | PKC are holding workshops, Environmental Health is a stakeholder, for discussion on Air Quality an issue for the 1st stage main issues report. | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | provide evidence that air quality considerations have been formalised within it | | | | | |
| | | Investigate development of supplementary planning guidance on air quality | PKC | | 2010-14 | It is not possible to assign a quantitative indicator.<br>We will report progress on development of new guidance, though it is explicitly linked to the forthcoming LDP. | Small | PKC are holding workshops for discussion. Air quality is an issue for the 1st stage main issues report | PKC are holding workshops for discussion. Air quality is an issue for the 1st stage main issues report | **Ongoing** | |
| | | Consider air quality in planning decisions and formalise decision making process/interaction with Environmental Health. This can relate not only to new transportation sources, but also to new biomass installations or | PKC | | Ongoing as required | It is not possible to assign a quantitative indicator. We will report on cases where air quality was a consideration in the reporting period, and the outcome of any decisions made. | Low | Planning applications 09/01691/AMM, 09/02126/FLM and 09/00348/REM were consulted on by Environmental health due to possible increase in traffic flows and due to industrial | Planning applications 09/01691/AMM, 09/02126/FLM and 09/00348/REM were consulted on by Environmental health due to possible increase in traffic flows and due to industrial | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | industrial sources. | | | | | | processes increasing ambient pollutant levels. Environmental Health will continue to check the weekly planning list and comment on applications which may adversely impact on local air quality | processes increasing ambient pollutant levels. Environmental Health will continue to check the weekly planning list and comment on applications which may adversely impact on local air quality | | |
| **10** | Procurement and air quality | Air quality will be formally considered in the tender process for new PKC vehicles. PKC currently specify a more stringent Euro standard than necessary.<br>A fleet survey will be necessary in the short term to establish the baseline for improvements. | PKC | | Fleet survey in year 1 of AQAP, then ongoing as tenders arise | If vehicles are replaced like for like, the number will be reported annually, with their Euro standard and that of the vehicle replaced. This will be fed into an emissions calculation and the saving in $NO_x$ and $PM_{10}$ will be reported annually.<br>If additional vehicles are | Small-Medium | We have investigated the possibility of replacing the Dog Control and Welfare diesel van with an electric van and a hybrid van. PKC intend to apply for grant funding to allow the installation of an electric hook up point. This will be followed with a network of electric hook up pints | We have investigated the possibility of replacing the Dog Control and Welfare diesel van with an electric van and a hybrid van. PKC intend to apply for grant funding to allow the installation of an electric hook up point. This will be followed with a network of electric hook up pints | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | bought, their Euro standard will be reported and an estimation of the impact of specifying a more stringent standard than necessary will be reported. | | | | | |
| **11** | Eco-driver training | PKC will seek to expand the existing provision of eco-driver training by utilising the newly formed training team to develop and add an eco-driving training course into our existing modular training syllabus.<br><br>The eco-driving module will become part of our regular driver CPC training package which will be delivered to all LGV drivers on an ongoing basis. The eco-module will also form part of future training | PKC | | Expanded programme by 2011 then ongoing | PKC intend to assess drivers after they have completed the training. The outcomes of these assessments (i.e. the fuel saving per driver) will allow simple calculation of avoided emissions of NOx and $PM_{10}$. | Small-Medium | 4 trainers have been trained | 4 trainers have been trained | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | modules for all council drivers as part of the driver assessment programme, which will also cover the driver's responsibilities on legislation and what pre-use vehicle checks need to be carried out and documented. | | | | | | | | | |
| **12** | Provision of travel information | Develop, promote and maintain a comprehensive Travel Information System, covering all modes and users and make this information available in hard-copy and on-line formats. Delivered through TACT Ran's Regional Travel Information Strategy. | TACTRAN<br>PKC | | Study/develop strategy by 2011<br>Specific measures ongoing to circa 2018. | We will liaise with TACTRAN and report annually on the findings of the feasibility work.<br>As initiatives are implemented we will report progress on these individually. | Medium | A web – based regional travel information database and journey planner has been in the course of development and is anticipated to go live in May 2010 | A web – based regional travel information database and journey planner has been in the course of development and is anticipated to go live in May 2010 | **Ongoing** | |
| | | Investigate and develop the provision of real time travel information for bus stops in Perth. | TACTRAN<br>PKC | | Study by end 2009<br>Implementation 2010-2018 | We will report annually the findings of any feasibility work that is carried out and report on | Small | No progress has been made in this area at this time | No progress has been made in this area at this time | | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | implementation as it is carried out | | | | | |
| | | Maintain current Public Transport Guides and section on PKC website | PKC | | 2009- ongoing | We will report on provision of materials and attempt to gauge penetration of these. | Small | Ongoing | Ongoing | **Ongoing** | |
| | | Hearts and Minds campaign to promote sustainable travel options | TACTRAN<br>PKC | | Ongoing to circa-2018 | We will liaise with TACTRAN and report annually on how what initiatives have been developed | Medium | AQ website is nearly ready for going live pending debugging and final checking.<br><br>'In Town Without My Car' initiative on the 22/09/09 was supported in terms of staffing and funding. | AQ website is nearly ready for going live pending debugging and final checking<br><br>'In Town Without My Car' initiative on the 22/09/09 was supported in terms of staffing and funding. | **Ongoing** | |
| **13** | Signage | Investigate the potential of Variable Message Signage linked to pollution monitoring systems. | PKC | | Feasibility work by 2011 | We will report annually the findings of any feasibility work that is carried out and develop the measure further based on their findings. | Medium | No progress | No progress | | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **14** | Alternative modes | Work closely with TACTRAN to aid delivery of the Walking and Cycling Strategy for the region to ensure walking and cycling are part of an integrated transport system. | TACTRAN<br>PKC | | Initial study- 2009/10<br>Ongoing liaison/review | We will liaise with TACTRAN annually and report progress with individual measures implemented under the Strategy | Medium | Cycle training provided to staff and production of walking and cycling maps has been undertaken. Grant funding has been awarded this year for a variety of walking , cycling and travel planning initiatives<br><br>Tactran has supported financially the provision of cycle lockers in Perth schools. | Cycle training provided to staff and production of walking and cycling maps has been undertaken. Grant funding has been awarded this year for a variety of walking , cycling and travel planning initiatives<br><br>Tactran has supported financially the provision of cycle lockers in Perth schools. | **Ongoing** | |
| **15** | Better access to public transport<br>(note: access to services, not person access to individual buses) | Work with planning colleagues to assess provision of public transport at new and existing developments | PKC | | 2009 then Ongoing | We will report on findings of reviews and any improvements made to the existing public transport network and on new developments that have been given public | Small | Grant funding has been awarded for a detailed investigation of public transport options for the soon to be expanded Murray Royal Hospital. We will report on findings as they | Grant funding has been awarded for a detailed investigation of public transport options for the soon to be expanded Murray Royal Hospital. We will report on findings as they | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | transport facilities. | | become available | become available | | |
| **16** | Idling emissions reduction | Enforce Vehicle Idling Regulations | PKC | | Feasibility study 2010 | Number of vehicles subject to enforcement. | Small | No progress | No progress | | |
| **17** | Roadside Emission Testing | Authorised Personnel to carry out roadside testing | PKC initially | | Feasibility study involving surrounding Local Authorities by end 2010 | Number of vehicles subject to enforcement | Small | No progress | No progress | | |
| **18** | LAQM marketing | Enhance existing provisions of publicity materials and ensure they reach their target audience.<br>Organise publicity initiatives in schools, large employers, public sector. | PKC | | Commence 2009, then ongoing. | Publication of materials, events held, website statistics. | Small-Medium | AQ website is nearly ready for going live pending debugging and final checking | AQ website is nearly ready for going live pending debugging and final checking | **Ongoing** | |
| **19** | LAQM monitoring and reporting | PKC will continue to monitor air pollution in the City and will meet its statutory reporting requirements. | PKC | | Ongoing | Monitoring data will be provided in annual progress reports to track the overall effect of the | Small | Ongoing | Ongoing | **Ongoing** | |

| No. | Measure | Focus | Lead authority | Planning phase | Implementation phase | Indicator | Target annual emission reduction in the AQMA | Progress to date | Progress in last 12 months | Estimated completion date | Comments relating to emission reductions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | AQAP. | | | | | |

**Potential AQ benefit criteria**

Small (0-0.5 µg/$m^3$ for $NO_2$ 0-0.2 µg/$m^3$ for $PM_{10}$)

Medium (0.5-1 µg/$m^3$ for $NO_2$ 0.2-0.5 µg/$m^3$ for $PM_{10}$)

High (>1 µg/$m^3$ for $NO_2$ >0.5 µg/$m^3$ for $PM_{10}$)

# 9 Conclusions and Proposed Actions

## 9.1 Conclusions from New Monitoring Data

Diffusion tube data captured within Perth's AQMA show exceedences at 16 locations; this is a reduction from 19 identified by the 2009 Updating and Screening Assessment. This is due in the main to the bias adjustment factor reducing from 1.03 in 2008 to 0.87 in 2009 (see Appendix A). The automatic monitor at Atholl St shows a reduction of 4 µg/m$^3$ from 60 µg/m$^3$ in 2008 to 56 µg/m$^3$ last year; however this is still well above the objective of 40 µg/m$^{3.}$ There were 3 exceedences of the hourly mean objective for $NO_2$ in 2009 compared to 25 in 2008. The Automatic Monitor located on High St shows a reduction from 27 µg/m$^3$ to 25 µg/m$^3$ for the annual mean $NO_2$ objective.

$PM_{10}$ data at both sites shows a decrease with Atholl St decreasing from 26 to 21 µg/m$^3$ and High St decreasing from 20 to 16 µg/m$^{3.}$ The exceedences of the daily objective have increased from 0 to 2 at High St but decreased from 5 to 3 at Atholl St.

This may in part be due to measures within the Action Plan which were in place before the official adoption of the plan by the council.

Out with Perth, Crieff results have decreased, again due to a much lower bias adjustment factor being applied. After the application of the bias adjustment factor there is one tube in Crieff still above the objective. One of the 2 new tubes at façade level in Crieff read above the objective level when the raw data is considered but below once bias has been applied. The fact that $NO_2$ is below the objective at façade level is reinforced by applying the distance from road calculator found at www.airquality.co.uk to the one exceedence in Crieff at West High Street. The façade level is calculated as 34.4 mg/m$^3$ when calculated using this tool.

## 9.2 Conclusions relating to New Local Developments

New local developments are not anticipated to require a detailed consideration at the next Updating and Screening Assessment at this stage.

## 9.3 Proposed Actions

As discussed above monitoring has shown there are still exceedences in and around Perth City Centre therefore the AQMA should stay in place. The Air Quality Action Plan is now in place and Perth and Kinross Council have received grant funding from the Scottish Government towards measures contained within the plan.

Kerbside monitoring in Crieff shows exceedences of the annual $NO_2$ standard but the façade tubes are just below the standard. This is due to a much lower bias adjustment factor this year which may change next year. From April this year an Automatic Monitoring station for $NO_2$ and $PM_{10}$ has been up and running at James Square in Crieff. This will give PKC air quality officers a better idea of levels of these pollutants here, which will allow us to make an informed decision regarding whether or not we have to proceed to a Detailed Assessment in Crieff.

# 10 References

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Guidance LAQM.TG (09).

Spreadsheet of Bias Adjustment Factors accessed at www.uwe.ac.uk/aqm/review.

UK National Air Quality Information Archive, accessed at www.airquality.co.uk,

Air Quality Detailed Assessment. 2004, AEA Technology plc, Report AEAT/ENV/R1708 Issue 1

Air Quality Updating and Screening Assessment 2006, AEA Technology plc Report AEAT/ENV/R2256 issue 2

Further Assessment of Air Quality 2007 AEA Technology plc Report AEA/ED49360001 issue 1

Perth & Kinross Council Progress Report 2007 & 2008

Regional Transport Strategy http://www.tactran.gov.uk/documents/TACTRANRTS-FinalNov2008.pdf

National Transport Strategy
http://www.scotland.gov.uk/Publications/2006/12/04104414/0

Scotland's Climate Change Declaration (SCCD) Perth and Kinross Council's first annual progress report http://www.sustainable-scotland.net/documents/6703_annual%20progress%20report.pdf

Perth and Kinross Local Climate Impacts Profile (LCLIP)
http://www.pkc.gov.uk/NR/rdonlyres/E590425C-2665-4D13-B8DD-B70C659B3080/0/PerthandKinrossLocalClimateImpactProfile2008_w.pdf

AEA (on behalf of Defra and the Devolved Administrators), WASP – Annual Performance Criteria for

NO2 Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards, and Summary of
Laboratory Performance in Rounds 102-106 (http://www.laqmsupport.org.uk/), December 2009

AEA (on behalf of Defra and the Devolved Administrators), WASP – Annual Performance Criteria for
NO2 Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards, and Summary of
Laboratory Performance in Rounds 103-107 (http://www.laqmsupport.org.uk/), January 2010

# Appendices

Appendix A: QA/QC Data

Appendix B:

# Appendix A: QA: QC Data

Diffusion Tube Bias Adjustment Factors

### Diffusion Tube Bias Adjustment Factors

Diffusion tube monitoring has been undertaken at 44 locations within the Perth AQMA, and at 8 further locations within the Perth and Kinross Council area. The tubes are analysed by Dundee Scientific Services using a 20% TEA in water preparation method. Data capture at all of the sites was high, with at least eleven months data at all sites. The Bias adjustment for Tayside Scientific Services from the national database found at: http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusiontube310310.xls was 0.77.

### Factor from Local Co-location Studies (if available)

Collocation studies have been carried out at both of the automatic monitors in Perth, where diffusion tubes have been exposed in triplicate and the measured concentrations compared with the monthly results from the automatic monitor. The precision and accuracy tool found at http://www.airquality.co.uk/laqm/tools was used to determine bias factors for each of the automatic monitors. The results are below

## Atholl St Bias

# Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

| Diffusion Tubes Measurements | | | | | | | | | | Automatic Method | | Data Quality Check | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Mean | Standard Deviation | Coefficient of Variation (CV) | 95%CI of mean | Period Mean | Data Capture (% DC) | Tubes Precision Check | Automatic Monitor Data Capture |
| 1 | 06/01/20009 | 03/02/2009 | 68.4 | 63.6 | 66.7 | 66 | 2.4 | 4 | 6.0 | 69 | 99 | Good | Good |
| 2 | 03/02/2009 | 03/03/2009 | 69 | 74.1 | 67.9 | 70 | 3.3 | 5 | 8.2 | 60 | 100 | Good | Good |
| 3 | 03/03/2009 | 31/03/2009 | 66.1 | 65.8 | 61 | 64 | 2.9 | 4 | 7.1 | 60 | 100 | Good | Good |
| 4 | 31/03/2009 | 28/04/2009 | 70.7 | 64.7 | 66.1 | 67 | 3.1 | 5 | 7.8 | 63 | 96 | Good | Good |
| 5 | 28/04/2009 | 02/06/2009 | 61.8 | 62.7 | 62 | 62 | 0.5 | 1 | 1.2 | 50 | 99 | Good | Good |
| 6 | 02/06/2009 | 30/06/2009 | 58.4 | 59.7 | 56.6 | 58 | 1.6 | 3 | 3.9 | 41 | 100 | Good | Good |
| 7 | 30/06/2009 | 04/08/2009 | 54.4 | 55.6 | 52.7 | 54 | 1.5 | 3 | 3.6 | 44 | 86 | Good | Good |
| 8 | 04/08/2009 | 01/09/2009 | 58.4 | 59.7 | 56.6 | 58 | 1.6 | 3 | 3.9 | 49 | 100 | Good | Good |
| 9 | 01/09/2009 | 29/09/2009 | 55.7 | 59.9 | 59.6 | 58 | 2.3 | 4 | 5.8 | 48 | 100 | Good | Good |
| 10 | 29/09/2009 | 03/11/2009 | 62.3 | 63.2 | 59.6 | 62 | 1.9 | 3 | 4.7 | 50 | 99 | Good | Good |
| 11 | 03/11/2009 | 01/12/2009 | 69.2 | 71.8 | 71.5 | 71 | 1.4 | 2 | 3.5 | 62 | 99 | Good | Good |
| 12 | 01/12/2009 | 05/11/2010 | 71 | 72 | 69 | 71 | 1.5 | 2 | 3.8 | 71 | 100 | Good | Good |
| 13 | | | | | | | | | | | | | |
| | | | | | | | | | | | Overall survey --> | Good precision | Good Overall DC |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

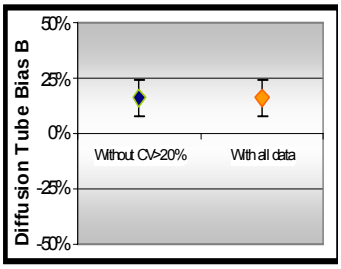
(Check average CV & DC from Accuracy calculations)

| Site Name/ ID: | Perth Atholl St |
|---|---|

Precision: 12 out of 12 periods have a CV smaller than 20%

**Accuracy (with 95% confidence interval)**
**without periods with CV larger than 20%**
Bias calculated using 12 periods of data
Bias factor A: 0.87 (0.82 - 0.94)
Bias B: 14% (6%- 22%)
Diffusion Tubes Mean: 64 $\mu gm^{3}$
Mean CV (Precision): 3
Automatic Mean: 56 $\mu gm^{3}$
Data Capture for periods used: 98%
Adjusted Tubes Mean: 55 (52 - 60) $\mu gm^{3}$

**Accuracy (with 95% confidence interval)**
**WITH ALL DATA**
Bias calculated using 12 periods of data
Bias factor A: 0.87 (0.82 - 0.94)
Bias B: 14% (6%- 22%)
Diffusion Tubes Mean: 64 $\mu gm^{3}$
Mean CV (Precision): 3
Automatic Mean: 56 $\mu gm^{3}$
Data Capture for periods used: 98%
Adjusted Tubes Mean: 55 (52 - 60) $\mu gm^{3}$




Jaume Targa
jaume.targa@aeat.co.uk
Version 03 - November 2006

## High St Bias

# Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

| Diffusion Tubes Measurements | | | | | | | | | | Automatic Method | | Data Quality Check | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Mean | Standard Deviation | Coefficient of Variation (CV) | 95%CI of mean | Period Mean | Data Capture (% DC) | Tubes Precision Check | Automatic Monitor Data Capture |
| 1 | 06/01/20009 | 03/02/2009 | 36.3 | 36.7 | 32.2 | 35 | 2.5 | 7 | 6.2 | 34 | 100 | Good | Good |
| 2 | 03/02/2009 | 03/03/2009 | 37.9 | 39.9 | 38.3 | 39 | 1.1 | 3 | 2.6 | 35 | 100 | Good | Good |
| 3 | 03/03/2009 | 31/03/2009 | 30.5 | 33.5 | 32.4 | 32 | 1.5 | 5 | 3.8 | 23 | 100 | Good | Good |
| 4 | 31/03/2009 | 28/04/2009 | 27.4 | 29.9 | 29.2 | 29 | 1.3 | 4 | 3.2 | 22 | 97 | Good | Good |
| 5 | 28/04/2009 | 02/06/2009 | 22.8 | 22.3 | 21.9 | 22 | 0.5 | 2 | 1.1 | 17 | 100 | Good | Good |
| 6 | 02/06/2009 | 30/06/2009 | 20.3 | 19.8 | 21.2 | 20 | 0.7 | 3 | 1.8 | 16 | 100 | Good | Good |
| 7 | 30/06/2009 | 04/08/2009 | 23.6 | 23.5 | 23.1 | 23 | 0.3 | 1 | 0.7 | 18 | 100 | Good | Good |
| 8 | 04/08/2009 | 01/09/2009 | 20.3 | 19.8 | 21.2 | 20 | 0.7 | 3 | 1.8 | 16 | 99 | Good | Good |
| 9 | 01/09/2009 | 29/09/2009 | 24.1 | 22.4 | 23.1 | 23 | 0.9 | 4 | 2.1 | 20 | 100 | Good | Good |
| 10 | 29/09/2009 | 03/11/2009 | 29.4 | 28.6 | 28.7 | 29 | 0.4 | 2 | 1.1 | 27 | 77 | Good | Good |
| 11 | 03/11/2009 | 01/12/2009 | 36.2 | 36.1 | 37.4 | 37 | 0.7 | 2 | 1.8 | 29 | 98 | Good | Good |
| 12 | 01/12/2009 | 05/11/2010 | 52.3 | 52.8 | 54.1 | 53 | 0.9 | 2 | 2.3 | 49 | 100 | Good | Good |
| 13 | | | | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey --> Good precision | Good Overall DC

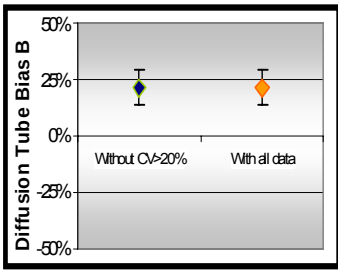
(Check average CV & DC from Accuracy calculations)

| Site Name/ ID: | Perth High St |
|---|---|

Precision: 12 out of 12 periods have a CV smaller than 20%

| Accuracy (with 95% confidence interval) |
|---|
| without periods with CV larger than 20% |
| Bias calculated using 12 periods of data |
| Bias factor A: 0.84 (0.79 - 0.9) |
| Bias B: 19% (11% - 26%) |
| Diffusion Tubes Mean: 30 $\mu gm^3$ |
| Mean CV (Precision): 3 |
| Automatic Mean: 26 $\mu gm^3$ |
| Data Capture for periods used: 98% |
| Adjusted Tubes Mean: 25 (24 - 27) $\mu gm^3$ |

| Accuracy (with 95% confidence interval) |
|---|
| WITH ALL DATA |
| Bias calculated using 12 periods of data |
| Bias factor A: 0.84 (0.79 - 0.9) |
| Bias B: 19% (11% - 26%) |
| Diffusion Tubes Mean: 30 $\mu gm^3$ |
| Mean CV (Precision): 3 |
| Automatic Mean: 26 $\mu gm^3$ |
| Data Capture for periods used: 98% |
| Adjusted Tubes Mean: 25 (24 - 27) $\mu gm^3$ |




Jaume Targa
jaume.targa@aeat.co.uk

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**Discussion of Choice of Factor to Use**

The co-location studies gave factors of 0.87 and 0.84 for Atholl Street and High Street respectively. The factor given on the national database of co-location studies, found at: http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusiontube050509.xls was 0.77. Based on advice given in Technical Guidance LAQM TG (09)), it was decided a local factor would be more appropriate. The Atholl Street figure was chosen as the higher of the two, in order to obtain worst case scenario results. As we are using the highest of the 3 possible figures, the results are likely to be somewhat conservative.

**PM Monitoring Adjustment**

TEOM data used by Perth and Kinross Council was corrected using the Volatile Correction Model by AEA using daily average purge measurements from the 9 FDMS sites in Scotland.

**QA/QC of automatic monitoring**

AEA carries out the QA/QC for the automatic monitors and they are calibrated annually

**QA/QC of diffusion tube monitoring**

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO2 Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). The laboratory participants analyse four spiked tubes, and report the results to HSL. HSL assign a performance score to each laboratory's result, based on their deviation from the known mass of nitrite in the analyte.

The outcomes of these QA/QC schemes are evaluated on a regular basis against a set of pre-defined performance criteria. The Performance criteria are due to be changed, *at present* the criteria are based on the z-score method, however from April 2009; the criteria will be based upon the Rolling Performance Index (RPI) statistic.

Dundee Scientific Services takes part in this scheme and in each of the rounds: 102-106 (July 2008-July 2009) and 103-107 (Oct 2008-Oct 2009); were scored as good.

# Appendix B Diffusion Tube Results

## Perth Nitrogen Dioxide Diffusion Tube Results ($\mu gm^{-3}$)

| Site No | Address | Jan-09 | Feb-09 | Mar-09 | Apr-09 | May-09 | Jun-09 | Jul-09 | Aug-09 | Sep-09 | Oct-09 | Nov-09 | Dec-09 | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Perth 1 L | 42 Scott St, Perth, PH1 5PH | 51.8 | 52.6 | 41.9 | 55.6 | 42.8 | 34.9 | 42.7 | 34.9 | 36.8 | 45.7 | 52.8 | 72.7 | 47.1 |
| Perth 1 C | 42 Scott St, Perth, PH1 5PH | 54.3 | 48.8 | 42.4 | 58.2 | 40.6 | 33.4 | 41.1 | 33.4 | 37 | 44 | 51.1 | 71.4 | 46.3 |
| Perth 1 R | 42 Scott St, Perth, PH1 5PH | 52.9 | 49.1 | 42.8 | 53.7 | 40.8 | 34 | 41.4 | 34 | 32.9 | 47.8 | 50.6 | 75.6 | 46.3 |
| Perth 2 | 17 Speygate, Perth, PH2 8PJ | 32.1 | 41.8 | 29.2 | 27.7 | 21 | 18.1 | 21.2 | 18.1 | 21 | 28.3 | 31.4 | 48 | 28.2 |
| Perth 3 L | 15 Murray Crest, Perth, PH2 0HU | 33.1 | 29.4 | 20.8 | 23.4 | 16.1 | 12.6 | 13.1 | 12.6 | 16.8 | 23.6 | 27.2 | 45.3 | 22.8 |
| Perth 3 R | 15 Murray Crest, Perth, PH2 0HU | 31.3 | 33.6 | 26.5 | 23.4 | 16 | 12.5 | 13.7 | 12.5 | 15.9 | 21.9 | 28.1 | 42.5 | 23.2 |
| Perth 5 L | 8 Stormont St, Perth, PH1 5NW | 39.4 | 37.5 | 31.7 | 29 | 24.3 | 21.3 | 18.8 | 21.3 | 24.4 | 27.8 | 32.7 | 41.2 | 29.1 |
| Perth 5 R | 8 Stormont St, Perth, PH1 5NW | 38.9 | 33.5 | 26.4 | 26.3 | 20.5 | 21.3 | 18.6 | 21.3 | 22.7 | 24.9 | 35.4 | 39.4 | 27.4 |
| Perth 6 | 41 Mull Place, Perth, PH1 3DP | 25.8 | 21 | 15.4 | 15.4 | 10 | 9.8 | 0 | 9.8 | 10.8 | 15.8 | 21.3 | 29.2 | 15.4 |
| Perth 7 | 257 Rannoch Rd/Newhouse Road Roundabout, Perth, PH1 2DW | 22.9 | 26.1 | 19.6 | 23.5 | 15.5 | 14.2 | 0 | 14.2 | 14.6 | 21.7 | 28.2 | 42.8 | 20.3 |
| Perth 13 L | 86/88 South Street Perth PH2 8PD | 50.2 | 55.9 | 47.7 | 44.5 | 42.3 | 34.2 | 33.3 | 34.2 | 36.5 | 42.1 | 45.7 | 52.1 | 43.2 |
| Perth 13 R | 86/88 South Street Perth PH2 8PD | 49.7 | 56.4 | 41.6 | 47.8 | 41.7 | 35 | 33.8 | 35 | 37.4 | 38.7 | 40.2 | 54.9 | 42.7 |
| Perth 14 L | 9 Main St, Bridgend, Perth, PH2 7HD | 44 | 49.5 | 38.9 | 58.8 | 43.5 | 34.6 | 45.2 | 34.6 | 36.2 | 45.5 | 46.7 | 61.2 | 44.9 |
| Perth 14 C | 9 Main St, Bridgend, Perth, PH2 7HD | 48.6 | 47 | 39.3 | 55.7 | 47.1 | 36.7 | 46.3 | 36.7 | 36.3 | 48.1 | 48.1 | 59.9 | 45.8 |
| Perth 14 R | 9 Main St, Bridgend, Perth, PH2 7HD | 50.8 | 48.9 | 40 | 54.6 | 46 | 35.6 | 45.1 | 35.6 | 33.8 | 46.8 | 46.5 | 60.9 | 45.4 |
| Perth 19 | St Ninian's School ,Dunkeld Rd, Perth, PH1 5RF | 46 | 48.8 | 39.9 | 41.9 | 32.8 | 35.1 | 31.1 | 35.1 | 33.5 | 42.5 | 49.9 | 58.8 | 41.3 |
| Perth 20 | 2 Crieff Road Perth PH1 5RT | 38.6 | 34.2 | 31.2 | 37.2 | 24.3 | 26.3 | 27.6 | 26.3 | 26.4 | 35.2 | 41.1 | 55.6 | 33.7 |
| P28 | 28 York Place Perth PH2 8EH | 61.5 | 56.8 | 46.6 | 62.5 | 34.4 | 43.3 | 44 | 43.3 | 42.5 | 49.1 | 52.1 | 68 | 50.3 |
| P29 | 37 York Place Perth PH2 8EH | 38.4 | 55.3 | 39.8 | 49.1 | 47.1 | 32.1 | 37.8 | 32.1 | 32.1 | 45.5 | 49.5 | 65.7 | 43.7 |
| P30 L | 104 South St, Perth, PH2 8PA | 52.2 | 63.5 | 54.1 | 51.6 | 42.8 | 38.5 | 34.4 | 38.5 | 40.1 | 41.7 | 50.3 | 54.3 | 46.8 |
| P30 C | 104 South St, Perth, PH2 8PA | 52.4 | 57.7 | 54.9 | 50.4 | 42.9 | 35.2 | 34.7 | 35.2 | 42.8 | 42.5 | 51.3 | 56.9 | 46.4 |
| P30 R | 104 South St, Perth, PH2 8PA | 46.3 | 58.1 | 50.1 | 45.1 | 40.6 | 28.3 | 36.4 | 28.3 | 44.6 | 47.9 | 46.6 | 55.3 | 44.0 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P31 | 45-47 South St, Perth, PH2 8PD | 38.2 | 47.5 | 34.5 | 41 | 30.6 | 22.1 | 29.6 | 22.1 | 26.5 | 35.9 | 37.5 | 48.7 | 34.5 |
| P32 | 135 South St, Perth, PH2 8PA | 46.6 | 56.6 | 49.2 | 47.6 | 35 | 28.6 | 37.3 | 28.6 | 33.5 | 40.7 | 47.2 | 63.6 | 42.9 |
| P33 | 216 South Street Perth PH2 8NY | 54.7 | 56.5 | 43.9 | 49.6 | 41.5 | 41.7 | 38 | 41.7 | 43.6 | X | 47.2 | 68.8 | 47.9 |
| P34 L | 10 County Place, Perth, PH2 8EE | 60 | 63.6 | 55.3 | 63.3 | 53.6 | 49.4 | 46.9 | 49.4 | 51.3 | 52 | 64.4 | 65 | 56.2 |
| P34 R | 10 County Place, Perth, PH2 8EE | 62 | 67.6 | 56.3 | 63.5 | 54.5 | 49.7 | 48.9 | 49.7 | 52.6 | 57.1 | 58.4 | 65.8 | 57.2 |
| P35 | 17 Princes St, Perth, PH2 8NG | 37.8 | 47.7 | 33.1 | 30 | 25.3 | 23.4 | 24.7 | 23.4 | 27.5 | 34.7 | 38.9 | 56.2 | 33.6 |
| P36 | 51 Glasgow Rd, Perth, PH2 0PE | 42.4 | 48 | 39.1 | 39 | 25.1 | 28.2 | 30.2 | 28.2 | 30.2 | 39.9 | 38.5 | 60.1 | 37.4 |
| P37 | Riggs Rd, Perth, PH1 1PR | 35.1 | 39 | 31.9 | 35.4 | 34.8 | 24.8 | 24.8 | 24.8 | 28.1 | 35.1 | 39.9 | 55.4 | 34.1 |
| P38 | 93-109 Main St Bridgend, PH2 7HE | 40.9 | 37 | 31.8 | 43.4 | 36.6 | 28.5 | 34 | 28.5 | 26.8 | 33.7 | 32.3 | 45 | 34.9 |
| P39 L | 39 Main St, Bridgend, PH2 7HD | 61.8 | 56.8 | 49.3 | 61.5 | 55 | 44 | 55.1 | 44 | 43.7 | 54.2 | 55.2 | 53.6 | 52.9 |
| P39 R | 39 Main St, Bridgend, PH2 7HD | 63.2 | 64.7 | 46.6 | 65 | 48.9 | 42.6 | 55 | 42.6 | 43.7 | 58.2 | 53.6 | 65.3 | 54.1 |
| P40 L | 18 Main St, Bridgend, PH2 7HB | 54.3 | 59.2 | 57.4 | 52.7 | 47.9 | 42.8 | 47.8 | 42.8 | 47.9 | 53.1 | 53.2 | 59.8 | 51.6 |
| P40 R | 18 Main St, Bridgend, PH2 7HB | 57.2 | 69.3 | 58.4 | 55.1 | 47 | 44 | 47.2 | 44 | 49.3 | 53.7 | 53.7 | 59.9 | 53.2 |
| P41 L | 76 Atholl St, Perth, PH1 5NL | 64.6 | 67.6 | 54.7 | 69.8 | 53.5 | 39 | 58.7 | 39 | 43.6 | 58.7 | 60.2 | 79.7 | 57.4 |
| P41 R | 76 Atholl St, Perth, PH1 5NL | 60.1 | 62.7 | 53.8 | 69 | 51.2 | 40.3 | 53.3 | 40.3 | 43.5 | 60.6 | 62.4 | 77.8 | 56.3 |
| P42 | 26-28 Atholl St, Perth, PH1 6NP | 61.2 | 59.6 | 52.7 | 54.8 | 44 | 35 | 47.6 | 35 | 43.1 | 50.6 | 56 | 72 | 51.0 |
| P43 L | 17 Atholl St, Perth, PH1 5NH | 64.2 | 64.9 | 64.2 | 67.8 | 58.3 | 54.5 | 53.5 | 54.5 | 54.1 | 58.1 | 66.2 | 66.8 | 60.6 |
| P43 C | 17 Atholl St, Perth, PH1 5NH | 64.6 | 70 | 61.5 | 65.3 | 57.6 | 50.9 | 50.1 | 50.9 | 53.9 | 62.9 | 70 | 70.1 | 60.7 |
| P43 R | 17 Atholl St, Perth, PH1 5NH | 65.1 | 66.6 | 62.9 | 68.6 | 55.7 | 56.4 | 55.7 | 56.4 | 55.3 | 57.9 | 66.4 | 69.3 | 61.4 |
| P44 L | 22 Barrack St, Perth, PH1 5RD | 56.7 | 57.5 | 44.1 | 55.6 | 41 | 34.2 | 40 | 34.2 | 37.6 | 50.6 | 55.6 | 76.9 | 48.7 |
| P44 R | 22 Barrack St, Perth, PH1 5RD | 56.2 | 57.5 | 48.9 | 57.3 | 44.7 | 35.9 | 41.5 | 35.9 | 35.9 | 50.1 | 56.4 | 78 | 49.9 |
| P45 | Ballantine Place, Perth PH1 5RR | 35.9 | 32.9 | 24.1 | 30.4 | 17.8 | 15.7 | 19.9 | 15.7 | 15.5 | 28.3 | 32.7 | 50.2 | 26.6 |
| P46 | 204 A Crieff Rd, Perth, PH1 2PE | 43.2 | 34.8 | 29.4 | 39.7 | 26.6 | 27.2 | 29.4 | 27.2 | 28.1 | 35.8 | 43.7 | 51.8 | 34.7 |
| P47 | 5 East Huntingtower, Perth, PH1 3JJ | 38.8 | 37.1 | 28.9 | 35.5 | 26.3 | 22.5 | 27.2 | 22.5 | 24.4 | 36.2 | 37.5 | 45.8 | 31.9 |
| P48 | 30 Edinburgh Rd, Perth, PH2 8BX | 37.1 | 29.3 | 25.2 | 36.7 | 23.1 | 20 | 22.5 | 22 | 17.8 | 33 | 35.5 | 48.2 | 29.2 |
| P49 | Opp Wood'n Garden, Glencarse, PH2 7LX | 35.7 | 27.4 | 21.1 | 38.2 | 26.1 | 20.3 | 18.6 | 20.3 | 20.2 | 26 | 28.3 | 39.5 | 26.8 |
| P50 | Linden Garden Centre, Glencarse, PH2 7LX | 35.2 | 28 | 23.8 | 36.9 | 24.9 | 19.6 | 20.7 | 19.6 | 19 | 27.6 | 32.7 | 40.3 | 27.4 |
| P51 | 2 West Bridge St, Bridgend, Perth, PH2 7HA | 36.6 | 46.8 | 35.6 | 34.4 | 27.1 | 22.7 | 31.6 | 22.7 | 27.6 | 32.8 | 37.6 | 53.4 | 34.1 |
| P54L | Real Time Monitor adjacent to 176 High St, Perth PH1 5EW | 36.3 | 37.9 | 30.5 | 27.4 | 22.8 | 20.3 | 23.6 | 20.3 | 24.1 | 29.4 | 36.2 | 52.3 | 30.1 |
| P54C | Real Time Monitor adjacent to 176 High St, Perth PH1 5EW | 36.7 | 39.9 | 33.5 | 29.9 | 22.3 | 19.8 | 23.5 | 19.8 | 22.4 | 28.6 | 36.1 | 52.8 | 30.4 |
| P54R | Real Time Monitor adjacent to 176 High St, Perth PH1 5EW | 32.2 | 38.3 | 32.4 | 29.2 | 21.9 | 21.2 | 23.1 | 21.2 | 23.1 | 28.7 | 37.4 | 54.1 | 30.2 |
| P55 | 7 West High St, Crieff | 50.2 | 53.6 | 47.4 | 56.7 | 46.9 | 42.7 | 52.7 | 42.7 | 41 | 62.6 | 52.8 | 67.6 | 51.4 |
| P56 | 39, High St, Crieff | 43.9 | 41.3 | 37.8 | 47.1 | 37.1 | 35.2 | 32.9 | 35.2 | 34 | 38.1 | 47.8 | 48.1 | 39.9 |
| P57 | The Highland Trading Company, 62, High St, Crieff | 43.9 | 38.2 | 37.1 | 35.4 | 30.6 | 27.2 | 32.8 | 27.2 | 28.7 | 39.8 | 42.8 | 52.1 | 36.3 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P58 L | 9 East High St, Crieff | 48.2 | 44.7 | 43.3 | 51.9 | 43.1 | 33.6 | 36.3 | 33.6 | 34.1 | 47.1 | 48.3 | 52.4 | 43.1 |
| P58R | 9 East High St, Crieff | 48.8 | 46.2 | 42.8 | 50.6 | 41.3 | 33 | 39.7 | 33 | 33.7 | 43.8 | 52.4 | 60.9 | 43.9 |
| P59 | 12 Dunkeld Street, Aberfeldy | 38.1 | 32.2 | 28 | 33.7 | 25.2 | 26.4 | 26.2 | 26.4 | 25.7 | 30.5 | 36.9 | 43.5 | 31.1 |
| P60L | Highland Gift Shop, Bridgend, Aberfeldy | 24.6 | 23.8 | 21.5 | 26.7 | 21.6 | 20 | 19.8 | 20 | 20.1 | 21.3 | 23.4 | 26 | 22.4 |
| P60R | Highland Gift Shop, Bridgend, Aberfeldy | 26.1 | 24.4 | 21.3 | 25.6 | 22.4 | 19.3 | 19.1 | 19.3 | 17.5 | 21.6 | 24.9 | 28.1 | 22.5 |
| P61L | Atholl St, Perth real time monitor | 68.4 | 69 | 66.1 | 70.7 | 61.8 | 58.4 | 54.4 | 58.4 | 55.7 | 62.3 | 69.2 | 71 | 63.8 |
| P61C | Atholl St, Perth real time monitor | 63.6 | 74.1 | 65.8 | 64.7 | 62.7 | 59.7 | 55.6 | 59.7 | 59.9 | 63.2 | 71.8 | 72 | 64.4 |
| P61R | Atholl St, Perth real time monitor | 66.7 | 67.9 | 61 | 66.1 | 62 | 56.6 | 52.7 | 56.6 | 59.6 | 59.6 | 71.5 | 69 | 62.4 |
| P62 | 84 Dundee Rd, Perth PH2 7BA | 45.5 | 49.7 | 34.8 | 47.6 | 31.3 | 28.6 | 38.8 | 28.6 | 30.2 | 45.1 | 46.6 | 63.9 | 40.9 |
| P63 | 30 Dundee Rd, Perth PH2 7AQ | 48.9 | 51.2 | 42.8 | 55.7 | 45.7 | 39.1 | 48.9 | 39.1 | 36.5 | 51.5 | 49.8 | 56.9 | 47.2 |
| P64 | The Lodge, Isla Rd, Bridgend, Perth PH2 7HG | 54.4 | 68.9 | 51.7 | 60.5 | 48.1 | 46.6 | 54.1 | 46.6 | 54.6 | 56.9 | 59.6 | 68 | 55.8 |
| P65 | 5-7 Charlotte Street, Perth PH1 5LW | 42.1 | 40.5 | 31.4 | 45.2 | 34.6 | 23.3 | 28 | 23.3 | 26 | 35 | 38.7 | 48.5 | 34.7 |
| P67 | 1 Atholl Street, Perth PH1 5NH | 53.6 | 40.1 | 50.7 | 50.2 | 41.1 | 40.4 | 35.2 | 40.4 | 43.3 | 43.8 | 55.6 | 52.9 | 45.6 |
| P68 | 2 Atholl Street, Perth PH1 5NP | 41.9 | 49.1 | 40.1 | 35.3 | 27.5 | 25.3 | 31.2 | 25.3 | 32.5 | 38.6 | 43.5 | 50.8 | 36.8 |
| P69 | United Free Church of Scotland, Kinnoull Street, Perth PH1 5EZ | 55.6 | 61.9 | 61.1 | 51.8 | 33 | 30.6 | 37.7 | 30.6 | 35.3 | 44 | 53.9 | 68.1 | 47.0 |
| P70 | Leith Buildings, 28 Dunkeld Rd, Perth PH1 5AJ | 42.8 | 45.7 | 36.7 | 40.2 | 27.1 | 26.2 | 29 | 26.2 | 24.5 | 37.3 | 40.6 | 64.5 | 36.7 |
| P71 | 134-140 Dunkeld Road, Perth PH1 5AS | 26.7 | 25.3 | 18.3 | 22.1 | 13.1 | 11.6 | 11.9 | 11.6 | 12.6 | 20 | 24.9 | 44.4 | 20.2 |
| P72 | 82 Crieff Road, Perth PH1 2RP | 49.1 | 50.5 | 45 | 45.9 | 37.5 | 35 | 34.4 | 35 | 41.2 | 46.2 | 49.8 | 57.3 | 43.9 |
| P73 | CRIEFF - NEW | | 44.8 | 43.8 | 49.3 | 40.3 | 32.7 | 43 | 32.7 | 33.7 | 48.2 | 31.3 | 58.8 | 41.7 |
| P74 | CRIEFF - NEW | | 37.6 | 38.2 | 42.1 | 35.5 | 33.1 | 32.8 | 33.1 | 32 | 38.7 | 44.7 | 45.4 | 37.6 |