



Detailed Assessment of Nitrogen Dioxide at Portobello, Gateshead

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

Date: May 2011 (revised October 2011)

A DETAILED ASSESSMENT OF NITROGEN DIOXIDE AT PORTOBELLO, BIRTLEY, GATESHEAD

1 Introduction

1.1 This is a detailed assessment of air quality in Gateshead Council's Portobello Air Quality Management Area (AQMA), which was declared by Order on 1 April 2008 for nitrogen dioxide (NO₂). The AQMA is shown in Figure 1.

1.2 Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections. Continued or frequent exposure to concentrations that are much higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children.

1.3 Nitrogen dioxide is mainly derived from road transport sources and other combustion sources such as the electricity supply industry. In Gateshead the nitrogen dioxide hotspots are caused by pollution from road traffic.

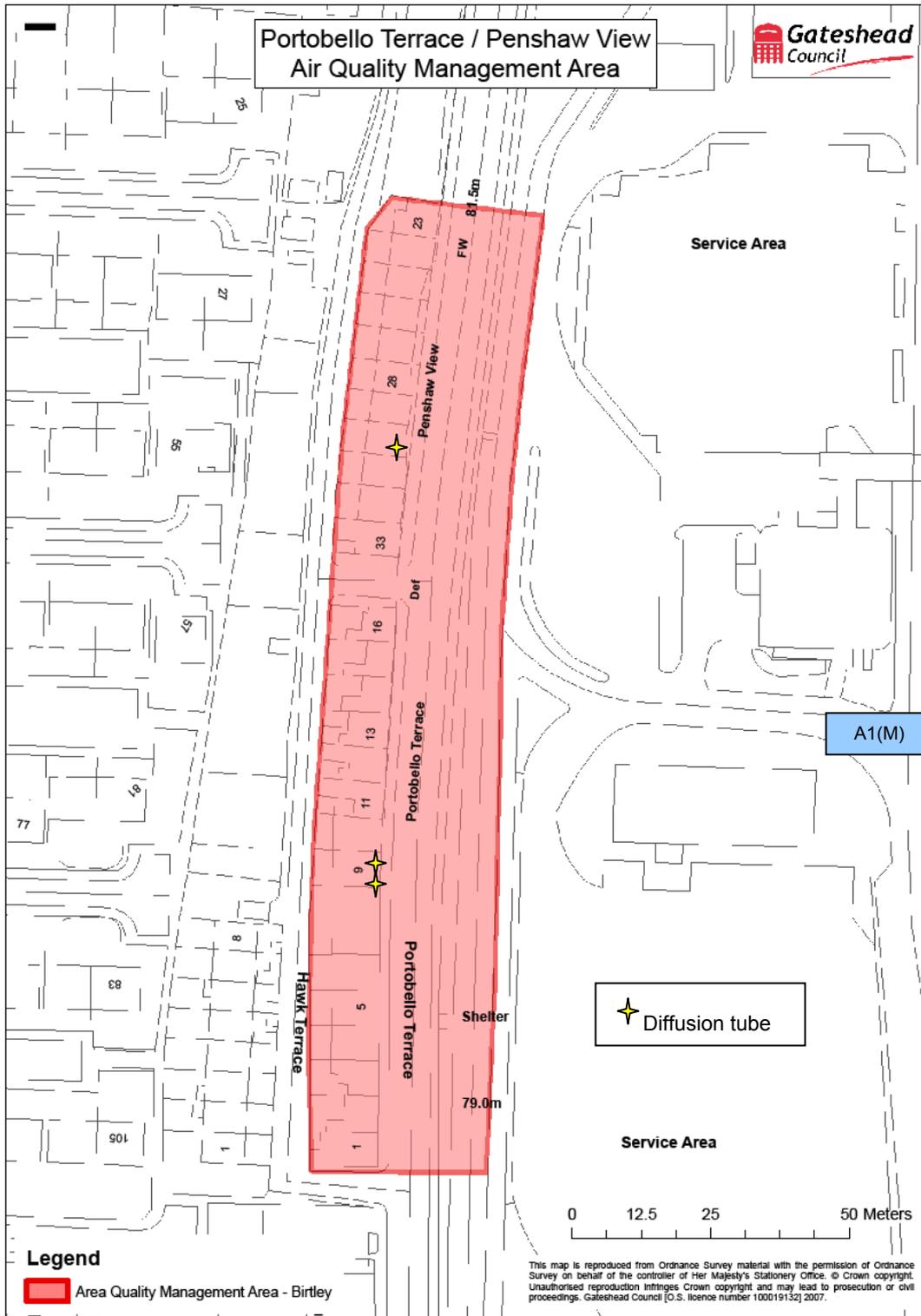
Air Quality Objectives

1.4 The UK Air Quality Strategy defines standards and objectives for each of a range of air pollutants. The standards are set as concentrations below which health effects are unlikely, even in sensitive population groups, or below which risks to public health would be exceedingly small, based on medical and scientific evidence. The objectives set out the dates by which the standards are to be achieved. The objectives are prescribed within The Air Quality (England) Regulations 2000, and amendments.

1.5 The air quality objectives (AQO's) only apply where members of the public are likely to be regularly present for the averaging time of the objectives. For annual mean objectives, relevant exposure is limited to residential properties, schools and hospitals. The 1-hour objectives may apply at outdoor locations such as shopping streets, and bus and railway stations that are not fully enclosed.

1.6 There are two air quality objectives for nitrogen dioxide both of which were to be achieved by 2005 - a 1-hour mean of 200 µgms/m³ which should not be exceeded more than 18 times a year; and an annual mean of 40 µgms/m³. Compliance with the annual mean objective has been assessed for residential properties at Portobello.

Figure 1: Portobello AQMA



The Portobello Air Quality Management Area

1.7 The Portobello Air Quality Management Area consists of a row of 27 terraced houses whose front elevations are located on a C classified road (Portobello Terrace and Penshaw View), which had an annual average daily traffic flow (AADT) of 7199 for 2010. The properties have no front gardens, and face the A1(M) trunk road, with an AADT in 2010 of 82,907 vehicles, which runs parallel to the C road at a distance of approximately 90 metres to the East. The motorway northbound and south bound services are also situated in the locality (see map Figure 1).

1.8 An updating and screening assessment (USA) carried out as part of the third round review and assessment of air quality in Gateshead in 2006 identified a number of locations where the annual mean UK air quality objective for nitrogen dioxide ($40\mu\text{gms}/\text{m}^3$) was at risk of being exceeded, including the Portobello location in Birtley. A detailed assessment (DA) for nitrogen dioxide was subsequently carried out to determine the likelihood of the objective being exceeded in these locations, in order to determine the need for any air quality management areas.

1.9 For Portobello, the Detailed Assessment (April 2007) concluded that the annual mean AQO was likely to be exceeded and an AQMA was required. Measured nitrogen dioxide concentrations averaged $44\mu\text{gms}/\text{m}^3$ for Portobello Terrace, slightly above the AQO, and concentrations at a nearby terrace, Penshaw View, were found to average slightly below $40\mu\text{gms}/\text{m}^3$. Gateshead Council therefore subsequently declared an AQMA for NO₂ for part of the Portobello area in April 2008.

1.10 A further detailed assessment (April 2009) found that no exceedences of the annual mean objective were recorded in 2008, and that nitrogen dioxide concentrations at Portobello had decreased year on year since the Detailed Assessment was carried out. This was found to coincide with year on year reductions in traffic volumes in Gateshead, including the A1(M) motorway in the vicinity of the Portobello AQMA, for which the reduction was 2.3%, representing 2,213 vehicles. Given the current economic recession and associated slowing rate of increase in car ownership in the North East, together with continuing escalating fuel costs, it was expected that the current trend of levelling and reduction in traffic volumes was likely to continue until at least the end of 2010.

1.11 The further detailed assessment also found that year on year decreases in background annual mean concentrations of nitrogen dioxide were predicted by the national maps published by Defra. The background concentration represents nitrogen dioxide pollution from roads outside of the AQMA, and from non-road sources (the A1(M) motorway being the main local background source) and is the main component of the total measured concentrations (contributing 59% to NO₂ concentrations in the area in 2007, and 66% in 2008). The maps predicted a total reduction in background concentrations of $3.2\mu\text{gms}/\text{m}^3$ by 2012.

1.12 The AQMA was not revoked however, as the Council recognised that pollutant concentrations can vary significantly from one year to the next, due to the influence of various factors, such as meteorological and economic factors, and therefore considered it to be inappropriate to revoke the AQMA based on only one year's monitoring data showing no exceedences of the air quality objective.

1.13 Gateshead's Updating & Screening Assessment for 2009 and the Progress Report for 2010 both also found that no exceedences of the NO₂ air quality objectives were recorded at Portobello, and a year on year decrease in concentrations was shown for 2007 to 2009.

1.14 The Council therefore decided to carry out another detailed assessment of nitrogen dioxide at Portobello during 2010. Due to changes in equipment supplier for the financial year 2010/11 it was only possible to obtain 9 months of monitoring data for the calendar year 2010 (April – December inclusive).

2 Assessment Methodology

2.1 Monitoring for nitrogen dioxide at Portobello is carried out using passive diffusion tubes to identify any exceedences of the nitrogen dioxide (NO₂) objectives. The monitoring locations are shown in Figure 1. The tubes are located on the façades of residential properties in Portobello Terrace and Penshaw View, 1.5 metres from the nearest curb, their locations therefore being indicative of relevant exposure. The Portobello Terrace tubes represent worst case locations for exposure to NO₂. The tubes are sheltered by the properties which act as a barrier to dispersion of any pollutants.

2.2 The diffusion tubes are exposed for a month at a time in accordance with the calendar of suggested exposure periods, before being returned to Gradko International Ltd laboratory, which participates in the Workplace Analysis Scheme for Proficiency (WASP) QA/QC procedure, for analysis using the 20% TEA in water method.

2.3 All of the data presented in this report have been adjusted to account for diffusion tube bias, using the correction factor on the R&A website helpdesk for the relevant years. For this detailed assessment a factor of 0.92 from the R&A helpdesk: spreadsheet version 04/11 (now 09/11) was used for the monitoring period April 2010 to December 2010. This period provides the 75% data capture requirement and negates the requirement to calculate annualised data (TG 09 section 3 Box 3.1).

3 Detailed Assessment

3.1 The results for the monitoring period, together with the monitoring results for 2008 and 2009, are presented in Table 1. No exceedences of the annual mean air quality objective are shown for any of the three years.

Table 1: Diffusion Tube Monitoring Data - Portobello

Site ID	Location	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) (bias adjusted)		
		2008 ^a	2009 ^b	2010 ^c
10	Portobello Terrace	38	36	37
16	Portobello Terrace	38	36	38
74	Penshaw View	33	32	32

^a Bias Adjustment Factor (BAF) = 0.77; ^b BAF = 0.81; ^c BAF = 0.92

Traffic Data

3.2 Traffic flow data for Tyne & Wear are reported annually by the Tyne & Wear Accident and Traffic Data Unit (TADU). Traffic counts have been obtained for several years for the C category road (Portobello Terrace and Penshaw View), and the A1(M) trunk road in the Portobello vicinity.

3.3 Traffic flows on the C road have fluctuated between 7,000 and 8,000 for several years, with a peak in the annual average daily traffic flow (AADT) of 8,500 vehicles in March 2009.

3.4 Traffic flows (AADT's) on the A1(M) have always been above 80,000 vehicles. The Further Detailed Assessment 2009 found year on year reductions in traffic flows from 2006 to 2008. Data from TADU has shown that this trend has continued, with the AADT's being 85,005 for 2008; 82,373 for 2009; and 82,097 for 2010.

4 Conclusions

4.1 Results over three years of monitoring, 2008 to 2010, have shown that there are no exceedences of the annual mean air quality objective for nitrogen dioxide in the Portobello Air Quality Management Area in Gateshead.

4.2 Decreasing nitrogen dioxide concentrations have coincided with reductions in traffic flows on the A1(M) motorway, which is the main local background source in the Portobello vicinity. Traffic flows on the C category road (Portobello Terrace and Penshaw View) have increased overall over the

last five years, suggesting that the decreasing background concentrations and traffic on the A1(M) motorway are the main factor in the decreasing nitrogen dioxide concentrations within the AQMA.

4.3 The background concentration is the main component of the total measured nitrogen dioxide concentrations in the Portobello area, and Defra's national maps predict year on year decreases in the annual mean background concentration. These decreases are likely to be more than predicted due to year on year reduction in traffic flows on the A1(M) over the last five years.

4.4 The Council therefore intends, subsequent to appraisal of this detailed assessment by Defra, to revoke the Order for the AQMA, and inform local residents within the Area of its intentions.

4.5 This report, together with the Revocation, will subsequently be published on the Council's website.