Horsham District Council

SUSSEX-air
Air Quality Partnership

2017 Annual Status Report (ASR) for Horsham District Council

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

July 2017

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Executive Summary of Air Quality in Our Area

This report details the results of air quality monitoring undertaken in 2016 across Horsham District and is prepared in accordance with the guidance issue by the Department for Environment, Food and Rural Affairs (Defra).

Local Authorities across the United Kingdom are required to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives set by the Government are likely to be achieved. Where exceedances are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

Air Quality in Horsham District

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2]. The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3]. Improving air quality is essential for making sure we live in a healthy environment and breathe clean air.

This report considers new monitoring data and actions taken to improve air quality during 2016.

Horsham district is primarily agricultural in character and does not incorporate a significant heavy industrial base or major transport hubs. The main source of air pollution locally are road traffic emissions from major roads, notably the A24, which intersects the district north – south; A264 to the north of Horsham; A272 and A281 at Cowfold; and A283 at Storrington. Two Air Quality Management Areas (AQMAs) have been declared in the district in the village of Cowfold and town centre of Storrington, both for the exceedances of the annual mean objective for nitrogen dioxide (NO_2). A draft Air Quality Action Plan (AQAP) was prepared for both AQMAs; the Storrington AQAP was submitted to Defra in 2012 and the Cowfold AQAP in 2013.

Although the work under the Local Air Quality Management (LAQM) is the legal obligation of district councils, actions aimed at improving air quality most of the time require the cooperation of various departments and organisations. Horsham District Council (HDC) works in cooperation with other stakeholders, such as planning, Public Health England, West Sussex County Council (WSCC) highways, neighbouring districts, Sussex-Air Partnership and the Environment Agency. The assessment and

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

implementation of the identified traffic management schemes is done in cooperation with WSCC as they are the authority responsible for roads and transport management. Steering groups were set up for each of the AQMAs. The the steering groups have contributed to the development of the Action Plans and are the decision making body for the action plan measures to be taken forward. The Council is consulted by the Environment Agency upon the granting of environmental permits for 'PartA1' processes and liaises with the Agency regarding any issues concerning those permits.

Regarding nitrogen dioxide, the air quality objective for annual mean NO_2 has been exceeded at three diffusion tube sites in 2016, all located within the existing AQMAs: Storrington 1,2 (Manleys Hill) and Storrington 19n (jct of Manley's Hill and School Hill) in the Storrington AQMA, and Cowfold 7n (3 Huntscroft Gardens, Bolney Road) within the Cowfold AQMA. Based on the results, the boundaries of the Storrington and Cowfold AQMAs can remain unchanged.

The annual mean NO_2 concentration recorded at the new diffusion tube site set up near the Gatwick airport boundary was well below the objective, which indicates that exceedances of the objective in that area are unlikely.

The results from NO_2 monitoring within Horsham district show that concentrations increased slightly in 2016 as compared with the two previous years. Nonetheless, there is still a distinct overall downward trend in measured concentrations of NO_2 over the ten-year monitoring period. This can be attributed to decreasing background concentrations and is also indicative of a gradual improvement in fleet emissions.

There were no exceedances of the PM_{10} objectives at the two monitoring sites in the district. Both sites showed a slight increase in the annual mean concentrations and in the number of exceedances of the daily mean concentration objective when compared to the 2015 data. Still, the overall trend in the recent years is decreasing for both sites.

Monitoring in 2016 has not identified any potential or actual exceedances at relevant locations outside existing AQMAs, and it is not therefore necessary to proceed to detailed assessment at any additional locations.

Actions to Improve Air Quality

Horsham District Council has taken forward a number of measures during the current reporting year of 2016 in pursuit of improving local air quality. The key actions completed in 2016 are: the review of the previous measures proposed to address air quality issues in Storrington and Cowfold; and working with planning policy and development control to secure air quality mitigation from new development.

The achievement of congestion improvement measures in Storrington and Cowfold has been challenging as there are no easy solutions. Horsham District Council continues to work with WSCC to explore traffic management measures to reduce congestion and improve air quality. This has included revisiting and reviewing the evidence from all previous measures identified to understand what impacts these would be likely to have in terms of improving air quality, and whether the measures would be deliverable and provide value for money. A number of these measures are continuing to be explored.

Local Priorities and Challenges

The Council's priorities for the coming year are: finalising the update of the *Planning Advice Document: Air Quality and Emissions Reduction Guidance* and progressing delivery of those traffic management / congestion improvement schemes for Storrington and Cowfold which have been identified as deliverable in the 2016 review. Following the completion of those actions, the Action Plans for Storrington and Cowfold will be duly updated.

How to Get Involved

Two air quality Steering Groups have regular meetings in the district: Storrington Steering Group and Cowfold Steering group. Their objective is to progress the work on the Storrington and Cowfold Action Plans. Each group is a partnership of Councillors and officers from Horsham District Council and West Sussex County Council and includes representatives from the Parish Council. If you would like to obtain further information on the work being done please visit the Horsham District Council website or contact:

- Environmental Health: tel. 01403 215609; email: publichealth.licensing@horsham.gov.uk
- https://www.horsham.gov.uk/environmentalhealth/environmental-health/air-quality

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1 Local Air Quality Management

This report provides an overview of air quality in Horsham District during 2016. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) 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 an exceedance is 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. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Horsham District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table F1 in Appendix F.

Horsham District is a predominantly rural area with a population of 126 000. The total area is 205 square miles. Horsham is the main town and the principal administrative and commercial centre within the district with a population of around 40 000.

Horsham District is well served by transport links to London, Gatwick Airport, the M25 and the coast. A network of subsidiary routes connects the villages and small centres of population. Road transport remains the main source of air pollution in the district.

A large proportion of the district is composed of countryside with a varied landscape of woodland, heathland, downland, river valleys and meadows being represented. Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest, and Sites of Nature Conservation Importance overlap the area. At the southern end of the district is the South Downs National Park. Agriculture remains a major user of land within the district. Significant industrial premises include a mechanical biological waste treatment facility and landfill site to the north of Horsham town and two brickworks.

The main source of air pollution in the district is road traffic emissions from major roads, notably the A24, A272 and A283, A281 and A264. Two Air Quality Management Areas (AQMAs) have been declared in the district, both for the exceedances of the annual mean nitrogen dioxide (NO_2) objective: Storrington AQMA was declared in December 2010 in the town centre of Storrington along the A283 and Cowfold AQMA was declared in September 2011 in the town centre of Cowfold along the A272/A281.

Steering groups were set up in the community for each of the AQMAs. The work of the steering groups contributed largely to the development of Action Plans for the AQMAs.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months, setting out measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by Horsham District Council can be found in Table 2.1. Figure 2.1 and

Figure 2.2 show the boundaries of the declared AQMAs. Further information related to declared or revoked AQMAs, is available online at http://uk-air.defra.gov.uk/aqma/list?la=H. A draft AQAP was prepared for both AQMAs; the Storrington AQAP was submitted to Defra in 2012 and the Cowfold AQAP in 2013 (Table 2.1).

2.1.1 Summary of Previous Review and Assessments

Under the Environment Act 1995, local authorities are required to Review and Assess (R&A) air quality on a regular basis. A review of air quality means a consideration of the levels of pollutants in the air for which objectives are prescribed in Regulations[4], and estimations of likely future levels. An assessment of air quality is the consideration of whether estimated levels for the relevant future period are likely to exceed the levels set in the objectives. A table of reports published is presented in Table 2.2 below.

The first review and assessment round was completed in 2000. The main conclusion was that the national air quality objectives were not likely to be exceeded at any locations in the district.

This first round of R&A constituted a benchmark against which Horsham District Council (the Council) measure progress in making improvements to the local air quality. Subsequent progress reports were completed in 2004 and 2005. In 2006 an Updating and Screening Assessment was completed. In all these reports no exceedance of air quality objectives was identified or predicted.

The Progress Reports submitted in 2007 and 2008 identified an exceedance of the air quality annual mean objective for NO_2 in Storrington and Cowfold and the need for Detailed Assessments for both locations was acknowledged. Steps were taken to install continuous monitoring equipment at both locations in order to proceed to the detailed assessment stage.

The Updating and Screening Assessment submitted in 2009 confirmed continued exceedances of the air quality objective for NO_2 at Storrington and Cowfold on the basis of diffusion tube monitoring results and the detailed assessment study of these areas begun.

[4] Air Quality Regulations for England (2000; Amendment Regulations 2002)

The 2010 Progress Report provided an update on air quality within the district and confirmed a continued exceedance of the air quality objective for NO_2 at Storrington and Cowfold. In accordance with the requirements of the LAQM framework the Council submitted the Detailed Assessments of air quality for these villages.

Following recommendations from the Detailed Assessments reports, the Council declared two Air Quality Management Areas (AQMAs), Storrington in December 2010 and Cowfold in October 2011. Maps showing the AQMA boundaries for both locations are provided in Figure 2.1 and Figure 2.2 overleaf.

The Further Assessment report for Storrington, submitted in March 2012, confirmed the findings of the Detailed Assessment and the AQMA in Storrington remained as originally declared. The Further Assessment report for Cowfold village was submitted to Defra in October 2012.

The declaration of AQMAs committed the Council to taking actions towards achieving the air quality objectives in the AQMA. In October 2012 Horsham District Council produced a draft AQAP for Storrington AQMA which was subject to public consultation during February/March 2013. The Action Plan for Cowfold was submitted to Defra in September 2013.

The Progress Reports produced in 2013 and 2014 confirmed continued exceedances of the annual mean air quality objective for NO_2 within the existing two AQMAs and updated the Action Plans for both Cowfold and Storrington.

The Updating and Screening Assessment completed in 2015 confirmed that the annual mean NO_2 concentrations continued to exceed or be close to exceeding the objective in the AQMAs in Cowfold and Storrington; as such, the AQMAs remain valid. The USA report included the Action Plan Progress Report for the Storrington and Cowfold AQMAs. The assessment of sources identified relevant exposure close to the Gatwick airport boundary that has not been previously assessed. It was recommended that a decision on a requirement to proceed to a Detailed Assessment in respect of this area is taken after the Airport Commission has given its recommendation on the airport expansion. Now that the recommendation has been made and Gatwick has not been considered the best option for the national airport capacity expansion, it is still recommended that diffusion tube monitoring is undertaken at the receptors closest to the airport boundary in order to determine the NO_2 concentrations in this area as the current total equivalent passenger throughput exceeds the threshold defined by the TG(16) guidance.

Table 2.1 - Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan (inc. date of publication)
						At Declaration	Now	
Storrington	December 2010	NO_2 – annual mean	Storrington	Storrington town centre incorporating West Street, the High Street, and part of School Hill and Manleys Hill.	No - WSCC	50.2µg/m^3 (Storrington 1,2) 39.3µg/m^3* (Storrington 7n)	42.1µg/m^3 (Storrington 1,2) 38.3µg/m^3 (Storrington 7n) 59.8µg/m^3 (Storrington 19n)	Draft AQAP for Storrington (October 2012)
Cowfold	October 2011	NO_2 – annual mean	Cowfold	Cowfold town centre incorporating The Street, part of Station Road and Bolney Road.	No - WSCC	40.5µg/m^3 (Cowfold 1,2) 45.9µg/m^3 (Cowfold 7n)	39.6µg/m^3 (Cowfold 1,2) 46.5µg/m^3 (Cowfold 7n)	Draft AQAP for Cowfold (September 2013)

* Annual mean concentration in 2011

Table 2.2 - Summary of Air Quality Review and Assessment Reports and Conclusions for Horsham District Council

Year	Report	Conclusions
2000	Review and Assessment	No exceedance of air quality objectives identified or predicted
2003	Review and Assessment	No exceedance of air quality objectives identified or predicted
2004	Progress Report	No exceedance of air quality objectives identified or predicted
2005	Progress Report	No exceedance of air quality objectives identified or predicted
2006	Update and Screening Assessment	No exceedance of air quality objectives identified or predicted
2007	Progress Report	Detailed assessment required for NO_2 in Cowfold and Storrington
2008	Progress Report	Detailed assessment for NO_2 required in Cowfold and Storrington
2009	Update and Screening Assessment	Detailed assessment for NO_2 required in Cowfold and Storrington
2010	Progress Report	Detailed assessment for NO_2 required in Cowfold and Storrington.
2010	Detailed Assessment for Storrington	Declaration of AQMA
2011	Detailed Assessment for Cowfold	Declaration of AQMA under consultation.
2012	Further Assessment Storrington	Report confirmed findings of Detailed Assessment 2010

2012	Action Plan Storrington	Submitted to Defra October 2012
2012	Further Assessment Cowfold	Report confirmed findings of Detailed Assessment 2011.
2012	Updating and Screening Assessment	Report confirmed AQMAs justified in Storrington and Cowfold.
2013	Progress Report	Report confirmed AQMAs justified in Storrington and Cowfold. Action Plans updated.
2013	Action Plan Cowfold	Submitted to Defra September 2013
2014	Progress Report	Report confirmed AQMAs justified in Storrington and Cowfold. Action Plans updated.
2015	Updating and Screening Assessment	Monitoring data for 2014 confirmed that annual mean NO_2 concentrations continued to exceed or be close to exceeding the objective in the AQMAs at Cowfold and Storrington; as such, the AQMAs remain valid. The assessment of sources identified relevant exposure within 1000m of the Gatwick airport boundary that has not been previously assessed. Although Gatwick Airport currently has a total equivalent passenger throughput of more than 10 million passengers per annum (mppa) and according to Section B.1 of Box 5.4 of TG(09) it is necessary to proceed to a Detailed Assessment, the report recommended that a decision on a requirement to proceed to a Detailed Assessment in respect of this area is taken after the Airport Commission has given its recommendation on the airport expansion.
2016	Annual Status Report	Report confirmed AQMAs justified in Storrington and Cowfold. Action Plans updated.

Figure 2.1 - Map of Storrington AQMA Boundary

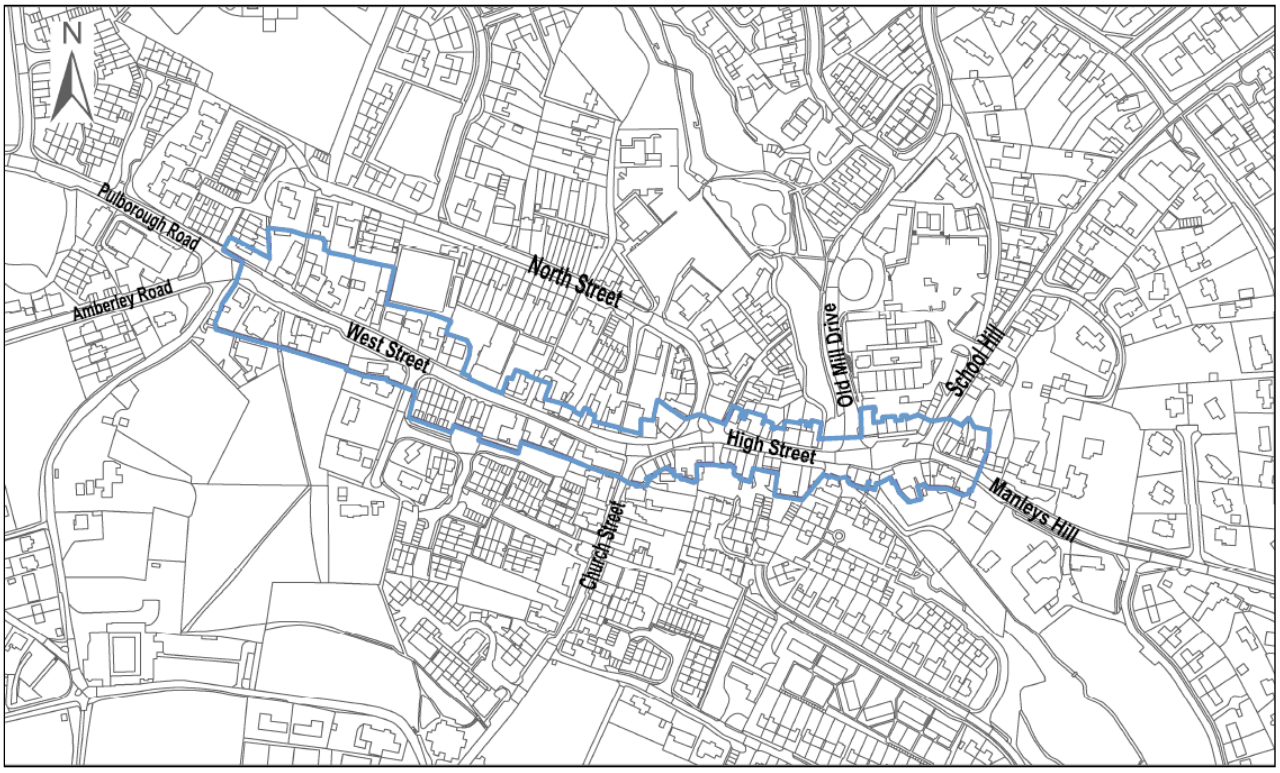
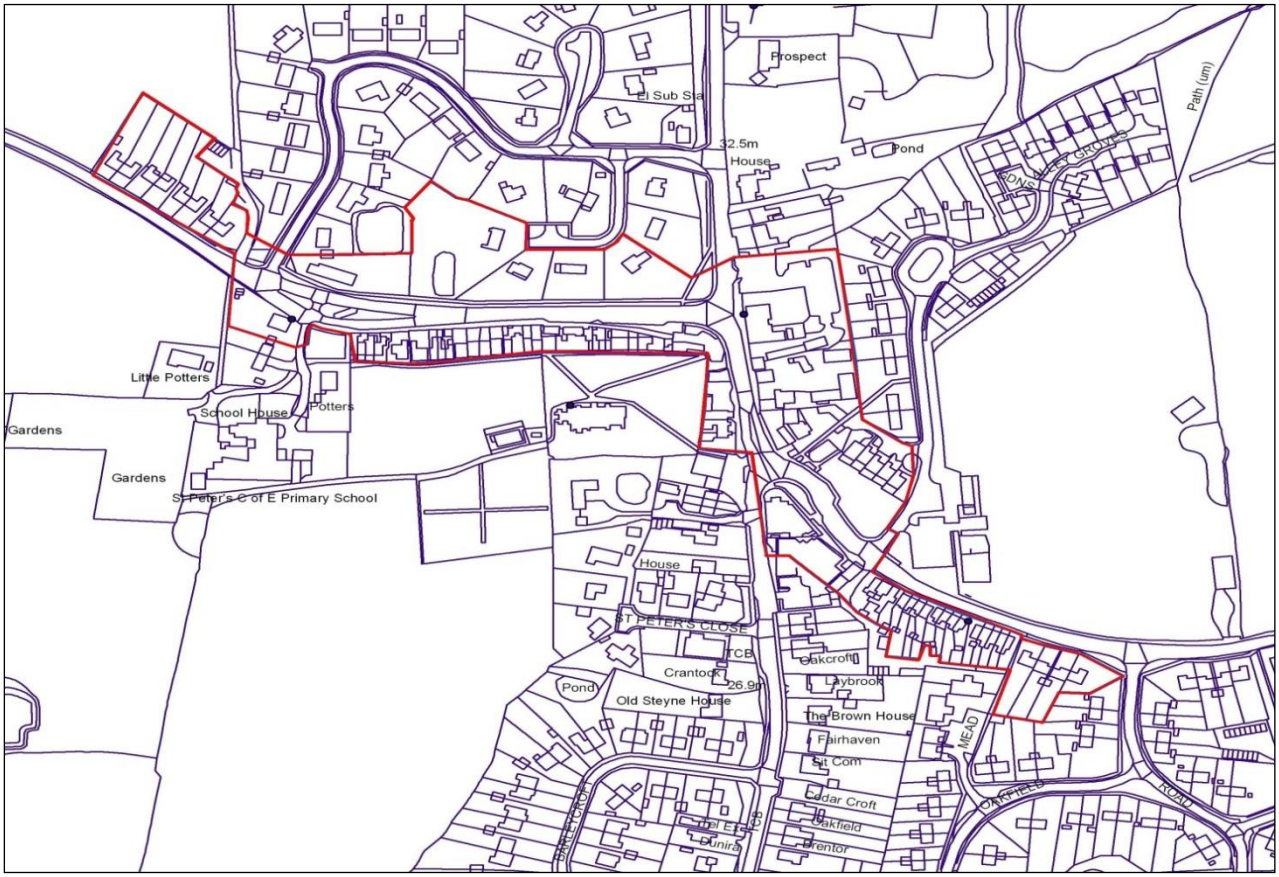


Figure 2.2 - Map of Cowfold AQMA Boundary



2.2 Progress and Impact of Measures to Address Air Quality in Horsham District

Horsham District Council (HDC) has taken forward a number of measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in train or planned are set out in Table 2.3. More detail on these measures can be found in their respective Action Plans: Draft AQAP for Storrington[5] and Draft AQAP for Cowfold[6].

The key actions completed in 2016 are:

- Review of the previous measures proposed to address air quality issues in Storrington;
- Review of the previous measures proposed to address air quality issues in Cowfold;
- Working with planning policy and development control to secure air quality mitigation from new development.

[5] https://www.horsham.gov.uk/__data/assets/pdf_file/0013/5431/Storrington-AQ-ActionPlan-draft.pdf

[6] https://www.horsham.gov.uk/__data/assets/pdf_file/0004/14494/Cowfold-AQ-Action-Plan-draftfinal..pdf

The achievement of congestion improvement measures in Storrington and Cowfold has been challenging as there are no easy solutions and because Horsham District Council is not the highways authority. Horsham District Council continues to work with WSCC to explore traffic management measures to reduce congestion and improve air quality. This has included revisiting and reviewing the evidence from all previous measures identified to understand what impacts these would be likely to have in terms of improving air quality, and whether the measures would be deliverable and provide value for money. A number of these measures are continuing to be investigated. Promotional initiatives that encourage people to consider walking, cycling and public transport use as alternatives to the car across the District also continue to be explored in line with the West Sussex Transport Plan 2011-2026.

The previous measures proposed to address air quality issues in Storrington and Cowfold AQMA have been reviewed in respect of their deliverability. The review has identified a number of measures as deliverable; those are:

- Prohibition of lorries turning right into School Hill from Manley's Hill within the Storrington AQMA;
- Advisory lorry route signage improvements within the Storrington AQMA;
- Linking of two pedestrian crossings along the High Review two pedestrian crossings along the HighStreet/West Street;
- Installation of advisory signs for lorries deterring HGV traffic from taking the route through Cowfold AQMA; and
- Re-alignment of the A272 Bolney Road away from Huntscroft Cottages.

The Council's priorities for the coming year are:

- Finalising the update of the *Planning Advice Document: Air Quality and Emissions Reduction Guidance*; and
- Progressing delivery of those traffic management / congestion improvement schemes for Storrington and Cowfold which have been identified as deliverable in the 2016 review.

Following the completion of those actions, the Action Plans for Storrington and Cowfold will be duly updated.

District Wide Action Plan Measures

In the 12 months since submission of the 2016 Annual Status Report, work continued on the update of the **Planning Advice Document: Air Quality and Emissions Reduction Guidance.** The document has been linked into the HDPF core strategy and developments must meet the standards within it for exposure assessment, cumulative impact assessment and mitigation. The amendments being considered include: damage cost figures and clarifying the procedure for the damage cost calculation. It is also proposed to

include a guidance note on the assessment of impacts from industrial installations, and add details regarding the mitigation of construction dust.

Development of the **Emission Reduction Strategy** is progressing with a number of key projects being developed in collaboration with partners. Notably Horsham District Council is working with the Sussex Air Partnership and *eV South East* to provide locations within the District to house electric vehicle rapid charge points. *eV South East* is a public private partnership connecting eV charge points together to benefit and encourage the growth in electric vehicles (eV) in the region.

Rapid charging provides fast, convenient electric vehicle charging with the ability to charge a vehicle's battery to 80% capacity in as little as 30 minutes. Two rapid charge points were installed in 2015 in Billingshurst and Storrington village. The sites form part of the 'Energise' network, which will enable:

- EV drivers to find "open to all" public charge points more easily;
- Allow ease of access for all eV drivers by encouraging pay as you go (PAYG) at point of purchase;
- Allow drivers to move freely across the south east and other regions (UK and EU).

In 2014 Horsham became host to its first **car club**. With the recently added car, three cars (one eV/petrol hybrid) are currently available in Horsham. A scoping assessment is currently in progress to establish the viability of extending the car club scheme to Cowfold, Storrington, Billingshurst and Henfield. The car clubs in Horsham and in neighbouring Chichester District Council have been funded from the Department for Transport's Local Sustainable Transport Fund (LSTF).

Horsham Council has successfully bid for support from the Department for Transport (DfT) under Phase Two of the **ULEV Readiness Project**. This provides a fleet review and possible financial contribution to support the uptake of Ultra Low Emission Vehicles (ULEV) within public sector fleets. The Energy Saving Trust (EST) has evaluated the Council's current fleet and made a recommendation for up to four fleet vehicles, as well as two pool cars to replace grey fleet when driven for at least 10,400 miles. A grant offer was subsequently received from DfT in respect of three vehicles. The grant will contribute 75% of the cost of 24-month eV vehicle leases for three vehicles: two Nissan e-NV200 vans and one Nissan Leaf car, as well as the costs of the installation and maintenance of one charge point per vehicle - located at Swan Walk Car park, Chesworth Depot HDC and Hop Oast Depot HDC. Each vehicle was procured with a telematics system enabling an automatic data connection. The vehicles have been delivered in May 2016 and are being used by the parking and leisure services. The Council has committed to share data on vehicle usage with OLEV. The first report was submitted to OLEV in January 2017.

Storrington Air Quality Action Plan

The Action Plan for Storrington was submitted to DEFRA and published on the Council's website in October 2012. The action plan appraisal report was received from DEFRA in November 2012 with the draft

plan accepted as fulfilling the requirements of the Local Air Quality Management policy guidance (LAQM PG (09)). The appraisal report included recommendations for the finalised plan.

A significant element of the Action Plan for Storrington included a traffic management feasibility study undertaken by an independent air quality consultant. The 'Storrington Traffic Management Options Appraisal' study was presented to the Storrington Air Quality Steering Group in January 2013. The study was used to assess the air quality benefits of 7 possible traffic management schemes. Of those options, 3 were identified as having the potential to reduce emissions and alleviate congestion within the village. The feasibility study outcomes and the Action Plan as a whole were the focus of the public exhibition held in the village centre in February 2013. Further analysis of the feedback from the exhibition, local residents and other key stakeholders, including Sussex Police, identified the introduction of a Low Emission Zone (LEZ) as the most viable traffic management option.

Low Emission Zones are areas within a defined boundary, where vehicle access is restricted according to the level of their emissions. Currently there are 4 operational LEZ's in the UK; London, Norwich and Oxford and Brighton. The aim of an LEZ in Storrington would be to reduce pollution levels by restricting the most polluting vehicles from entering the Air Quality Management Area. Pollution emissions from vehicles are regulated under various European Directives which specify emission standards for different vehicle types. The emission standards become increasingly stringent for newer vehicles over time.

In order to accurately identify the most effective LEZ strategy for the village, the Storrington AQAP Steering Group and the Sussex Air Quality Partnership[1] implemented a trial project utilising a LEZ system designed by Siemens plc. 'Greenzone' has been developed by Siemens based on their experience of setting up the London LEZ to enable workable schemes to be implemented on a smaller scale. The trial incorporated the use of 4 'Automatic Number Plate Recognition' (ANPR) cameras positioned at strategic locations on Pulborough Road, Amberley Road, Washington Road and School Hill. The expectation of the system was that the cameras count and categorise vehicles by size (e.g. cars, buses, trucks etc.) and identify Euro standard by reference to vehicle registration dates. There was to be no enforcement or restriction of vehicles during the trial period.

It was intended that the data from the trial would be used to ascertain the air quality benefits of a range of possible LEZ options including restrictions based on a range of Euro standards; restrictions on specified vehicle types; possible time-limited restrictions on specified vehicles e.g. during peak traffic periods; and consideration of potential vehicle exemption criteria.

The trial was due to commence in June 2014 for a period of 12 months. However, there were a series of unavoidable delays which have significantly impacted on the availability of reliable data from the cameras. In particular, the mobile network in Storrington has proved to be extremely variable and it has been difficult to establish a secure connection at two of the four camera sites. After a series of remedial measures were tested, the reliability of the connection seemed to improve in June 2015. The data collected for a period of four months from June 2015 to September 2015 was recently evaluated for completeness and conformity

with the data captured by local traffic counters. Regrettably, it was found that the data capture for the four cameras was low - within the range of 35-37%. Furthermore, the data collected by the cameras showed poor conformity with the data collected from the corresponding traffic flow counters, with total vehicle flow numbers significantly different in the camera and traffic counter datasets. Therefore, the conclusion of the trial is that the Greenzone system is not appropriate in the rural setting of Storrington due to problems with data capture. In the talks with Siemens it was established that the camera system can achieve results with wired communication, or with the use of local storage and regular collection of data (costs to be compared).

Subsequently, funding from Defra's Air Quality Grant was sought in order to undertake a feasibility study into the costs of using either a wired camera connection or local storage and regular collection of data. The application was unsuccessful, therefore the project cannot be progressed unless an alternative source of funding is found.

In 2016 the Council together with officers from WSCC reviewed the previous measures and assessments undertaken for all of the identified measures proposed to address air quality issues in Storrington. This includes traffic management related measures, and other measures drawn from the Storrington AQAP (October 2012), the previously commissioned Ricardo-AEA Traffic Management Feasibility Study (January 2013), as well as other proposals highlighted by the Storrington Steering Group.

The review identified the following schemes as deliverable:

- Prohibition of lorries turning right into School Hill from Manley's Hill within the Storrington AQMA;
- Advisory lorry route signage improvements within the Storrington AQMA; and
- Linking of two pedestrian crossings along the High Review two pedestrian crossings along the High Street/West Street.

Regarding the ban of turning movements for lorries, the scheme would seek the **prohibition of lorries turning right into B2139 School Hill from A283 Manleys Hill and turning left from A283 High Street into B2139 School Hill**. This would ban all vehicles of a defined class from turning from Manley's Hill into School Hill and vice versa. Vehicles turning into School Hill are blocking traffic going up Manley's Hill, which exacerbates congestion on Manley's Hill and the High Street. Furthermore, the mini-roundabout of School Hill and Manley's Hill lacks the space for lorry turning so the lorry turning ban will have a positive impact on safety in addition to reducing congestion. The scheme scored well in the WSCC Integrated Works Programme (IWP) in respect of the environmental and safety criteria and consequently has been programmed for design in 2017/18 and delivery in 2018/19. WSCC is investigating if it is feasible to accelerate delivery of the scheme so that implementation is in 2017/18. The scheme will require the installation of appropriate diversion signage.

In terms of **advisory lorry route signage** there is a current voluntary agreement in place with Waitrose for delivery lorries coming from the A24 to use Water Lane to access the village centre. In addition, local

signage directs lorries to the Water Lane Trading Estate to use Water Lane. Further improvements to advisory signage for lorries are being considered by the Steering Group. This will include diversion signage required for the progression of the lorry turning ban scheme.

As part of the congestion improvement measures for Storrington, HDC are working closely with WSCC to resolve parking issues within the village which have been identified as contributing to congestion within the AQMA. Two parking areas have been identified as causing congestion on a regular basis. Further detailed evaluation is being considered to understand the causes of congestion through the High St/West St related to the interactions of the pedestrian crossings, junctions, parking and deliveries. Regarding the scheme to **link two pedestrian crossings along the High Street/West Street**, both crossings have previously been upgraded to Puffin crossings (they use kerbside detectors to cancel demands on the crossing no longer required). The crossings use 'vehicle actuation' technology but do not include microprocessor technology (Microprocessor Optimised Vehicle Actuation - MOVA). This technology has the potential to be able to link the two crossings and to react to dynamic sensors. For example, this may enable the green/red phase timings to react to periods of high air quality sensitivity and to prioritise traffic movement at peak times. To progress the scheme, a site study is needed to explore if MOVA technology is technically feasible to be delivered.

Previously discussed **scheme to improve the High Street/North Street junction** within the AQMA was examined. The construction of a mini-roundabout at this junction was originally scoped as part of planning application for re-development of a major store (Waitrose) within the village, and whilst planning permission was granted, the scheme has not been brought forward. The air quality assessment submitted with the original application indicated that changing it to a mini-roundabout would improve traffic flow with resultant benefits in terms of reducing vehicle emissions. However, an assessment is still needed to what level of benefit this is likely to bring to congestion and reducing vehicle emissions, and whether this scheme presents good value for money to be brought forward independent of the development via alternative funding means. The scheme did not meet threshold criteria for progression on the IWP list of projects 2017/18 as it showed a negative impact on traffic flow and scored low on pedestrian safety and low on environmental benefits. A more detailed air quality assessment by a suitable consultant of the anticipated impacts of this scheme at this junction could help to demonstrate the business case or not for this scheme if the steering group still wished to progress it in the future.

Cowfold Air Quality Action Plan

Horsham District Council produced a draft Air Quality Action Plan for Cowfold in September 2013. The draft was accepted by DEFRA in December 2013.

The Action Plan incorporated both Cowfold specific measures and other 'district-wide' measures to reduce vehicle emissions and improve air quality. Of the Cowfold measures one of the main projects was to undertake a traffic management options appraisal study in conjunction with the Highways Authority at WSCC. This project followed on from the 'Storrington Traffic Management Options Appraisal' study which

looked at a number of possible schemes to reduce traffic congestion and improve vehicle emissions. The Storrington study was undertaken by an air quality consultancy which was able to model the potential benefits of the potential schemes. The project was funded by an air quality grant awarded by DEFRA. Unfortunately Horsham District Council has been unsuccessful in bidding for a similar grant for Cowfold and are therefore unable to assess the options in the same way. However, given that there are similarities between the two locations in terms of air quality we have been able to apply some of the principles of the Storrington study to identify possible traffic management options which may be appropriate for Cowfold.

On the basis of the feasibility study outcomes for Storrington, it can be assumed that there would be no air quality benefit in **imposing a 20mph speed restriction** through the Cowfold AQMA.

We have also re-evaluated the option of **'gating'** traffic in Cowfold to understand whether it is possible to reduce air pollution problems at the worst locations within the village. Dispersion modelling undertaken for the scheme showed negligible improvements to NO_2 concentrations at relevant receptors. The feasibility of this option is unclear and there are a number of challenges, in particular around driver compliance and enforcement, and with regard to traffic flow management. As such, this option will not be given further consideration.

The Council has been liaising with WSCC to consider a proposed **A272 road realignment** project in the centre of Cowfold village. The proposed scheme, whilst initiated originally on highway safety grounds, would have the effect of moving the road further from the worst affected receptors within the AQMA. Dispersion modelling showed a significant reduction in NO_2 concentrations at receptors currently exceeding the annual mean objective. The cost of the scheme is significant due to underground utilities present under the road, which adds to the traffic management costs. Due to high costs, the only route to progress the scheme is through the WSCC Strategic Transport Investment Programme (STIP). The Council has applied for Defra's air quality grant to provide partial funding for the scheme but was unsuccessful as should it be implemented, the scheme will have a positive impact on NO_2 concentrations at relevant receptors but overall emissions will remain unchanged. The schemes proposed for the STIP are currently being reviewed. The outcome of the review will be communicated in the next report.

Another scheme being considered is the installation of **advisory signs for lorries** deterring HGV traffic from taking the route through Cowfold AQMA. A feasibility study is needed to investigate alternative routes for the traffic that otherwise would take the route through Cowfold. The results of the air quality modelling show that a 25% reduction in lorry numbers would result in an approximate reduction of 1.0-1.5 $\mu g/m^3$ for nitrogen dioxide concentrations. A reduction of 1 $\mu g/m^3$ is significant in planning terms, albeit would probably not be sufficient to undeclare the AQMA. A 75% reduction was modelled to reduce NO_2 concentrations by 3.4-3.8 $\mu g/m^3$, which would probably be sufficient to undeclare the AQMA, but which cannot be achieved with the scheme.

Horsham District Council has also requested that WSCC investigate the feasibility and costs associated with **upgrading the existing pedestrian crossing** in the centre of the village on 'The Street' between the

mini-roundabouts. The crossing was recently (beginning of 2016) upgraded to a puffin crossing, which means it should operate more efficiently using kerbside detectors to cancel no longer required demands. The crossing uses 'vehicle actuation' technology. The crossing does not use microprocessor technology (Microprocessor Optimised Vehicle Actuation - MOVA) as this is not appropriate to apply in this location due to the nature of the traffic speeds. It is not believed that any further benefit can be achieved to traffic flows in Cowfold through changes to the operation of the pedestrian crossing.

Figure 2.3 – Billingshurst eV Rapid Charging Point (Six Bells Car Park)

Figure 2.4 – ULEV Readiness Grant – Nissan Leaf

Table 2.3 – Progress and Impact of AQAP Measures (2016)

Measure No.	Measure	EU Category / EU Classification	Focus	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments / Barriers so Implementation
DISTRICT WIDE MEASURES 1	Planning Advice Document: Air Quality & Emissions Reduction Guidance	Policy Guidance and Development Control / Air Quality Planning and Policy Guidance	Mitigation of air quality impact of development based on principle of Horsham district as an 'Emission Reduction Area'	HDC	2013-14	May 2014	Reduction in emissions from transport associated with new development through mitigation and compensation. Assessment of emissions from development required with application. Scheme of mitigation required.	1%	Planning Advice Document produced by HDC Environmental Health Dept. in collaboration with Strategic Planning Dept. The guidance provides advice to developers on how to address local air quality when making a planning application in Horsham District.	Air Quality & Emissions Reduction Guidance produced & tested. Revised Horsham District Planning Framework (HDPF) incorporates AQ guidance / policy statement.	2017	The *Planning Advice Document: Air Quality and Emissions Reduction Guidance* has been completed and published in May 2014 and has been included in the Environmental Protection Policy 24 of the recently adopted Horsham District Planning Framework (HDPF). Guidance is to be updated in the coming months. The Council is also looking to adopt the Guidance as a Supplementary Planning Document (SPD).
2	District Emission Reduction Strategy District Emission Reduction Strategy	Promoting Low Emission Transport / Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV recharging, gas fuel recharging Promoting Low Emission Transport / Company Vehicle Procurement – Prioritising uptake of low emission vehicles	Development of alternative fuel strategy	HDC	2013	2014 – ongoing	At least one alternative refuelling option in all new/refurbished filling stations. One public EV charging point in each village in Horsham district. EV rapid charge points for Energise network. Work with local businesses to develop CNG refuelling infrastructure for local commercial fleet operators.	1%	One new refuelling station application received to date – recommendation made to DPO by EH Dept. – Four existing standard EV charging points in HDC (Horsham x2 & Storrington x2). Rapid chargers for one additional location (Billingshurst) and replacement of two existing standard EV chargers being instigated via Energise	See progress to date. Principle of CNG infrastructure provision incorporated into planning Advice Document as possible mitigation measure for commercial developments.	Ongoing 2017	Small initial impact on emissions but aim to facilitate the uptake of more LE vehicles. Planning guidance requires EV charging points for all developments as mitigation measure. Review of potential LE fuel assets within district e.g. biomethane from existing landfill/anaerobic digestion plant ongoing as part of strategic planning.

Measure No.	Measure	EU Category / EU Classification	Focus	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments / Barriers so Implementation
									Network			
2 cont/		Promoting Low Emission Transport / Public Vehicle Procurement – Prioritising uptake of low emission vehicles Promoting Low Emission Transport / Taxi licensing conditions Promoting Low Emission Transport / Low Emission Zone	Public /commercial vehicle fleet improvement	HDC Funding for ULEV vehicle leases: HDC & OLEV	2013/14	2014/15	Introduction & increase % of ULEV's into Council's vehicle fleet. -Condition requiring latest Euro standard for all new taxis through licensing condition. -buses entering AQMAs to be best available Euro standard vehicle within the company fleet. Achieved via negotiation/LEZ	1%	ULEV Readiness Grant was secured in 2015. Three ultra-low emission vehicle have been delivered to the HDC fleet. Most of the cost of vehicle leases is to be reimbursed by OLEV for 24 months. Taxi/private hire vehicle licence conditions under review. Current vehicles comply with latest Euro standard. Ongoing liaison with bus companies serving routes through AQMAs to reduce engine idling at bus stops. Brighton Bus LEZ introduced in Jan 2015.	Three ultra-low emission vehicles (two vans and one car) have been delivered in May 2016 and are being used by the parking and leisure services. The first report on vehicle usage submitted to OLEV in January 2017.	2015 – ongoing	Small initial impact on emissions but aim to facilitate the uptake of more LE vehicles. Benefits of Brighton LEZ vehicle emission improvements will extend to areas outside Brighton.
3	AirAlert	Public Information/ Via other mechanisms	Promote AQ health warning system for individuals with respiratory /cardiac conditions.	Sussex-Air/HDC	Service operational	Service operational	Increase in subscriptions to pollution alert service within Horsham district.	No reduction in emissions.	Project started in 2006. Health based study	Health study continuing. Increase in subscriptions. Cold alert added to service.	Ongoing service.	No direct impact on emission reductions but optimising use of monitoring network data for health associated benefits.
STORRINGTON-SPECIFIC MEASURES 1	Low Emission Zone	Promoting Low Emission Transport/ Low Emission Zone	Assessment of vehicle restrictions /measures to reduce traffic volume and improve flow through Storrington	HDC / WSCC	2014/15	LEZ Trial commenced December 2014	Reduction in nitrogen dioxide concentrations in Storrington. Improved traffic flow / reduction in traffic congestion.	10%	AQ feasibility study completed December 2013. Public consultation & Sussex Police consulted. LEZ identified as most feasible traffic	LEZ identified as preferred option. 'ANPR camera' based LEZ trial delayed due to network problems. June 2015: connection issues seemingly resolved. June 2016: data	The trial has now been completed. The conclusion of the trial is that the Greenzone data collection	Funding from Defra's Air Quality Grant was sought in order to undertake a feasibility study into the costs of using either a wired camera connection or local

Measure No.	Measure	EU Category / EU Classification	Focus	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments / Barriers so Implementation
			AQMA						management option. LEZ trial commissioned & implemented.	collected from June to September 2015 evaluated for completeness and conformity. Data found unsatisfactory due to high rates of missing data and poor conformity of captured data with data collected from traffic counters. HDC will not continue with the project unless funding is found for the wired connection for the cameras	system is not appropriate in the rural setting of Storrington. A report on LEZ trial data was requested from Siemens but has not been delivered as yet.	storage and regular collection of data. Application was however unsuccessful, therefore the project cannot be progressed unless an alternative source of funding is found.
2	Prohibition of lorries turning right into School Hill from Manley's Hill and turning left into Manley's Hill from School Hill	Traffic Management/ Strategic highway improvements	Improvement to existing highway through Storrington to reduce traffic congestion	HDC / WSCC	2013-17	2018/19	Reduction in nitrogen dioxide concentrations in Storrington. Improved traffic flow / reduction in traffic congestion.	1%	Meetings with Steering Group & Storrington business representatives identified the scheme as deliverable.	The scheme has been programmed for design in 2017/18 and delivery in 2018/19. WSCC is investigating if it is feasible to accelerate delivery of the scheme so that implementation is in 2017/18. June 2017: The Improvements Team at WSCC is organising a design brief. It is expected that the Team will give feedback on whether the scheme can be prioritised.	2018/19	There have been incidences of large lorries making turning movements between School Hill and Manley's Hill and vice versa causing congestion at the mini-roundabout due to the constrained junction. This measure proposes banning this turning movement for lorries. Emission reductions anticipated as a result of reduced congestion caused by blockages on High Street / West Street.
3	Time restrictions for goods vehicle loading/delivery within the AQMA during peak periods.	Traffic Management/ Strategic highway improvements	Improvement to existing highway through Storrington to reduce traffic congestion	HDC / WSCC	2013-17	2018/19	Reduction in nitrogen dioxide concentrations in Storrington. Improved traffic flow / reduction in traffic congestion.	1%	Meetings with Steering Group & Storrington business representatives identified the scheme as deliverable.	Meeting to be held by WSCC with the Parish Council to discuss the extent of the loading ban.	2018/19	Parking on double yellow lines remains an issue in the town centre. The most affected area is North Street near the junction with the A283 West Street. Prohibition of

Measure No.	Measure	EU Category / EU Classification	Focus	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments / Barriers so Implementation
												loading/unloading, either 24 hours or at specific times, in that area would reduce congestion and have a positive impact on safety. This would require a Traffic Regulation Order (TRO) to be legally enforceable and consultation with the local community and local businesses.
4	Review on-street car parking and loading bay provision	Traffic Management/ UTC, Congestion management, traffic reduction	Improvement to existing highway through Storrington to reduce traffic congestion	HDC / WSCC	2013-17	2020	Reduction in nitrogen dioxide concentrations in Storrington. Improved traffic flow / reduction in traffic congestion.	1%	Meetings with Steering Group & Storrington business representatives identified the scheme as deliverable.	The steering group would like to prioritise schemes 2), 3) and 5) ahead of this one as parking in bays is not as much of an issue in terms of increased congestion as e.g. lorry turning into School Hill or vehicle parking on double yellow lines.	2020	A more detailed air quality assessment of changes to and re-designation of parking-bays and loading bays could be investigated further. This could be a combined assessment of some of the other measures discussed in this document, including a review of the pedestrian crossings and junctions.
5	Review two pedestrian crossings along the High Street/West Street.	Traffic Management/ UTC, Congestion management, traffic reduction	Improvement to existing highway through Storrington to reduce traffic congestion	HDC / WSCC	2013-17	2018/19	Reduction in nitrogen dioxide concentrations in Storrington. Improved traffic flow / reduction in traffic congestion.	1%	Meetings with Steering Group & Storrington business representatives identified the scheme as deliverable.	- A site study needed to explore if MOVA technology is technically feasible to deliver will cost £500-£1000 to assess site specific circumstances including speed of traffic, detection points, visibility, interactions to side roads, etc. Such assessment will provide a view on the likely benefit of the scheme as well as recommendations on	2018/19	Funding is a major constraint to the progress of this scheme.

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										changes to the operation of the crossings (e.g. timings) under the current technology to promote smoother traffic flow. A more detailed study giving more certainty about the degree of benefit from MOVA is likely to cost in the region of £5000 due to the high survey costs in on-ground operatives trying to manually recreate the operational benefits of the technology by controlling the current crossings. The overall expected cost of the MOVA technology is £20k.		
6	A27 Improve-ments	Traffic Management/ Strategic highway improvements	Campaign to improve A27 on air quality grounds at Chichester, Worthing & Arundel to reduce use of 'alternative' routes such as A283 through Storrington.	Highways Agency/ WSCC	2013 – ongoing	Dependant on HA	Improvements to A27 now programmed by Highways England. Key indicator of AP measure will be for HE to agree scheme and implement.		WSCC A27 Action campaign launched to seek improvement to A27.	The Road Investment Strategy produced by DfT in March 2015 allocates a budget for the A27 schemes including the A27 Arundel bypass and A27 Worthing and Lancing improvements. HE are currently looking at the improvement options and undertaking technical work before consultation in 2017.	If approved, construction is currently scheduled to commence in 2021, with completion scheduled for 2023-2024.	Improvements to the A27 are one of the key priorities of the current West Sussex Transport Plan (LTP3). Currently approximately 50% of all vehicles passing through the Storrington AQMA are 'through traffic'. 60% of HGV's in Storrington are 'through traffic'.

Measure No.	Measure	EU Category / EU Classification	Focus	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments / Barriers so Implementation
7	Promotion of Alternative Transport / Fuelling options	Promoting Low Emission Transport/ Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV recharging, gas fuel recharging	Local initiatives to incentivise the uptake of low emission vehicles / sustainable transport.	HDC / WSCC	2013/14	2014/15	Standard eV charging points to be upgraded to rapid charge. Review car parking charging to encourage LE vehicles as part of Energise network. Review transport links/car parking facilities associated with Pulborough main-line station.	1%	Preliminary assessment of existing arrangements.	Measure incorporated into Planning Advice Document. Review undertaken of HDC vehicles at Storrington transport depot to establish opportunities for upgrading/ replacing with low emission vehicles. Rapid EV charger installed in Storrington in 2015.	2013 – ongoing	Emission reductions anticipated as a result of reduction in local car journeys and increase in LE vehicles & improved sustainable transport options.
8	Public/commercial vehicle fleet improvement	Promoting Low Emission Transport/ Public Vehicle Procurement – Prioritising uptake of low emission vehicles	Working with local businesses	HDC / WSCC	2013/14	2014/15	Encourage use of LE home delivery vehicles Incentivise use of LE vehicles by Community minibus service. Work with local bus service to utilise best available Euro standard vehicles for AQMA routes. Promote use of transport /travel plans to increase use of sustainable transport.	1%	Preliminary meeting with local Business Club representatives Low Emission Strategy negotiated with Waitrose as part of planning condition for extended store incorporating use of LE delivery vehicles.	Review of Council Depot vehicles underway by EST to establish Euro standard, replacement schedule and opportunities for upgrading to low emission fuels.	2013 – ongoing	Emission reductions sought through partnership working with local businesses to minimise impact of deliveries etc. on the village.
9	Promotion of Alternative Lorry delivery Routes	Promoting Low Emission Transport/ Public Vehicle Procurement – Prioritising uptake of low emission vehicles	Freight delivery partnerships	HDC / WSCC	2013/14	2015/16	Encourage use of WSCC preferred lorry routes. Facilitate links for local shared deliveries. Encourage use of LE delivery vehicles in AQMAs. Provide links to EV/CNG refuelling facilities.	1%	Freight delivery partnership group previously established by WSCC to be reviewed to assess merit of re-establishing group. May be valid should LEZ option be adopted.	LEZ trial initiated in December 2014. Waitrose agreed for delivery lorries coming from the A24 to use Water Lane to access the village centre. Local signage directs lorries to the Water Lane Trading Estate to use Water Lane. The options for further advisory signage for lorries are considered by Storrington AQAP	2013 – ongoing	Emission reductions sought through partnership working with local businesses to minimise impact of deliveries etc. on the village.

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										Steering Group.		
10	Smart Choices	Transport Planning and Infrastructure/ Cycle network Alternatives to private vehicle use/ Car Clubs	Encouraging local walking /cycling by improving access & safety of routes. Introduction of local car club.	HDC / WSCC	2013/14	2015/16	Promote bike rental scheme with local supplier. Investigate funding streams for improvements to local walking & riding paths. – Improve signage -Investigate funding for secure bike storage at local car parks. Undertake feasibility study for introduction of car club in Storrington following success of initiative in Horsham town.	1%	Preliminary review of current facilities. Further meeting with Parish Council to be arranged. Feasibility study to be considered to assess suitability of car club in Storrington by looking at demographics etc.	Measures incorporated into Planning Advice Document for new developments. WSCC School Travel Coordinator identified key walking/ cycling routes requiring improvement. Scoping report in progress for provision of car club to village.	2013 – ongoing	Emission reductions sought through encouraging the use of sustainable transport options within the village.
11	School Travel Plans	Promoting Travel Alternatives/ School Travel Plans	Working with local schools	WSCC/ HDC	Ongoing	Ongoing	Work with WSCC to enhance school travel plans. Identify safety improvements to encourage walking/cycling Contribute to air quality awareness education programmes.	1%	Preliminary meeting with WSCC School Travel Advisor June 2013 to review issues and identify options.	Further work required in liaison with School Travel Advisor. School travel improvements considered as part of planning applications for new residential developments in Storrington. WSCC introduced parking restrictions outside Storrington Primary School.	2013 – ongoing	Emission reductions sought through working with schools, parents and pupils to encourage the use of safe and sustainable transport to and from schools, and reduce the number of local car trips.

Measure No.	Measure	EU Category / EU Classification	Focus	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments / Barriers so Implementation
COWFOLD Specific Action Plan Measures 1	Improved signage on strategic routes or restrictions on longer distance lorry traffic	Traffic Management/ Strategic highway improvements	Improvement to existing highway through Cowfold to reduce traffic congestion	HDC / WSCC	2013-17	2014/17	Reduction in NO_2 concentrations in Cowfold. Improved traffic flow / reduction in traffic congestion.	1%	Identification of traffic control mechanisms in village. A review of current loading bays and on-street parking provision identified no particular issues.	Scheme has been endorsed by Cowfold Parish Council. A feasibility study is needed to progress the scheme. Permission of Highways England is needed before signs could be installed on the A23 as it is not a WSCC maintained highway.	2018/19	Changes to road signs might encourage longer distance lorry traffic to use other strategic routes such as the A23/A264/A24 to the north or the A23/A27/A24 to the south to avoid the Cowfold AQMA. Variable Message Signs (VMS) might also be considered to encourage drivers to use alternative routes at peak times when air quality problems are worse. Funding for a feasibility study needs to be found to progress the scheme. It remains uncertain whether HE would grant permission to install the signs on the A23.

Measure No.	Measure	EU Category / EU Classification	Focus	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments / Barriers so Implementation
2	A272 Road Realignment (Realignment of A272 Bolney Road adjacent to Huntscroft Cottages)	Traffic Management/ Strategic highway improvements	Assessment of vehicle restrictions /measures to reduce traffic volume and improve flow through Cowfold AQMA	HDC / WSCC	2014/15	2018/20	Reduction in nitrogen dioxide concentrations in Cowfold. Improved traffic flow / reduction in traffic congestion.	10%	A272 road realignment scheme identified by WSCC County Local Committee. Project would move carriageway further from receptors at Huntscroft Cottages.	Road realignment scheme – proposed primarily on pedestrian safety grounds because of the narrow footpath adjacent to Huntscroft cottages. Dispersion modelling showed a significant reduction in NO_2 concentrations at receptors currently exceeding the annual mean objective. The scheme is being assessed through the WSCC Strategic Transport Investment Programme (STIP).	2020	Road realignment will move A272 further from Huntscroft Cottages which experience the highest NO_2 concentrations within the Cowfold AQMA. NO_2 concentrations will be significantly reduced at receptor locations. Feasibility of the scheme is unclear due to potential impacts on character of village and business case. The cost of the scheme is significant due to underground utilities present under the road and with the traffic management costs required. An estimate of the scheme cost is £600,000.

Measure No.	Measure	EU Category / EU Classification	Focus	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments / Barriers so Implementation
3	Clean Air Zone	Promoting Low Emission Transport/ Low Emission Zone	Assessment of vehicle restrictions /measures to reduce traffic volume and improve flow through Cowfold AQMA	HDC / WSCC	2017/18	2025	Reduction in nitrogen dioxide concentrations in Cowfold. Improved traffic flow / reduction in traffic congestion.	10%	Any LEZ might restrict all HGV's of pre Euro V classification from entering the village. A LEZ trial was undertaken in Storrington AQMA in partnership with Siemans. The scheme could not go ahead due to the Greenzone system not functioning affectively. Signal reception problems affecting the system resulted in significant loss of data, whilst there were also problems with the categorisation of vehicles into Euro standard categories.	Given the experience from the Storrington LEZ trial, and the questions of practical enforceability of any LEZ restrictions it can be expected that there would be significant reservations about the feasibility and effectiveness of progressing a separate LEZ in Cowfold.	2025	The zone would limit access to the village for specific vehicle types not meeting specified emission standards (e.g. Euro V or above). The set up cost and operational costs of the scheme are significant. Additional considerations are needed to be given to the practical enforceability of any restrictions, whether exemptions are needed for local access, and the impacts of the zone on local businesses and the local community.
4	Review on-street car parking provision and possible re-designation of spaces as dedicated loading bays, to reduce number of vehicles stopping on the carriageway	Traffic Management/ UTC, Congestion management, traffic reduction	Potential changes to on-street parking and to delivery arrangements for businesses in the centre of Cowfold.	HDC / WSCC	2015/20	2020	Reduce emissions from traffic in Cowfold	1%	It is believed that this measure was originally identified in the Action Plan in relation to delivery arrangements to the Coop before it moved to the former Old Coach House pub site.	There are not known to be significant on-street car parking or loading issues within Cowfold affecting air quality receptor hotspot locations through the village. Close monitoring of any proposals for new uses of the former Coop building will need to be made to ensure any potential impacts on air quality will be appropriately mitigated.	2015 – ongoing	Any planning applications coming forward for use of the former coop building, as well as any continuing or emerging community concerns about on-street parking or loading issues should be monitored in relation to air quality impacts.

Measure No.	Measure	EU Category / EU Classification	Focus	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments / Barriers so Implementation
5	Promotion of Alternative Transport Options	Promoting Low Emission Transport / Public Vehicle Procurement - Prioritising uptake of low emission vehicles Alternatives to private vehicle use/ Car Clubs Promoting Low Emission Transport / Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	Local initiatives to incentivise the uptake of low emission vehicles / sustainable transport.	HDC / WSCC	2013/14	2014/17	Reduce emissions from traffic in Cowfold	1%	Planning Advice Document incorporates local mitigation measures. Current planning applications will be required to provide incentives to encourage low emission vehicles. This includes a number of measures focusing on working with local businesses, promoting electric vehicles, improving public transport, promoting travel plans, encouraging walking and cycling, and working with schools.	Cowfold village serves a local population of approximately 1800 residents. Public transport options are limited and private car use is the primary mode of transport. Although expected to be a low proportion of the overall volume of vehicle trips, engagement with Cowfold Primary School should continue in order to ensure as many local trips are made by other means to single child occupancy car use as possible.	2015 – ongoing	These schemes are being investigated through various delivery routes. Their direct impact on Cowfold air quality issues in the short to medium are not likely to be significant, however they form part of a wider approach of promoting a culture of using alternative travel options to single occupancy car use.
6	A27 Improve-ments	Traffic Management/ Strategic highway improvements	The Road Investment Strategy produced by DfT in March 2015 allocates a budget for the A27 schemes including the A27 Arundel bypass and A27 Worthing and Lancing improvements.	Highways Agency/ WSCC	2013 – ongoing	Dependant on HA	Improvements to A27 now programmed by Highways England. Key indicator of AP measure will be for HE to agree scheme and implement.		This is expected to reduce traffic flows through Cowfold where longer distance traffic is avoiding the A27 due to congestion (for example longer distance journeys between Haywards Heath and Chichester).	. Highways England are currently looking at the improvement options and undertaking technical work before consultation in Spring 2017.	If approved, construction is currently scheduled to commence in 2021, with completion scheduled for 2023-2024.	Improvements to the A27 are one of the key priorities of the current West Sussex Transport Plan (LTP3). Currently approximately 50% of all vehicles passing through the Storrington AQMA are 'through traffic'. 60% of HGV's in Storrington are 'through traffic'.

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$. There is clear evidence that particulate matter ($PM_{2.5}$) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The major sources of primary $PM_{2.5}$ are industrial combustion, road transport, off-road transport, residential sources and small-scale waste burning[7]. Road transport sources of $PM_{2.5}$ include mainly exhaust emissions from diesel vehicles, together with non-exhaust emissions from tyre wear, brake wear and road surface abrasion. Chemically, a large proportion of the total mass of $PM_{2.5}$ consists of nitrates, sulphates and organic and elemental/black carbon[8]. The carbon(aceous) particles are associated with a variety of combustion sources including diesel powered engines, residential burning and power stations. There is evidence of adverse health effects of black carbon particles linked with cardiovascular conditions and premature mortality[9].

Horsham District Council is working to address $PM_{2.5}$ through measures aimed at reducing emissions from road transport, in particular, measures increasing the uptake of low emission vehicles.

The principles of the Planning Advice Document: Air Quality and Emissions Reduction Guidance (May 2014) endorse the objective of reducing traffic emissions associated with new development. All developments are required to implement mitigation/offsetting measures commensurate with its size/predicted impacts.

In cooperation with Sussex-Air Partnership, Horsham DC has supported the development and maintenance of the “Energise” eV charge point network[10]. The publicly available network is linking up new and existing electric vehicle charge points across the South East. The network numbered in excess of 150 charge points by the end of 2015 and stretches across Surrey, Sussex and Kent. It has been developed from Government grant funding under the Office of Low Emission Vehicles (OLEV) which has supported the installation of over 25 rapid chargers and over 75 fast chargers with the SE Energise Network partners. The plans are to

[7] Air Quality Expert Group (2012) *Fine Particulate Matter (PM2.5) in the United Kingdom*
[8] Elemental carbon and black carbon are terms often used interchangeably, however they are defined by the measurement method applied - John G. Watson, Judith C. Chow, and L.-W. Antony Chen (2005) *Summary of Organic and Elemental Carbon/Black Carbon Analysis Methods and Intercomparisons*
[9] WHO (2013) *Review of evidence on health aspects of air pollution – REVIHAAP Project*
[10] http://www.energisenetwork.co.uk/

connect the existing points to other UK regional networks and to Continental Europe to enable eV drivers in our region to move freely across the UK and beyond without range anxiety. The main advantage of the Sussex-Air network lies in the simplicity of use as it enables the user to have one charging card, which works on the Energise network as well as other networks such as “Charge-Your-Car” (CYC) network and Ecotricity’s network.

The Energise network in Horsham District includes five charging points; two points are classified as ‘rapid’ and have been installed in Billingshurst (Six Bells car park) and Storrington (Library car park).

The Council has secured funding from the Office for Low Emission Vehicles, Department for Transport’s Local Sustainable Transport Fund (LSTF) to set up of a car club in Horsham. It is anticipated that the scheme can be extended to other towns in the district.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Currently Horsham District Council has three automatic monitoring stations located in:

- **Park Way, Horsham** town centre, monitoring NO_2 and PM_{10} TEOM particulate analyser;
- **Storrington** village, housing a nitrogen dioxide analyser, and PM_{10} and $PM_{2.5}$ analysers. This station is affiliated to the Automatic Urban and Rural Network (AURN).
- **Cowfold** village, housing a nitrogen dioxide analyser.

All stations are roadside sites with relevant public exposure[11]. Further details of these monitoring stations are provided in Table A1 in Appendix A. The location of the automatic monitoring stations are shown in Figures D1 - D3, Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

All monitoring stations are collocated with triplicate NO_2 diffusion tubes.

The Storrington monitoring site is part of the AURN. A recent review of the monitoring requirements by Defra found that the South East region had a greater number of PM_{10} and $PM_{2.5}$ instruments than required under the Air Quality Directive[12] whilst some other zones and agglomerations in the UK were identified as requiring additional measurement for those pollutants. Therefore, the two FDMS instruments for PM_{10} and $PM_{2.5}$ previously located at the Storrington AURN site were relocated to another AURN site in January 2017. The NO_2 analyser at this site will remain affiliated.

[11] NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. National monitoring results are available at https://uk-air.defra.gov.uk/data/

[12] Directive 2008/50/EC on ambient air quality and cleaner air for Europe

Horsham District Council is a member of the Sussex Air Quality Partnership (Sussex Air) which benefits from the co-ordinated monitoring of air pollutants across the region. The Sussex Air Quality Monitoring Network is managed and co-ordinated by the Environmental Research Group based at King's College London, on behalf of Sussex-air and they provide data calibration and ratification of results. All data from the network is published at www.sussex-air.net.

3.1.2 Non-Automatic Monitoring Sites

The nitrogen dioxide monitoring network in 2016 included 39 sites across the district. The total number of diffusion tubes was 47. Details of the monitoring sites are shown in Table A2 in Appendix A. The site locations are shown in Figures D4-D11 in Appendix D.

Since the Annual Status Report 2016 two new sites have been added to the survey in April 2016; those were:

- Gatwick 1n (Hyders Farmhouse, Bonnetts Ln, Crawley) – located to the north of the district in Crawley near to the Gatwick airport's boundary. The assessment of sources carried out in the 2015 USA identified relevant exposure close to the Gatwick airport boundary that has not been previously assessed. This new site was set up at a receptor located close to the airport boundary in order to determine the NO_2 concentrations in this area;

- Henfield 1n (Golden Sq, jct of A2037 Barrow Hill and A281 Brighton Rd). This site was set up at a junction of three major commuting routes – the A281 High Street, A281 Brighton Road and A2037; and

- Kingsfold 1n (Opp. Leith View Cottages, A24 Dorking Rd, Kingsfold). This diffusion tube was installed to the north of Horsham, on the A24. The site was set up to determine existing NO_2 concentrations near the A24 in the context of North Horsham having been identified in the Planning Framework as the main location for new housing (2,500 new homes planned as committed development).

One monitoring site was relocated in April 2016; this was:

- Storrington 19n – moved from Magpies on Manleys Hill in Storrington to the junction of A283 Manley's Hill and School Hill in Storrington.

One monitoring site was discontinued in 2016; this was one of the two Steyning sites where annual mean concentrations of NO_2 have remained well below the objective for a number of years:

- Steyning 3N at 61 High St Steyning.

All diffusion tubes have relevant exposure within 10m of the kerbside, except tubes:

- Horsham 6N – receptor at Rusper Road located a distance of 11.2m from kerbside;
- Horsham 7N – receptor at Warnham Road located a distance of 12m from kerbside; and
- Storrington 14 – receptor at Washington Road located a distance of 19m from kerbside.

Triplicate tubes have been maintained at all three automatic analyser sites:

- HO2 Horsham Park Way (junction of Park Street and Park Way in Horsham);
- HO4 Storrington AURN (junction of Manley's Hill nad Meadowside in Storrigton; and
- HO5 Cowfold (Bolney Road/The Street, Cowfold).

There were two duplicate sites in 2016; these were Storrington 1,2 – Manleys Hill and Cowfold 1,2 – Olde House, The Street, Cowfold.

3.2 Individual Pollutants

The following sections provide results from the automatic monitoring stations and diffusion tube network hosted by Horsham District Council and additional data from the Lullington Heath site in East Sussex for sulphur dioxide. The air quality monitoring results presented in this section are, where relevant, adjusted for "annualisation" and bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

The Council monitored NO_2 at three locations during 2016: HO2 Horsham Park Way, HO4 Storrington AURN and HO5 Cowfold. Table A3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for all the years where monitoring was undertaken with the air quality objective of 40µg/m^3. (1) Data capture for the full calendar year.

Table A4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for all the monitoring years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Data capture was good (above 75%) during 2016 at all three sites and as such no annualisation has been required.

As data capture was below 90% at HO2 Horsham Park Way in 2016 the 99.8th percentile has also been reported for the hourly objective for this site.

The results at the three monitoring stations indicate that the NO_2 objectives for 2016 were not exceeded, with annual mean concentrations below the annual mean objective level of 40µg/m^3 and no measured exceedances of the 1-hour objective.

The annual mean NO_2 concentration for Park Way, Horsham for 2016 was 28.6µg/m^3; this showed a small increase on two previous years. There were no exceedances of the 1-hour objective at the Park Way site. The highest concentrations in the year were recorded in November (average mean concentration of 39.1µg/m^3), followed by December 2016 (average mean concentration of 38.9µg/m^3); this is shown in Figure B3, Appendix B. From the analysis of hourly mean concentrations it can be seen that the highest hourly mean concentrations (exceeding 40µg/m^3) were recorded in the morning and afternoon traffic peaks from Monday through to Friday (Figure B4, Appendix B).

For the Storrington AURN site the annual mean NO_2 concentration for 2016 was 25.1µg/m^3, showing a small increase on 2015. As data capture precluded assessment of the 1-hour mean objective, the 99.8th percentile was calculated. The result of 102.7µg/m^3 indicated no exceedances of the 1-hour mean

objective, which is 200µg/m^3. The highest concentrations in the year were recorded in November (average mean concentration of 30.4µg/m^3) and December 2016 (average mean concentration of 28.7µg/m^3); the period of the lowest concentrations was over the summer months July-August (Figure B8, Appendix B). From the analysis of hourly mean concentrations it can be seen that the highest hourly mean concentrations (exceeding 40µg/m^3) were recorded in the morning traffic peaks for Thursday and Friday (Figure B9, Appendix B).

The measured annual mean NO_2 concentration at the Cowfold station in 2016 was 27.2µg/m^3, a small increase on 2015. There were no exceedances of the 1-hour objective at the site. The highest concentrations in the year were recorded in the second half of the year, from September (34.2µg/m^3) to December (35.8µg/m^3); the lowest concentrations occurred in the summer months (Figure B11, Appendix B). The analysis of hourly mean concentrations by day of the week indicates that the highest concentrations were recorded during the afternoon traffic peaks throughout the working week from Monday to Friday, with results showing hourly mean concentrations of 40 – 50 µg/m^3 (Figure B12, Appendix B).

Figure A1 in Appendix A shows the trend in NO_2 concentrations at the monitoring locations for all the years of monitoring. This shows that the annual mean concentrations have increased in 2016 from the previous year at all three sites. Nonetheless, the Storrington and Horsham Park Way sites show an overall decreasing trend over the monitoring period. Regarding the Cowfold site, the concentrations peaked in 2012, 2014 and 2016, and showed decreases in 2013 and 2015. Therefore, the overall trend at the site is not clear. The peak concentration for the Cowfold site was 29.1µg/m^3 in 2012.

Diffusion Tube Monitoring Data

Nitrogen dioxide diffusion tube monitoring was undertaken at 41 locations throughout Horsham District during 2016. Data capture for the survey in 2016 was good (100%) for most sites. Two sites had data capture below 75%; those were Henfield 1n (Golden Square, jct of A2037 Barrow Hill and A281 Brighton Rd) and Storrington 19n (jct of A283 Manley's Hill and School Hill), both set up in April 2016. The results for those sites were 'annualised' in accordance with Box 7.10 of the Technical Guidance LAQM.TG(16). The details for the annualisation can be found in Appendix C.

The results for 2016 (shown in Table A9 and Table A10) have been corrected using a local bias correction factor of 0.78, as obtained from three co-location studies at HO2 Horsham Parkway, HO2 Storrington and HO5 Cowfold. Full details of the bias adjustment and QA/QC procedure are provided in Appendix C.

In 2016 there were three sites where the annual mean NO_2 objective was exceeded:

- Storrington 1,2 (Manleys Hill) – located within the Storrington AQMA;
- Storrington 19n (jct of Manley's Hill and School Hill) – located within the Storrington AQMA;
- Cowfold 7n (3 Huntscroft Gardens, Bolney Road) – located within the Cowfold AQMA.

There were three other monitoring sites with measured concentrations within 10% of the annual mean objective (i.e. 36µg/m³ or more), three of these sites are within the Storrington AQMA and one within the Cowfold AQMA:

- Storrington 4 (22 High Street) – located within the Storrington AQMA;
- Storrington 11n (53 West Street) – located within the Storrington AQMA; and
- Cowfold 1,2 (Olde House, The Street) – located within the Cowfold AQMA.

All of the sites which exceeded the annual mean objective, as well as those within 10% of the objective, are located within the existing AQMAs. This demonstrates that the Storrington and Cowfold AQMAs are still required.

The duplicate site Storrington 1,2 in the Storrington AQMA has shown a small increase in 2016 on the two previous years. The site is located approximately 2.5m from a residential property. A distance correction to estimate concentration at the façade was not carried out as the nearest receptors are located on ground floor whereas the measurement was taken at the height of 3m. Therefore, it is assumed that the concentrations at the façade of the property immediately behind the site, and the properties nearest the site, are close in value to the concentration recorded at the site. Near to Storrington 1,2, on the opposite side of the road, is the relocated site Storrington 19n. The Storrington 19n site is located at the same distance from the road as the façade of the nearest residential property, and as such no correction was required.

The site Cowfold 7n within the Cowfold AQMA has shown an exceedance in 2016 and the previous years. The site is located approximately 2m from a residential receptor. A distance correction has been applied to estimate the concentration at the nearest relevant exposure (details of the correction shown in Figure C2, Appendix C). The distance corrected result of 42µg/m^3 indicates that the annual mean NO_2 objective was exceeded at the façade of the property in 2016.

The Horsham diffusion tube sites in 2016 have shown a slight increase from 2015 and the previous year. The highest concentrations were recorded at the roadside sites Horsham 1N (Park Way) and Horsham 5N (Harwood road). Horsham 1n is located at the intersection of major roads in the town centre and Horsham 5n is located near a busy junction leading into the town centre.

For the Storrington monitoring sites, the 2016 NO_2 concentrations have shown a small increase on the two previous years. An increase in traffic flows on the A283 in 2016 may have been a contributing factor to the increase in NO_2 concentrations. Nonetheless, the majority of long-term sites show a continuing overall downward trend over the monitoring period.

The measured annual mean NO_2 concentrations in Cowfold for 2016 were slightly higher than in the previous three years. Still, the overall trend is decreasing for the majority of sites. The Cowfold 7n site, located on the A272 to the east of the town, is the only monitoring site in Cowfold which exceeded the annual mean objective over the last few years. The trend for this site is not clear as concentrations peaked in 2011 and 2012, following which the annual mean decreased in 2013 and 2014, before increasing again in 2015 and 2016.

The monitoring sites in the towns of Billingshurst, Pulborough and Steyning have remained below the objective throughout the monitoring period. The concentrations measured in Billinghurst have remained relatively stable at approximately 30µg/m^3 over the monitoring period from 2013 to 2016. The Pulborough sites have shown an increase from two previous years. One contributing factor may have been that the tube height was reduced in 2016 by approximately 1m at both sites. One of the two monitoring sites in Steyning has been discontinued in 2016 as the concentrations have remained well below the annual mean objective for all the years of monitoring. The other site in Steyning – Steyning 4N – has shown a decrease in 2016, which may have been due to reduced exposure as scaffolding was built in March around the building adjacent to the site.

The assessment of sources carried out in the 2015 USA identified relevant exposure close to the Gatwick airport boundary that has not been previously assessed. A new site, Gatwick 1n (Hyders Farmhouse, Bonnetts Ln, Crawley) was set up at a receptor located close to the airport boundary in order to determine the NO_2 concentrations in this area. The site recorded an annual mean concentration of 18.5µg/m^3, which indicates that exceedances of the annual mean NO_2 objective in that area are unlikely.

The new sites Henfield 1n (Golden Sq, jct of A2037 Barrow Hill and A281 Brighton Rd) and Kingsfold 1n (Opp. Leith View Cottages, A24 Dorking Rd, Kingsfold) measured concentrations below the objective for 2016.

Figures A3 to A6 in Appendix A show the trends in annual mean NO_2 concentrations measured at the diffusion tube sites over the monitoring period 2008-2016. The results of diffusion tube monitoring indicate a small increase in nitrogen dioxide concentrations in 2016 as compared to the previous two years. Nonetheless, there is still a distinct overall downward trend in measured concentrations of NO_2 over the monitoring period. This can be attributed to decreasing background concentrations and is also indicative of a gradual improvement in fleet emissions.

3.2.2 Particulate Matter (PM_{10})

The Council monitored PM_{10} at two locations during 2016: HO2 Horsham Park Way and HO4 Storrington AURN. Table A5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for all the years where monitoring was undertaken with the air quality objective of 40µg/m^3. Table A6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for all

the monitoring years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

An automatic TEOM particulate monitor has been permanently located at Park Way in Horsham town centre for the past seven years, giving 15 minute measurements of particulate matter concentrations. Data collection and ratification is undertaken by the Environmental Research Group through their contract with the Sussex Air Quality Partnership. The data obtained from the Park Way analyser has been corrected using the Volatile Correction Model developed by the Environmental Research Group. Further information on the correction applied to the TEOM results is presented in Appendix C. The TEOM analyser at Horsham Park Way experienced data losses in 2016 due to breakdown and recurring issues with air flow. Adjustment of the PM_{10} annual mean concentration values from short-term monitoring data from the site has been carried out in accordance with Box 7.9 of the Technical Guidance LAQM.TG(16). The adjustment calculations are provided in Appendix C. The 90th percentile of PM_{10} 24-hour means was also reported for the site.

The Storrington monitoring station is an AURN affiliated site, which housed $PM_{2.5}$ and PM_{10} FDMS analysers in 2016. Data collection and ratification of the Storrington station has been undertaken by Ricardo-AEA as it is an AURN affiliated site. Data capture was above 75% in 2015 for the Storrington analyser and as such no annualisation has been required..

Automatic monitoring of PM_{10} at the Horsham Park Way site and the Storrington AURN indicated that both the annual mean and 24-hour UK objective for PM_{10} were complied with in 2016.

The annual mean PM_{10} concentration in 2016 for Horsham Park Way was 19.3µg/m³ and the daily mean objective (expressed as the 90th percentile) was 32.7µg/m³. The 2016 data for this site shows a marginal increase in the annual mean concentration and in the number of exceedances of the daily mean concentration objective when compared to the 2015 data.

For the Storrington AURN site, the annual mean PM_{10} concentration for 2016 was 18.8µg/m^3. There were three exceedances of the daily mean objective. The 2016 annual mean result shows a slight increase in PM_{10} concentrations when compared with the previous year.

Figure A2 shows the trend in PM_{10} concentrations at the two monitoring locations for all the years of monitoring. The concentrations at Horsham Park Way have generally showed higher annual mean results compared to the Storrington AURN site; both sites remaining well below both the long term and short term air quality objectives for PM_{10}. Data from the Horsham Park Way analyser shows an overall gradual reduction in measured concentrations since monitoring at this location begun in 2007. A decreasing trend has also been observed in the recent years at the Storrington AURN site.

3.2.3 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ objectives have been set out in the UK Air Quality Regulations. Although there is no requirement for local authorities in England to review and assess $PM_{2.5}$ against these objectives as part of the LAQM regime, results have been reported as recommended by Technical Guidance LAQM.TG(16).

$PM_{2.5}$ is measured at the Storrington (AURN) site. For the Horsham Park Way site, the annual mean concentrations of $PM_{2.5}$ were estimated from the PM_{10} measurements using a local ratio of $PM_{2.5}$ to $PM_{10,}$ as per method described in Box 7.7 of Technical Guidance TG(16).

The $PM_{2.5}$ results presented in Table A7 indicate that concentrations are well below the target value of 25µg/m^3 in 2015 at both locations[13].

Figure A2 shows the trend in both PM_{10} and $PM_{2.5}$ concentrations at the two monitoring locations (values plotted for the Horsham Parkway sites are estimated values). This shows an overall gradual reduction in the $PM_{2.5}$ concentrations over the recent years at both sites.

[13] National target value as per *The Air Quality Standards Regulations 2010*

3.2.4 Sulphur Dioxide (SO_2)

Automatic sulphur dioxide monitoring was undertaken at one permanent station in Sussex, located at Lullington Heath (rural). The 2016 data from the Lullington Heath AURN air quality station did not show any exceedance of the national objectives. This is in line with previous years' data.

Given that no large scale industrial combustion processes or significant areas of domestic solid-fuel burning have been identified within Horsham District it is unlikely that the objectives for sulphur dioxide would have been exceeded within the district during 2016.

The monitoring data is summarised in Table A8 in Appendix A.

3.2.5 Summary of Compliance with AQS Objectives

There was one monitoring location within the Cowfold AQMA (Cowfold 7n at 3 Huntscroft Gardens, Bolney Road) which exceeded the annual mean objective for nitrogen dioxide in 2015 and four further sites with measured concentrations within 10% of the objective (> 36µg/m^3) – three of these sites are within the Storrington AQMA (Storrington 1,2 at Manleys Hill, Storrington 4 at 22 High Street and Storrington 11n at 53 West Street) and one within the Cowfold AQMA (Cowfold 1,2 at Olde House, The Street).

No other monitoring sites within the district exceeded the air quality objectives for either nitrogen dioxide or particulate matter in 2015.

4 Conclusions and Proposed Actions

4.1 Conclusions from New Monitoring Data

The results from automatic monitoring for nitrogen dioxide within Horsham district show that the objectives were met at the three monitoring stations in 2016. With regards to diffusion tube monitoring, the air quality objective for annual mean NO_2 has been exceeded at three sites, all located within the existing AQMAs: Storrington 1,2 (Manleys Hill) and Storrington 19n (jct of Manley's Hill and School Hill) in the Storrington AQMA, and Cowfold 7n (3 Huntscroft Gardens, Bolney Road) within the Cowfold AQMA. This demonstrates that the Storrington and Cowfold AQMAs are still required.

The annual mean NO_2 concentration recorded at the new diffusion tube site set up near the Gatwick airport boundary was well below the objective, which indicates that exceedances of the objective in the Crawley area are unlikely.

The analysis of trends indicates a small increase in NO_2 concentrations in 2016 as compared to the previous two years. Nonetheless, there is still a distinct overall downward trend in measured concentrations of NO_2 over the monitoring period. This can be attributed to decreasing background concentrations and is also indicative of a gradual improvement in fleet emissions.

There were no exceedances of the PM_{10} long term or short term objectives at the two monitoring sites in the district. Both sites showed a slight increase in the annual mean concentrations and in the number of exceedances of the daily mean concentration objective when compared to the 2015 data. Still, the overall trend in the recent years is decreasing for both sites.

Monitoring in 2016 has not identified any potential or actual exceedances at relevant locations outside existing AQMAs, and it is not therefore necessary to proceed to detailed assessment at any additional locations.

4.2 Conclusions from Action Planning

Horsham District Council has taken forward a number of measures during the current reporting year of 2016 in pursuit of improving local air quality. The key actions completed in 2016 are: the review of the previous measures proposed to address air quality issues in

Storrington and Cowfold; and working with planning policy and development control to secure air quality mitigation from new development.

The achievement of congestion improvement measures in Storrington and Cowfold has been challenging as there are no easy solutions. Horsham District Council continues to work with WSCC to explore traffic management measures to reduce congestion and improve air quality. This has included revisiting and reviewing the evidence from all previous measures identified to understand what impacts these would be likely to have in terms of improving air quality, and whether the measures would be deliverable and provide value for money. A number of these measures are continuing to be explored.

The Council's priorities for the coming year are finalising the update of the *Planning Advice Document: Air Quality and Emissions Reduction Guidance* and progressing delivery of those traffic management / congestion improvement schemes for Storrington and Cowfold which have been identified as deliverable in the 2016 review. Following the completion of those actions, the Action Plans for Storrington and Cowfold will be duly updated.

4.3 Proposed Actions

- The Annual Status Report for 2016 has identified no need to proceed to Detailed Assessment for any pollutant;
- The new monitoring data for 2016 has indicated that there is no need to revise the current boundaries of the Storrington or Cowfold AQMAs;
- Horsham District Council will continue to monitor air quality in line with the Environment Act 1995. The existing monitoring network will be maintained;
- Data from both automatic and non-automatic monitoring will be incorporated into further modelling studies for Storrington and Cowfold as part of the Action Planning process as appropriate;
- Finalise the update of the *Planning Advice Document: Air Quality and Emissions Reduction Guidance;*
- Progressing further evaluation of the traffic management / congestion improvement schemes for Storrington and Cowfold;
- Update the Air Quality Action Plans for Storrington and Cowfold; and
- The 2018 Annual Status Report will be submitted to Defra in June 2018.

Appendices

Appendix A: Monitoring Results for 2016

Appendix B: Full Monitoring Results for 2016

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

Appendix D: Maps of Monitoring Locations

Appendix E: Industrial Processes

Appendix F: Summary of Air Quality Objectives in England

Appendix A: Monitoring Results for 2016

Table A1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS GridRef	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Inlet Height	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?
HO2	**Horsham Park Way**	Roadside	517485	130590	NO_2; PM_{10}	N	Chemiluminescence (APNA-370); TEOM	3.0m	Y (7.0m)	1.5m	Y
HO4	**Storrington AURN**	Roadside	509083	114198	NO_2; $PM_{2.5}$; PM_{10}	N	Chemiluminescence (Thermo 32i); TEOM FDMS; TEOM FDMS	3.3m	Y (9.6m)	4.6m	N
HO5	**Cowfold**	Roadside	521356	122553	NO_2	Y	Chemiluminescence (ML9841B)	2.0m	Y (4.0m)	6.5m	N

Table A2 – Details of Non-Automatic Monitoring Sites

Lab Ref.	Site Name	Site Location	Site Type	Triplicate or Co-located Tube?	OS Grid Ref X	OS Grid Ref Y	In AQMA?	Diffusion Tube Height	Relevant Exposure? *(Y/N with distance to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
Horsham Sites											
1	Horsham 1N	Park Way, Horsham	Roadside	N	517489	130580	N	2.2m	Y (3.5m)	2.0m	Y
3	Horsham 3N	69 Hillside, Horsham	Urban Background	N	516000	130600	N	2.9m	Y (7.6m)	1.5m	N
4	Horsham 4N	45 Gorings Mead, Horsham	Urban Background	N	517600	130100	N	2.5m	Y (9.8m)	1.2m	N
8	Horsham 5N	Harwood Rd, Horsham	Roadside	N	518230	131140	N	2.4m	Y (9.6m)	1.4m	Y
9	Horsham 6N	130 Rusper Rd, Horsham	Roadside	N	518650	132490	N	2.6m	Y (11.2m)	1.5m	N
10	Horsham 7N	30 Mill House, Warnham Rd, Horsham	Roadside	N	516952	132215	N	2.2m	Y (12.0m)	2.0m	N
11	Horsham 8N	54 Worthing Rd, Horsham	Roadside	N	516650	130220	N	3.0m	Y (8.0m)	1.6m	Y
5,6,7	Park Way	AQMS Horsham	Roadside	Triplicate, co-located with HO2 Horsham Park Way	517489	130580	N	2.8m	Y (8.9m)	2.1m	Y
23	N. Horsham 1N	Home Fm, Langhurstwd Rd, Horsham	Roadside	N	517702	133570	N	2.4m	Y(4.9m)	1.9m	N
24	N. Horsham 2N	Graylands Fm Cotts, Horsham	Roadside	N	517476	134013	N	2.8m	Y (5.5m)	1.0m	Y
Storrington Sites											
13,14	Storrington 1,2	Manleys Hill, Storr duplicate	Roadside	Duplicate	508960	114270	Y	3.0m	Y (2.5m)	1.1m	Y
15	Storrington 3	3 School Hill, Storrington	Roadside	N	508935	114297	Y	3.2m	Y (2.0m)	1.2m	Y
16	Storrington 4	22 High Street, Storrington	Roadside	N	508832	114272	Y	3.0m	Y (2.8m)	2.2m	Y
17	Storrington 5	2 West Street, Storrington (Post Office)	Roadside	N	508742	114288	Y	3.5m	Y (1.9m)	1.9m	Y

18	Storrington 6	1-4 Holly Court, Pulborough Rd Storrington	Roadside	N	508396	114449	N	2.4m	Y (7.7m)	1.9m	Y
19	Storrington 7	The Willows, Amberley Rd, Storrington	Roadside	N	508338	114374	N	3.0m	Y (6.7m)	1.6m	Y
29,30,31	Storrington 8/9/10 AURN	Manleys Hill AURN co-located	Roadside	Triplicate, co-located with HO4 Storrington AURN	509083	114198	N	3.3m	Y (9.6m)	4.6m	N
34	Storrington 11n	53 West Street, Storrington	Roadside	N	508511	114365	Y	3.0m	Y (1.0m)	3.0m	Y
33	Storrington 12n	3 Rectory Cottage Storrington	Roadside	N	508598	114323	Y	2.6m	Y (7.0m)	2.3m	Y
32	Storrington 13n	18 West Street, Storrington	Roadside	N	508675	114306	Y	2.2m	Y (0.5m)	3.0m	Y
38	Storrington 14n	Cobden, Manleys Hill, Storrington	Roadside	N	509319	114160	N	2.6m	Y (20.0m)	0.9m	N
40	Storrington 15n	Fryern Road, Storrington	Roadside	N	509103	114532	N	2.2m	Y (12.0m)	1.7m	N
39	Storrington 16n	Mill Parade, Waitrose car park, Storrington	Roadside	N	508905	114325	N	2.6m	Y (0m)	1.3m	N
41	Storrington 17n	33 Church Street, Storrington	Urban Background	N	508677	114149	N	2.2m	Y (1.0m)	1.5m	Y
42	Storrington 18n	20 Amberley Road, Storrington (Barges End)	Roadside	N	508215	114348	N	2.2m	Y (5.0m)	1.9m	Y
47	Storrington 19n	jct of A283 Manley's Hill and School Hill	Roadside	N	508945	114268	Y	2.0m	Y (0m)	1.0m	N
Cowfold Sites											
12,20	Cowfold 1,2	Olde House, The Street, Cowfold	Roadside	Duplicate	521324	122610	Y	2.7m	Y (2.5m)	1.7m	Y
21	Cowfold 3	6 Margaret Cotts, A272, Cowfold	Roadside	N	521267	122677	Y	2.7m	Y (9.7m)	2.0m	Y
35	Cowfold 4	Trelawny House, A281, Cowfold	Roadside	N	521311	122704	N	2.4m	Y (9.3m)	2.0m	Y
22	Cowfold 5n	Junction Station Road/Thorndon, Station Road, Cowfold	Roadside	N	521070	122706	Y	2.5m	Y (23.0m)	3.6m	Y

36	Cowfold 6n	Millers Cott. Henfield Road, Cowfold	Roadside	N	521309	122248	N	2.2m	Y (3.0m)	1.8m	Y
37	Cowfold 7n	3 Huntscroft Gardens, Bolney Road, Cowfold	Roadside	N	521460	122473	Y	2.2m	Y (2.0m)	1.1m	Y
43	Cowfold 8n	5-6 Fairfield Cottages, Cowfold	Urban Background	N	521411	122667	N	2.0m	Y (7.0m)	0.3m	N
44,45,46	Cowfold AU A/B/C	Bolney Road/The Street, Cowfold	Roadside	Triplicate, co-located with HO5 Cowfold	521356	122552	Y	2.0m	Y (20.0m)	6.5m	Y
Billingshurst Sites											
28	Billingshurst 1	96 High Street	Roadside	N	508623	125834	N	2.2m	Y (1.0m)	1.5m	Y
Crawley Sites											
49	Gatwick 1n	Hyders Farmhouse, Bonnetts Ln, Crawley	Roadside	N	525301	139338	N	2.0m	Y (5.0m)	1.0m	Y
Henfield Sites											
2	Henfield 1n	Golden Sq, jct of A2037 Barrow Hill and A281 Brighton Rd	Roadside	N	521530	115738	N	2.0m	Y (0m)	1.2m	Y
Kingsfold Sites											
48	Kingsfold 1n	Opp. Leith View Cottages, A24 Dorking Rd, Kingsfold	Roadside	N	516925	136646	N	2.0m	Y (0m)	1.0m	Y
Pulborough Sites											
26	Pulborough 1	Swan Corner, Station Road, Pulborough	Kerbside	N	504584	118568	N	3.2m	Y (1.7m)	0.4m	Y
27	Pulborough 2	42A Lower Street, Pulborough	Roadside	N	505185	118623	N	3.0m	Y (1.8m)	1.5m	Y
Steyning Sites											
25	Steyning 4N	Church St, Steyning	Kerbside	N	517732	111198	N	2.7m	Y (1.5m)	0.9m	Y

Table A3 – Results of Automatic Monitoring of NO_2: Comparison with Annual Mean Objective 2006 – 2016

Site ID/Name	Site Type	Within AQMA ?	Relevant public exposure? Y/N	Valid Data Capture 2016 % (1)	Annual Mean Concentration µg/m^3										
					2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
HO2 Horsham Park Way	Roadside	N	Y	95.1	26	30	29	31	30.4	27.0	28.6	29.9	25.4	26.5[a]	28.6
HO4 Storrington AURN	Roadside	N	Y	84.8	-	-	-	21[*]	27.6	23.4	24.8	26.9	22.4[a]	21.3	25.1
HO5 Cowfold	Roadside	Y	Y	99.5	-	-	-	-	-	27.0	29.1	24.7	27.9[a]	25.5	27.2

☒ **Annualisation has been conducted where data capture is <75%**

☐ **If applicable, all data has been distance corrected for relevant exposure**

[*] Indicative value only. The NO_2 annual mean has been estimated from 32ngratified data for period 21.10.09 – 31.12.2009.
[a] Annual mean concentration "annualised" as per Box 7.9 of TG(16) as data capture less than 75%. Appendix C gives details of 'annualisation' for 2016.
(1) Data capture for the full calendar year.

Table A4 – Results of Automatic Monitoring of NO_2: Comparison with 1-hour Mean Objective 2006 – 2016

Site ID/Name	Site Type	Within AQMA ?	Relevant public exposure? Y/N	Valid Data Capture 2016 % (1)	Number of Exceedances of Hourly Mean (200 µg/m^3) (2)										
					2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
HO2 Horsham Park Way	Roadside	N	Y	95.1	0	0	0	0	0	0	0	0	0	0 (102.9)	0
HO4 Storrington AURN	Roadside	N	Y	84.8	-	-	-	n/a	0	0	0	0	0 (78.7)	0 (85.1)	0 (102.7)
HO5 Cowfold	Roadside	Y	Y	99.5	-	-	-	n/a	n/a	0	0	0	0 (120)	0 (98.7)	0

(1) Data capture for the full calendar year.
(2) If the period of valid data is less than 85%, the 99.8th percentile of hourly means is included in brackets.

Figure A1 – Trends in Annual Mean NO_2 Concentrations Measured at Automatic Monitoring Sites 2006 – 2016

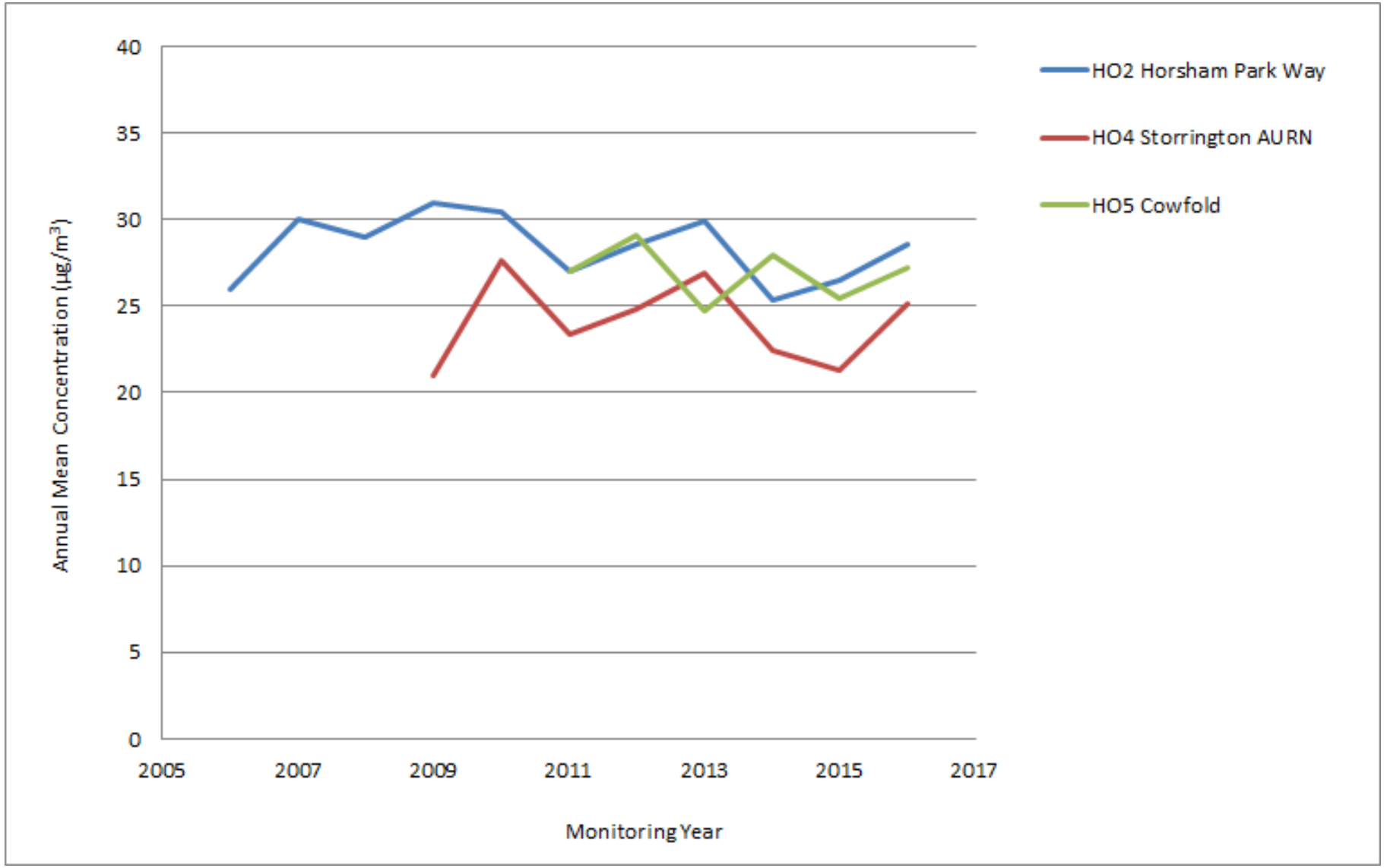


Table A5 – Results of Automatic Monitoring of PM_{10}: Comparison with Annual Mean Objective 2007 – 2016

Site ID	Site Type	Within AQMA?	Relevant public exposure? Y/N	Valid Data Capture 2016 % (1)	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration µg/m³									
						2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
HO2 Horsham Park Way	Roadside	N	Y	70.2	Y	24.9	23.8	23.9	18.3	24.0	23.2	22.3	20.9	18.6[a]	19.3[a]
HO4 Storrington AURN	Roadside	N	Y	94.0	Y	-	-	20.4*	20.4	22.4**	20.6	23.0	-	15.8	18.8

☒ Annualisation has been conducted where data capture is <75%

* Data capture for 5 month monitoring period August – December 2009. Data was not ratified.

** Data not fully ratified.

[a] Annual mean concentration "annualised" as per Box 7.9 of TG(16) as data capture less than 75%. Appendix C gives details of 'annualisation' for 2016.

(1) Data capture for the full calendar year.

Table A6 – Results of Automatic Monitoring of PM_{10}: Comparison with 24-hour Mean Objective 2007 – 2016

Site ID	Site Type	Within AQMA?	Relevant public exposure? Y/N	Valid Data Capture 2016 % (1)	Confirm Gravimetric Equivalent (Y or NA)	Number of Exceedances of 24-Hour Mean (50 µg/m³ not to be exceeded more than 35 times a year) (2)									
						2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
HO2 Horsham Park Way	Roadside	N	Y	70.2	Y	17	9	3	0	11 (39)	9 (38)	2 (33)	4 (32)	2 (29.3)	5 (32.7)
HO4 Storrington AURN	Roadside	N	Y	94.0	Y	-	-	0 (27)*	2 (36)	15**	9	7 (39.9)	-	2 (24.8)	3

* Data capture for 5 month monitoring period August – December 2009. Data was not ratified.

** Data not fully ratified.

(1) Data capture for the full calendar year.

(2) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is included in brackets.

Table A7 – Results of Automatic Monitoring of $PM_{2.5}$: Comparison with Annual Mean Objective 2010 – 2016

Site ID	Site Type	Within AQMA?	$PM_{2.5}$ Annual Mean (µg/m^3)* / (Valid Data Capture)						
			2010	2011	2012	2013	2014	2015	2016
HO2 Horsham Park Way	Roadside	N	13.0[e] (98.9)	16.8[e] (89.1)	18.3[e] (86.2)	16.1[e] (88)	14.6[e] (84)	13.2[e] (60.8)	13.5[e] (70.2)
HO4 Storrington AURN	Roadside	N	14.5 (93.1%)	15.6 (98.3%)	16.2 (92.1%)	16.6 (91.2%)	11.3 (85.1%)	11.2 (89.1%)	13.2 (91.7%)

* As a comparison, the UK Air Quality Standard objective for $PM_{2.5}$ is 25µg/m^3 (target value) for England

[e] $PM_{2.5}$ values for HO2 Horsham Park Way were estimated from the PM_{10} data using Storrington AURN ratio of $PM_{2.5}/PM_{10}$ as per method described in Box 7.7 of TG(16).

UK average ratio of 0.7 was used for 2014 where local data was not available.

Figure A2 – Trends in Annual Mean PM_{10} and $PM_{2.5}$ Concentrations Measured at Automatic Monitoring Sites 2007 – 2016

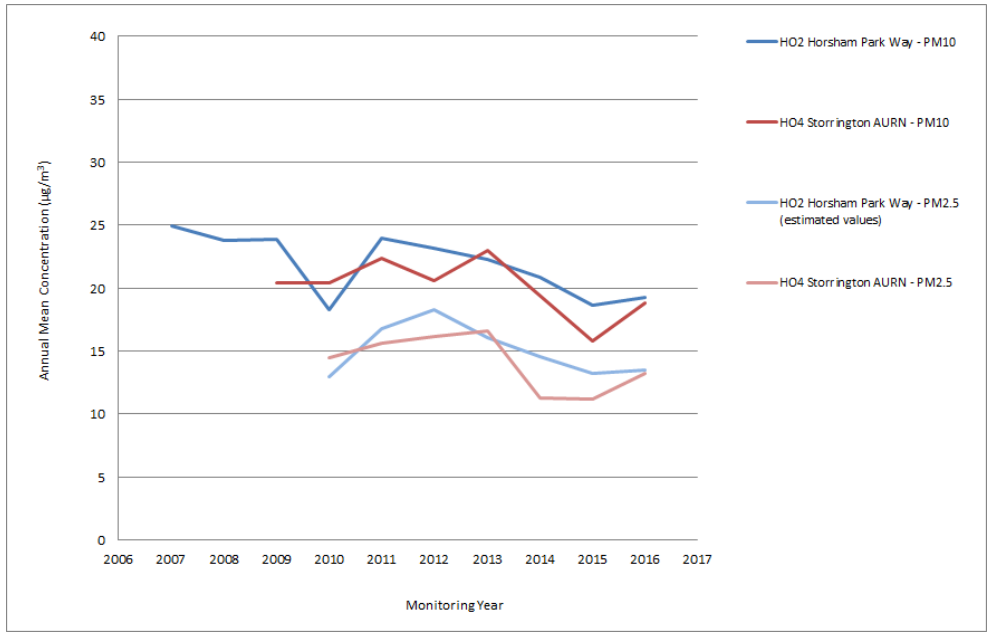


Table A8 – Results of SO2 Automatic Monitoring: Comparison with Objectives 2016

SiteType	Location	Within AQMA?	Data Capture 2016 %	Number of Exceedances of:		
				15-minute Objective (266 μg/m^3)	1-hour Objective (350 μg/m^3)	24-hour Objective (125 μg/m^3)
Rural	**Lullington Heath**	N	71.0%	0	0	0

Table A9 – Results of Nitrogen Dioxide Diffusion Tubes in 2016

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2016 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual Mean Concentration (Local Bias Adjustment factor = 0.78) 2016 (μg/m^3)
Horsham Sites								
Horsham 1N	Park Street, Horsham	Roadside	N	N	100.0	N	N	32.1
Horsham 3N	69 Hillside, Horsham	Urban Background	N	N	100.0	N	N	13.0
Horsham 4N	45 Gorings Mead, Horsham	Urban Background	N	N	100.0	N	N	12.9
Horsham 5N	Harwood Rd, Horsham	Roadside	N	N	100.0	Y	N	31.4
Horsham 6N	130 Rusper Rd, Horsham	Roadside	N	N	100.0	N	N	25.7
Horsham 7N	30 Warnham Rd, Horsham	Roadside	N	N	100.0	N	N	28.9
Horsham 8N	54 Worthing Rd, Horsham	Roadside	N	N	100.0	N	N	25.2
Park Way	AQMS Horsham	Roadside	N	Triplicate & co-located	100.0;100.0;91.7	N	N	25.3
N. Horsham 1N	Home Fm, Langhurstwd Rd, Horsham	Roadside	N	N	100.0	N	N	23.1
N. Horsham 2N	Graylands Fm Cotts, Horsham	Roadside	N	N	91.7	N	N	20.5
Storrington Sites								
Storrington 1/2	Manleys Hill, Storr duplicate	Roadside	Y	Duplicate	100.0; 91.7	N	N	**42.1**
Storrington 3	3 School Hill, Storrington	Roadside	N	N	91.7	N	N	30.4
Storrington 4	22 High Street, Storrington	Roadside	Y	N	100.0	N	N	37.5
Storrington 5	2 West Street, Storrington	Roadside	N	N	100.0	N	N	26.9

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2016 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual Mean Concentration (Local Bias Adjustment factor = 0.78) 2016 (µg/m^3)
Storrington 6	1-4 Holly Court, Pulborough Rd Storrington	Roadside	N	N	100.0	N	N	23.7
Storrington 7	The Willows, Amberley Rd, Storrington	Roadside	N	N	100.0	N	N	23.4
Storrington 8/9/10 AURN	Manleys Hill AURN co-located	Roadside	N	Triplicate & co-located	100.0	N	N	26.5
Storrington 11n	Limited Edition 53 West Street, Storrington	Roadside	Y	N	100.0	N	N	38.3
Storrington 12n	3 Rectory Cottage Storrington	Roadside	Y	N	100.0	N	N	29.3
Storrington 13n	18 West Street, Storrington	Roadside	Y	N	100.0	N	N	31.7
Storrington 14n	Cobden, Washington Rd	Roadside	N	N	100.0	N	**Y**	22.8
Storrington 15n	Fryern Road, Storrington	Roadside	N	N	100.0	N	N	20.3
Storrington 16n	Mill Parade, Waitrose car park, Storrington	Roadside	N	N	100.0	N	N	24.2
Storrington 17n	33 Church Street, Storrington	Urban Background	N	N	100.0	N	N	14.8
Storrington 18n	20 Amberley Road, Storrington	Roadside	N	N	100.0	N	N	21.9
Storrington 19n	jct of A283 Manley's Hill and School Hill	Roadside	Y	N	66.7	**Y**	N	**59.8**[a]
Cowfold Sites								
Cowfold 1,2	Olde House, The Street, Cowfold	Roadside	N	Duplicate	100.0	N	N	39.6

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2016 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual Mean Concentration (Local Bias Adjustment factor = 0.78) 2016 (µg/m^3)
Cowfold 3	6 Margaret Cotts, A272, Cowfold	Roadside	N	N	100.0	N	N	34.6
Cowfold 4	Trelawny House, A281, Cowfold	Roadside	N	N	100.0	N	N	30.9
Cowfold 5n	Junction Station Road/Thornden. Station Road, Cowfold	Roadside	Y	N	100.0	N	N	26.7
Cowfold 6n	Millers Cott. Henfield Road, Cowfold	Roadside	N	N	100.0	N	N	26.9
Cowfold 7n	3 Huntscroft Gardens, Bolney Road, Cowfold	Roadside	Y	N	100.0	N	N	**46.5**
Cowfold 8n	5-6 Fairfield Cottages, Cowfold	Background	Y	N	100.0	N	N	14.4
Cowfold AU A,B,C	Bolney Road/The Street, Cowfold	Roadside	Y	triplicate	100.0	N	N	27.5
Billingshurst Sites								
Billingshurst 1	96 High Street	Roadside	N	N	100.0	N	N	30.1
Crawley Sites								
Gatwick 1n	Hyders Farmhouse, Bonnetts Ln, Crawley	Roadside	N	N	75.0	N	N	18.5
Henfield Sites								
Henfield 1n	Golden Sq, jct of A2037 Barrow Hill and A281 Brighton Rd	Roadside	N	N	66.7	**Y**	N	28.7[a]
Kingsfold Sites								

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2016 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual Mean Concentration (Local Bias Adjustment factor = 0.78) 2016 (µg/m^3)
Kingsfold 1n	Opp. Leith View Cottages, A24 Dorking Rd, Kingsfold	Roadside	N	N	75.0	N	N	30.6
Pulborough Sites								
Pulborough 1	Swan Corner Station Road, Pulborough	Kerbside	N	N	100.0	N	N	35.4
Pulborough 2	42A Lower Street, Pulborough	Roadside	N	N	100.0	Y	N	23.5
Steyning Sites								
Steyning 4N	Church St Steyning	Kerbside	N	N	100.0	N	N	22.7

[a] Annual mean concentration "annualised" as per Box 7.10 of TG(16) as data capture less than 75%. Appendix C gives details of 'annualisation' for 2016.
In **bold**, exceedance of the NO_2 annual mean objective of 40 µg/m^3

Table A10 – Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2016)

Site ID	Site Type	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/m^3								
			2008 (NBF=0.93)	2009 (NBF=0.81)	2010 (LBF=0.81)	2011 (LBF=0.78 & 0.8)	2012 (NBF=0.79 & LBF=0.89, 0.77 & 0.82)	2013 (NBF=0.8 & LBF=0.92, 0.82 & 0.71)	2014 (NBF = 0.81)	2015 (Local Bias Factor = 0.81)	2016 (Local Bias Factor = 0.78)
Horsham Sites											
Horsham 1N	R	N	38.2	37.1	36.0	33.7 (32.0)	33.2(37.4)	25.6 (29.5)	32.3	32.4	32.1
Horsham 3N	UB	N	16.2	14.0	15.5	12.8 (12.2)	12.4(14.0)	13.6 (15.7)	11.6	10.3	13.0
Horsham 4N	UB	N	15.2	13.2	15.3	12.9 (12.3)	12.4(14.0)	12.9 (14.8)	9.4	11.0	12.9
Horsham 5N	R	N	36.9	32.1	33.2	27.8 (26.5)	27.4 (30.8)	28.0 (32.2)	23.8	30.4[a]	31.4
Horsham 6N	R	N	30.9	27.7	28.8	25.0 (23.7)	26.6 (30.0)	23.8 (27.4)	21.8	21.2	25.7
Horsham 7N	R	N	32.2	28.9	29.3	26.6 (25.3)	26.0 (29.3)	26.3 (30.2)	26.8	26.6	28.9
Horsham 8N	R	N	30.0	29.5	29.5	23.8 (22.6)	22.5 (25.3)	23.8 (27.3)	22.5	21.1	25.2
Park Way (triplicate)	R	N	30.8	28.7	30.3	26.0 (24.7)	25.0 (28.2)	25.9 (29.8)	24.0	23.5	25.3
N. Horsham 1N	R	N	29.6	27.9	23.7	24.2 (23.0)	25.8 (29.1)	21.9 (25.2)	23.0	22.9	23.1
N. Horsham 2N	R	N	24.2	22.1	19.4	18.8 (17.9)	19.9 (22.5)	19.2 (22.0)	18.9	17.4	20.5
Storrington Sites											
Storrington 1,2 (duplicate)	R	N	**49.8**	**50.7**	**50.2**	**45.1 (42.9)**	**42.7 (41.6)**	**41.0 (42.0)**	37.3	39.2	**42.1**
Storrington 3	R	N	**39.7**	38.0	37.5	33.4 (31.8)	35.1 (34.2)	31.9 (32.7)	28.8	27.7	30.4
Storrington 4	R	N	39.8	**43.4**	**42.0**	**42.0** (40.0)	**40.9** (39.9)	38.2 (39.2)	35.1	36.1	37.5
Storrington 5	R	N	32.2	27.9	32.4	25.8 (24.6)	26.9(26.2)	27.0 (27.6)	23.3	23.5	26.9
Storrington 6	R	N	27.6	28.1	27.4	21.0 (19.9)	23.9(23.3)	24.5 (25.2)	24.2	21.7	23.7
Storrington 7	R	N	27.1	25.2	21.6	24.6 (23.4)	22.4(21.8)	23.1 (23.7)	18.7	20.5	23.4
Storrington 8,9,10 AURN (triplicate)	R	N	-	29.2*	27.4	24.5 (23.3)	25.6 (25.0)	25.8 (24.2)	22.4	24.1	26.5
Storrington 11n	R	Y	-	-	35.8*	39.3 (37.4)	38.4(37.4)	39.0 **(40.0)**	36.2	37.8	38.3
Storrington 12n	R	Y	-	-	31.6*	32.8 (31.2)	31.2(30.4)	30.5 (31.3)	28.0	25.8	29.3

Site ID	Site Type	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/m^3								
			2008 (NBF=0.93)	2009 (NBF=0.81)	2010 (LBF=0.81)	2011 (LBF=0.78 & 0.8)	2012 (NBF=0.79 & LBF=0.89, 0.77 & 0.82)	2013 (NBF=0.8 & LBF=0.92, 0.82 & 0.71)	2014 (NBF = 0.81)	2015 (Local Bias Factor = 0.81)	2016 (Local Bias Factor = 0.78)
Storrington 13n	R	Y	-	-	35.3*	30.5 (29.0)	32.1(31.3)	33.7 (34.5)	28.2	27.5	31.7
Storrington 14n	R	N	-	-	-	**45.8 (43.6)**	22.6[b]	22.9[b]	22.2[b]	23.2[b]	22.8
Storrington 15n	R	N	-	-	-	20.5 (19.5)	19.1(18.6)	20.8 (21.3)	19.7	18.3	20.3
Storrington 16n	R	N	-	-	-	25.5 (24.3)	24.0(23.4)	25.6 (26.3)	26.3	23.1	24.2
Storrington 17n	UB	N	-	-	-	15.4 (14.6)	16.1(15.7)	15.8 (16.2)	12.9	11.8	14.8
Storrington 18n	R	N	-	-	-	21.4 (20.4)	19.7(19.2)	21.0 (21.5)	17.2	16.4	21.9
Storrington 19n	R	N	-	-	-	-	-	-	-	-	**59.8**[a]
Cowfold Sites											
Cowfold 1,2 (duplicate)	R	N	**46.3**	**45.4**	**43.4**	**40.5** (39.5)	39.2 **(40.6)**	37.5 (33.3)	37.8	36.0	39.6
Cowfold 3	R	N	**41.2**	39.1	36.4	35.2 (34.4)	32.5(33.7)	33.8 (30.0)	31.6	31.8	34.6
Cowfold 4	R	N	34.7	35.4	33.3	29.4 (28.7)	29.5(30.6)	28.7 (25.5)	29.7	24.6	30.9
Cowfold 5n	R	Y	-	-	30.5*	27.4 (26.8)	28.7(29.8)	25.7 (22.8)	23.9	29.9	26.7
Cowfold 6n	R	N	-	-	32.4*	27.4 (26.7)	28.9(30.0)	26.0 (23.1)	26.6	24.6	26.9
Cowfold 7n	R	Y	-	-	**47.8***	**45.9** (44.8)	**43.8(45.4)**	**41.0** (36.4)	**40.7**	**42.9**	**46.5**
Cowfold 8n	UB	Y	-	-	-	16.0 (15.6)	15.0(15.5)	14.3 (12.7)	11.8	12.4	14.4
Cowfold AU A,B,C (triplicate)	R	Y	-	-	-	26.7 (26.1)	28.2 (29.3)	27.0 (25.0)	27.2	25.4	27.5
Billingshurst Sites											
Billingshurst 1	R	N	-	-	-	-	-	30.8	28.8	30.0	30.1
Crawley Sites											
Gatwick 1n	R	N	-	-	-	-	-	-	-	-	18.5
Henfield Sites											

Site ID	Site Type	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/m^3								
			2008 (NBF=0.93)	2009 (NBF=0.81)	2010 (LBF=0.81)	2011 (LBF=0.78 & 0.8)	2012 (NBF=0.79 & LBF=0.89, 0.77 & 0.82)	2013 (NBF=0.8 & LBF=0.92, 0.82 & 0.71)	2014 (NBF = 0.81)	2015 (Local Bias Factor = 0.81)	2016 (Local Bias Factor = 0.78)
Henfield 1n	R	N	-	-	-	-	-	-	-	-	28.7[a]
Kingsfold Sites											
Kingsfold 1n	R	N	-	-	-	-	-	-	-	-	30.6
Pulborough Sites											
Pulborough 1	K	N	37.2	**39.2**	**40.2**	33.1 (31.5)	31.7	**40.5** (41.5) 32.5[b]	31.1	31.3	35.4
Pulborough 2	R	N	**52.1***	26.3	28.0	22.3 (21.2)	24.7	39.1 (31.3)[a]	21.5	20.1	23.5
Steyning Sites											
Steyning 4N	K	N	27.4	26.2	26.8	28.4 (27.1)	22.3	24.4	20.1	29.2	22.7

[a] Annual mean concentration "annualised" as per Box 7.10 of TG(16) as data capture less than 75%. Appendix C gives details of 'annualisation' for 2016.

[b] Tubes adjusted using the Defra's 'Distance from Roads Calculator' to calculate exposure at the facade of the nearest residential property.

* Denotes diffusion tubes that have not been in position for a sufficient period to give a reliable annual mean.

K – Kerbside; R-Roadside; UB – Urban background

In **red bold**, exceedance of the NO_2 annual mean objective of 40µg/m^3.

In red, concentrations equal or above 36µg/m^3 (within 10% of the NO_2 annual mean objective of 40µg/m^3).

Figure A3 – Trends in Annual Mean NO_2 Concentrations measured at Diffusion Tube Monitoring Sites 2008 – 2016: Horsham

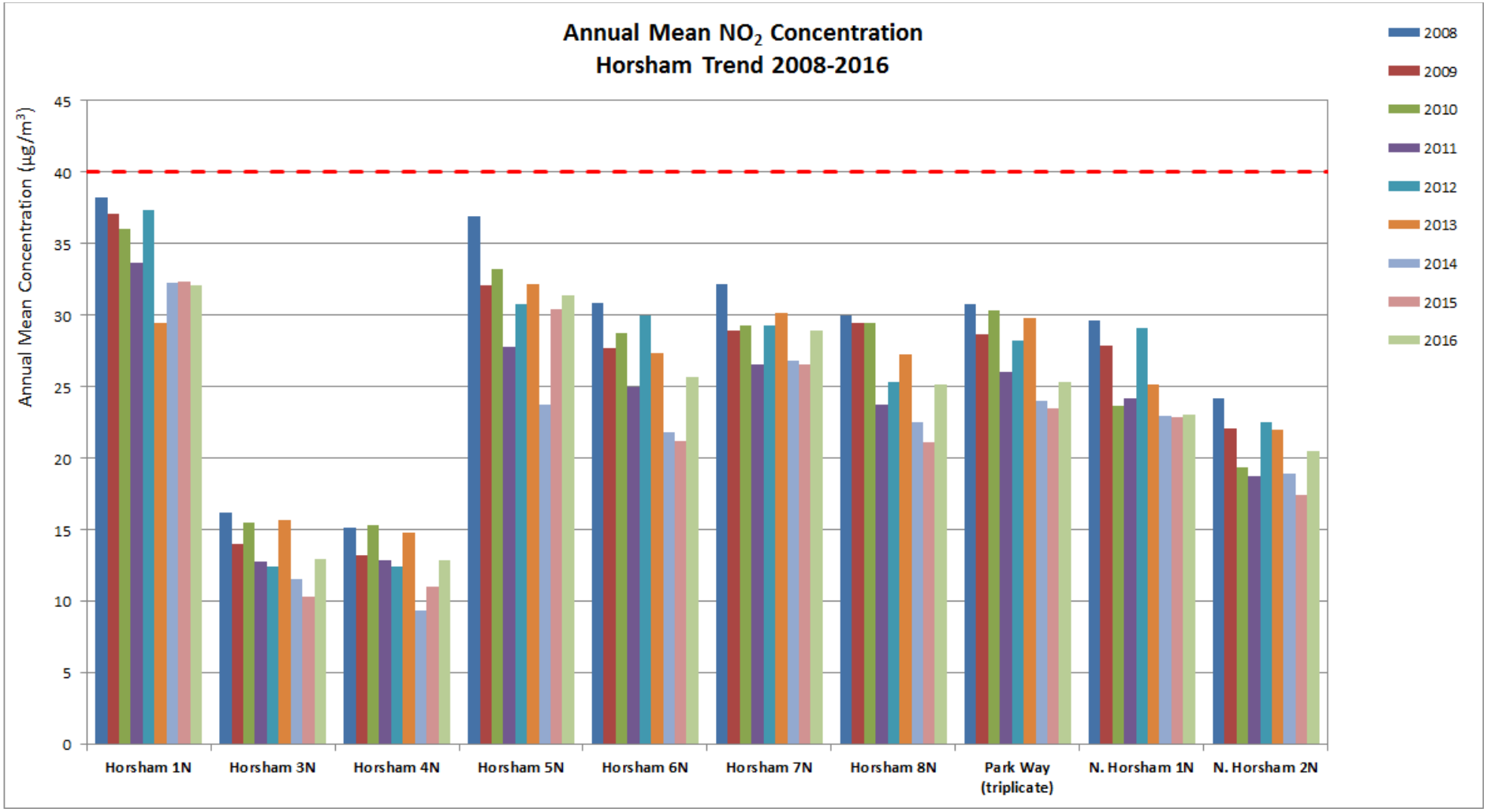


Figure A4 – Trends in Annual Mean NO_2 Concentrations measured at Diffusion Tube Monitoring Sites 2008 – 2016: Storrington

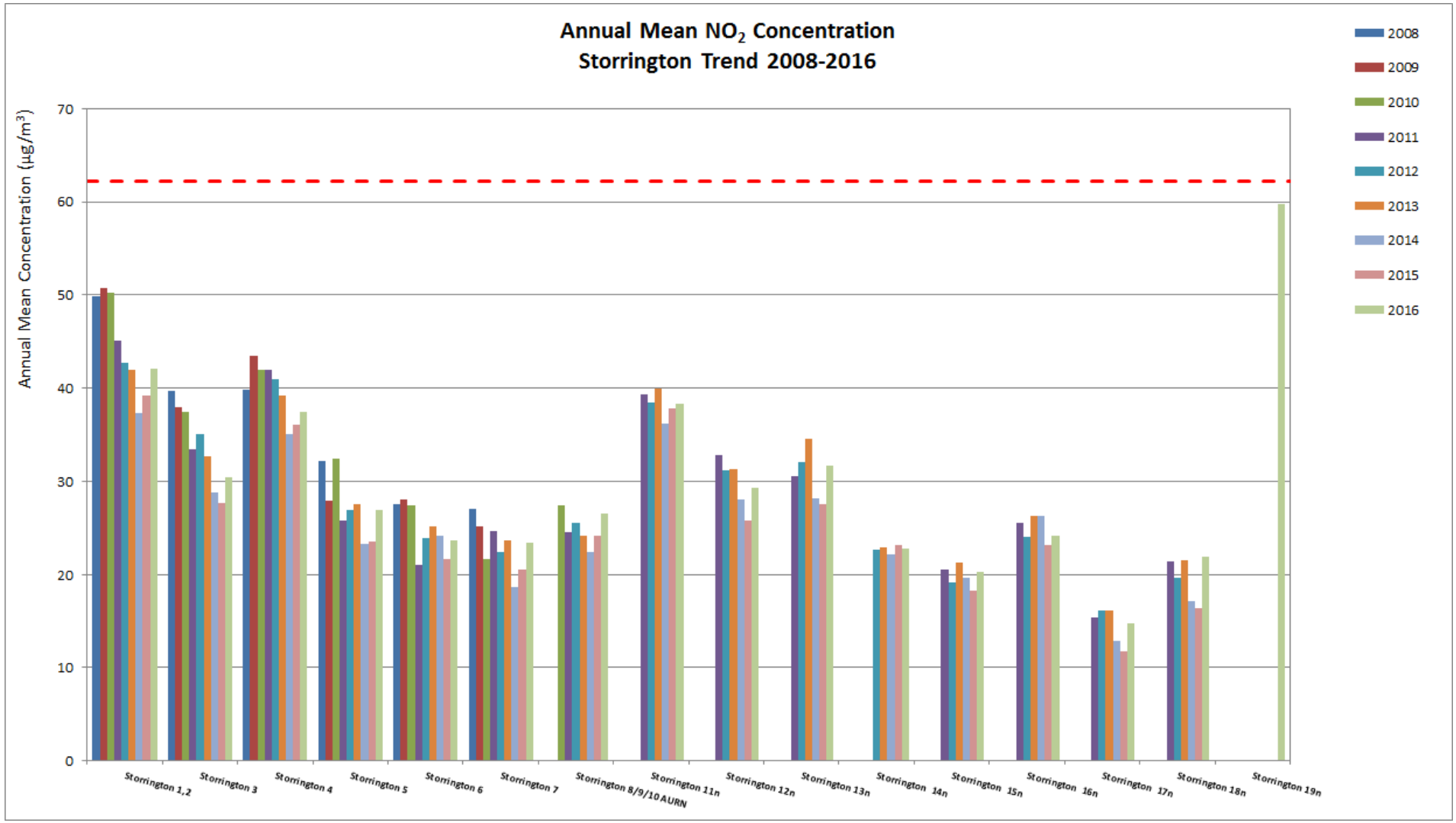


Figure A5 – Trends in Annual Mean NO2 Concentrations measured at Diffusion Tube Monitoring Sites 2008 – 2016: Cowfold

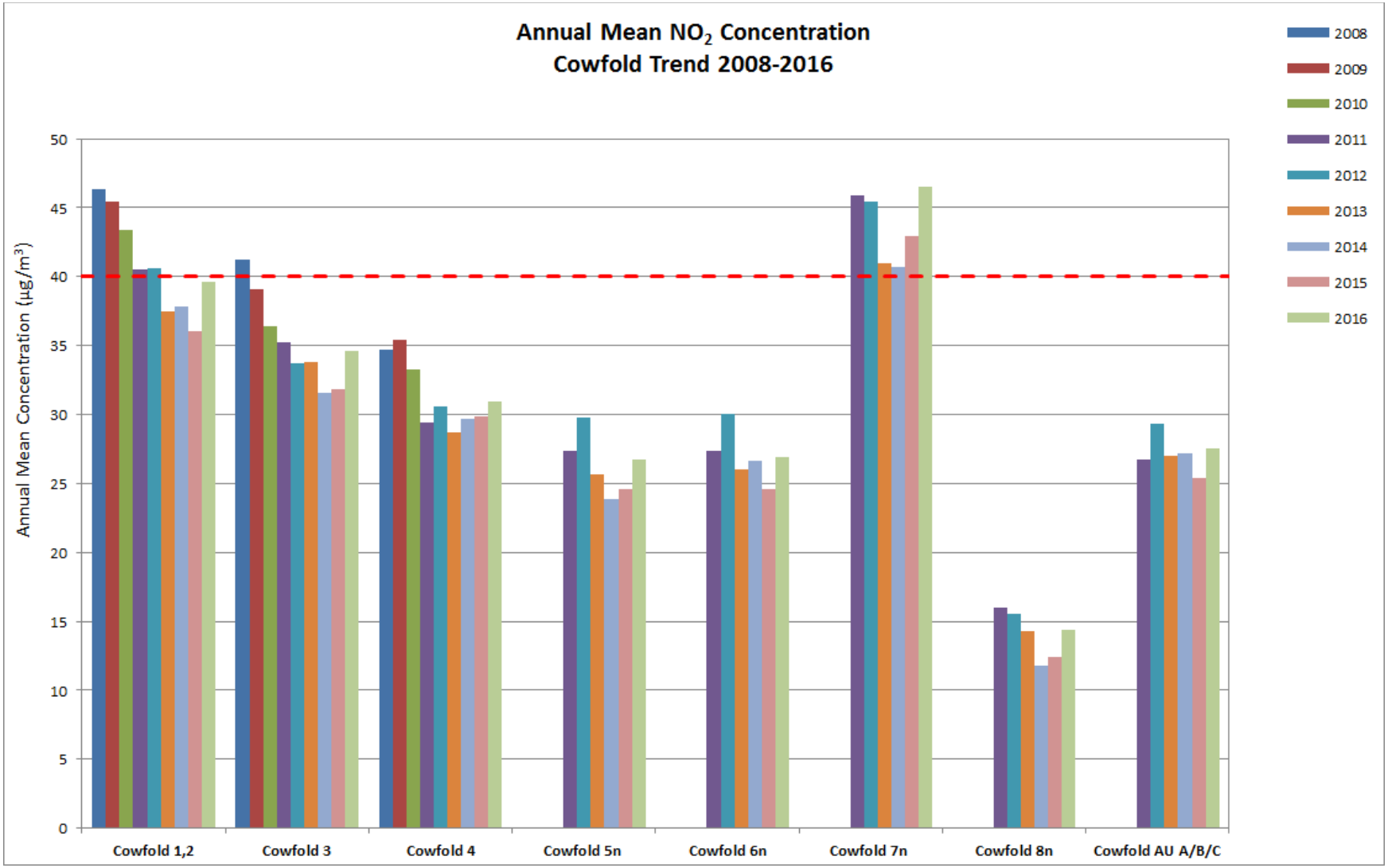
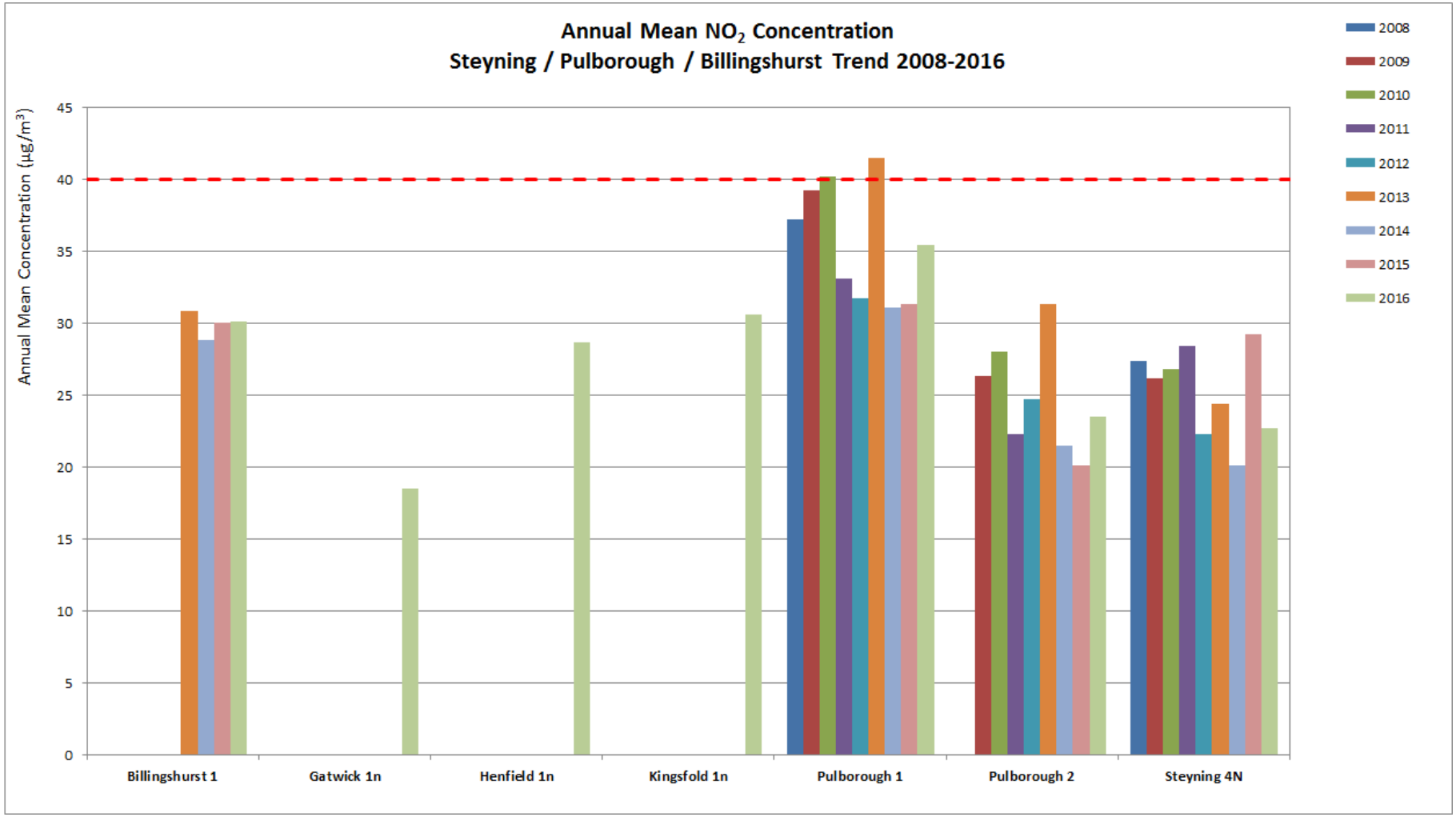


Figure A6 – Trends in Annual Mean NO_2 Concentrations measured at Diffusion Tube Monitoring Sites 2008 – 2016: Billingshurst; Crawley; Henfield; Kingsfold; Pulborough & Steyning



Appendix B: Full Monitoring Results for 2016

Table B1 – Full Monthly Diffusion Tube Results for 2016

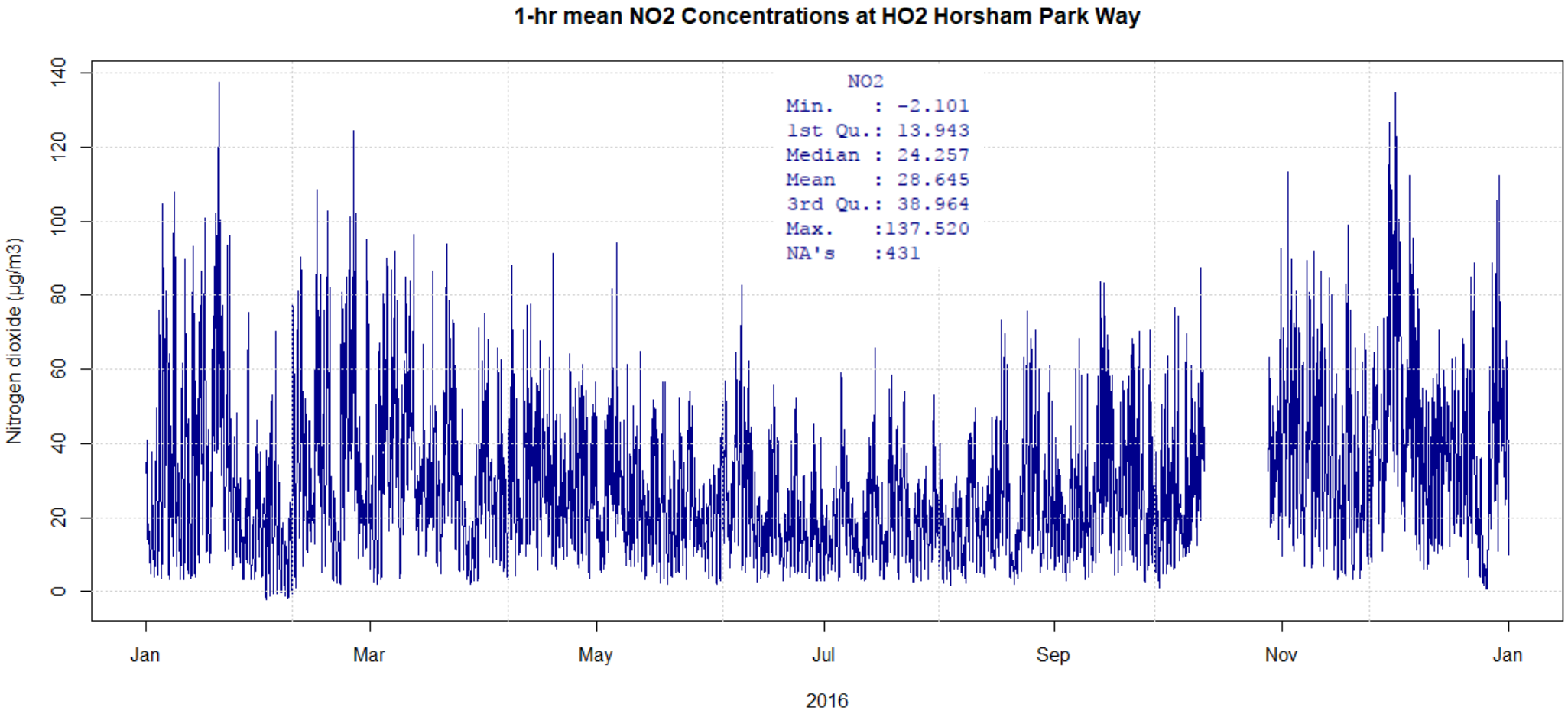
Lab Ref.	Site Name	NO_2 Concentrations µg/m^3														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	COUNT	% DATA CAPTURE	AVERAGE
1	Horsham 1N	43.5	36.7	48.6	41.1	39.9	33.3	29.4	35.0	39.1	42.5	52.9	52.3	12	100.0	41.2
2	Henfield 1n				43.5	35.3	31.7	30.1	27.8		36.4	40.4	44.8	8	66.7	36.3
3	Horsham 3N	17.1	17.2	23.1	14.9	12.3	12.2	8.7	10.4	12.9	21.6	22.7	26.4	12	100.0	16.6
4	Horsham 4N	16.3	18.0	23.7	15.8	11.2	14.3	9.2	11.0	12.4	19.7	23.6	23.2	12	100.0	16.5
5	Park Way	33.5	33.1	40.9	34.4	31.0	28.9	25.5	27.3	32.0	32.5	37.8	41.1	12	100.0	33.2
6	Park Way	34.6	35.6	38.2	31.6	27.3	27.6	25.8	24.7	31.8	33.3	39.4	41.8	12	100.0	32.6
7	Park Way	34.3	34.4	39.7	30.9	28.3	27.0	23.1	26.4	31.9	31.6	21.8	41.0	11	91.7	31.7
8	Horsham 5N	35.9	40.5	53.0	37.3	38.1	37.5	23.7	31.0	32.9	49.5	51.4	52.1	12	100.0	40.2
9	Horsham 6N	34.1	33.0	38.5	33.0	26.8	29.2	24.5	25.6	31.4	33.6	40.0	46.2	12	100.0	33.0
10	Horsham 7N	39.2	41.3	44.2	38.9	29.1	31.2	26.1	26.7	32.6	37.8	48.9	47.9	12	100.0	37.0
11	Horsham 8N	31.3	32.0	37.9	34.5	25.3	24.9	21.2	24.5	28.5	38.6	39.7	49.5	12	100.0	32.3
12	Cowfold 1	53.5	51.6	52.6	54.6	51.0	42.8	41.0	45.4	58.3	46.8	53.9	53.5	12	100.0	50.4
13	Storrington 1	46.6	52.3	63.4	56.4	46.8	60.5	43.3	53.0	51.1	61.4	65.5	58.2	12	100.0	54.9
14	Storrington 2	47.0	60.2	60.0	61.0	49.2	60.3	43.5	49.9	53.6	49.6		48.6	11	91.7	53.0
15	Storrington 3	33.9	37.8	40.1	42.5	37.0	38.7	32.6	37.0		40.3	47.1	42.3	11	91.7	39.0
16	Storrington 4	52.1	52.5	38.5	55.3	47.5	37.6	44.5	43.0	51.1	46.9	54.2	53.2	12	100.0	48.0
17	Storrington 5	29.0	28.0	38.7	39.1	33.7	38.0	27.9	29.9	29.3	42.0	44.7	33.5	12	100.0	34.5
18	Storrington 6	32.6	32.8	33.3	29.6	24.0	25.8	24.1	27.6	31.1	27.4	33.8	42.6	12	100.0	30.4
19	Storrington 7	28.6	31.1	34.0	31.7	26.2	27.2	23.4	24.0	29.1	30.5	37.2	37.2	12	100.0	30.0
20	Cowfold 2	54.6	48.0	54.1	53.9	48.4	45.4	42.4	40.5	49.3	60.2	55.5	62.4	12	100.0	51.2
21	Cowfold 3	43.1	46.4	44.8	39.6	40.4	42.3	36.6	42.0	45.4	49.9	51.8	49.6	12	100.0	44.3
22	Cowfold 5n	49.7	43.8	41.5	50.8	41.6	29.5	29.0	31.8	38.3	33.5	37.9	47.5	12	100.0	39.6
23	N. Horsham 1N	37.8	34.2	31.0	31.2	22.4	22.5	26.5	25.0	29.3	27.9	31.2	37.0	12	100.0	29.7
24	N. Horsham 2N	22.7	27.7	25.6	28.0	18.0	24.0	21.6		22.8	29.3	31.7	37.0	11	91.7	26.2
25	Steyning 4N	28.0	27.4	33.3	32.9	26.6	27.4	20.9	20.1	26.8	30.4	35.3	40.5	12	100.0	29.1
26	Pulborough 1	38.1	43.2	54.4	49.7	45.1	36.5	33.5	40.8	42.4	52.3	55.7	52.9	12	100.0	45.4
27	Pulborough 2	27.3	26.2	33.8	32.8	30.3	24.5	19.2	23.8	24.8	42.4	41.0	34.8	12	100.0	30.1
28	Billingshurst 1	42.0	43.6	40.4	37.0	37.4	33.5	33.5	30.7	36.5	36.2	44.1	47.5	12	100.0	38.5
29	Storrington 8 AURN	29.5	32.0	39.7	39.2	33.9	36.1	27.9	29.8	34.3	38.4	39.3	38.2	12	100.0	34.9
30	Storrington 9 AURN	26.3	33.4	37.4	38.5	32.1	36.8	27.3	29.7	34.8	38.5	41.6	36.8	12	100.0	34.4
31	Storrington 10n AURN	29.0	29.1	36.1	35.9	30.4	35.0	24.9	30.9	33.8	29.7	40.6	36.9	12	100.0	32.7
32	Storrington 13n	35.7	40.8	50.6	48.0	34.4	39.9	27.7	33.5	38.0	46.4	50.2	42.4	12	100.0	40.6
33	Storrington 12n	39.3	34.2	32.9	45.2	36.1	31.1	24.2	30.9	40.1	39.0	48.6	49.3	12	100.0	37.6
34	Storrington 11n	42.7	49.9	51.1	56.1	48.7	48.0	49.0	43.5	52.3	50.6	54.2	43.1	12	100.0	49.1
35	Cowfold 4	31.6	37.4	34.3	34.8	27.7	32.2	41.0	37.3	34.1	21.6	39.5	38.7	12	100.0	34.2

36	**Cowfold 6n**	35.2	35.6	39.9	34.9	31.1	31.2	29.5	29.4	33.1	32.9	38.0	43.1	12	100.0	34.5
37	**Cowfold 7n**	68.8	64.1	66.0	60.6	65.5	48.5	52.3	47.1	61.7	52.9	62.5	64.9	12	100.0	59.6
38	**Storrington 14n**	55.1	56.8	57.5	53.6	45.4	48.3	63.8	52.5	58.5	53.2	63.6	65.0	12	100.0	56.1
39	**Storrington 16n**	30.9	31.2	28.0	33.3	26.3	32.6	25.1	27.1	31.4	32.1	36.8	38.0	12	100.0	31.1
40	**Storrington 15n**	26.5	27.1	28.7	29.1	19.2	23.5	21.8	15.5	26.8	26.0	30.6	37.3	12	100.0	26.0
41	**Storrington 17n**	19.9	19.1	17.2	20.4	14.3	16.4	19.1	13.5	14.8	20.4	26.4	26.4	12	100.0	19.0
42	**Storrington 18n**	24.8	27.4	25.5	27.9	23.1	25.9	21.1	24.0	29.3	34.6	36.4	37.4	12	100.0	28.1
43	**Cowfold 8n**	18.7	20.2	22.4	18.1	15.5	14.6	13.4	14.0	14.3	19.1	23.6	27.2	12	100.0	18.4
44	**Cowfold AU A**	32.5	34.9	35.8	35.7	34.0	31.1	31.7	29.8	37.5	33.1	34.0	42.3	12	100.0	34.4
45	**Cowfold AU B**	37.6	35.9	34.3	37.5	31.1	32.2	32.6	28.7	38.5	33.2	40.1	45.3	12	100.0	35.6
46	**Cowfold AU C**	36.9	35.6	38.6	37.9	35.4	26.9	29.8	30.6	38.9	32.8	43.6	41.9	12	100.0	35.7
47	**Storrington 19n**				78.4	70.2	68.7	76.8	74.1	72.8	61.6		67.3	8	66.7	71.2
48	**Kingsfold 1n**				36.3	31.8	34	40.5	34.2	39.9	37.8	46.1	52	9	75.0	39.2
49	**Gatwick – 1n**				24.1	21.9	23.3	11.8	17.3	19.1	29.7	32.8	33.2	9	75.0	23.7

Value = Value removed from the dataset prior to processing (low value)

Value = Tube height reduced. Horsham 6N – height reduced from 2.6m to 2.4m. Horsham 8N – height reduced from 3.0m to 2.4m. Steyning 4N – height rediced from 2.8m to 2.2m. Pulborough 1 – height reduced from 3.2m to 2.3m. Pulborough 2 – height reduced from 3.0m to 2.2m.

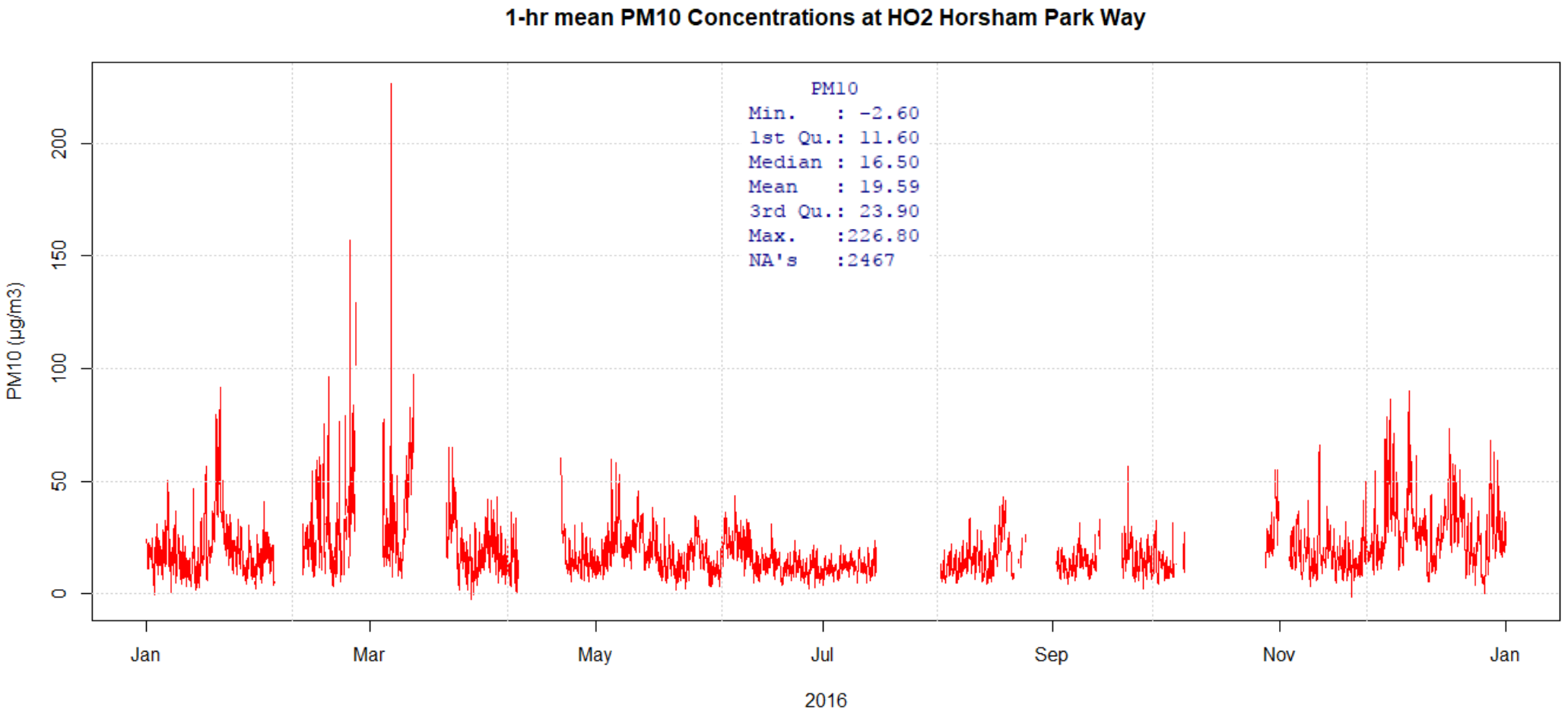
Figure B1 – Continuous Monitoring Results: 1-hr mean NO_2 Concentrations, HO2 Horsham Park Way, 2016



Min = minimum; Max = maximum, mean, 1st Qu. = First quantile; 3rd Qu. = Third quantile; NA's = missing data

Data plotted using openair.

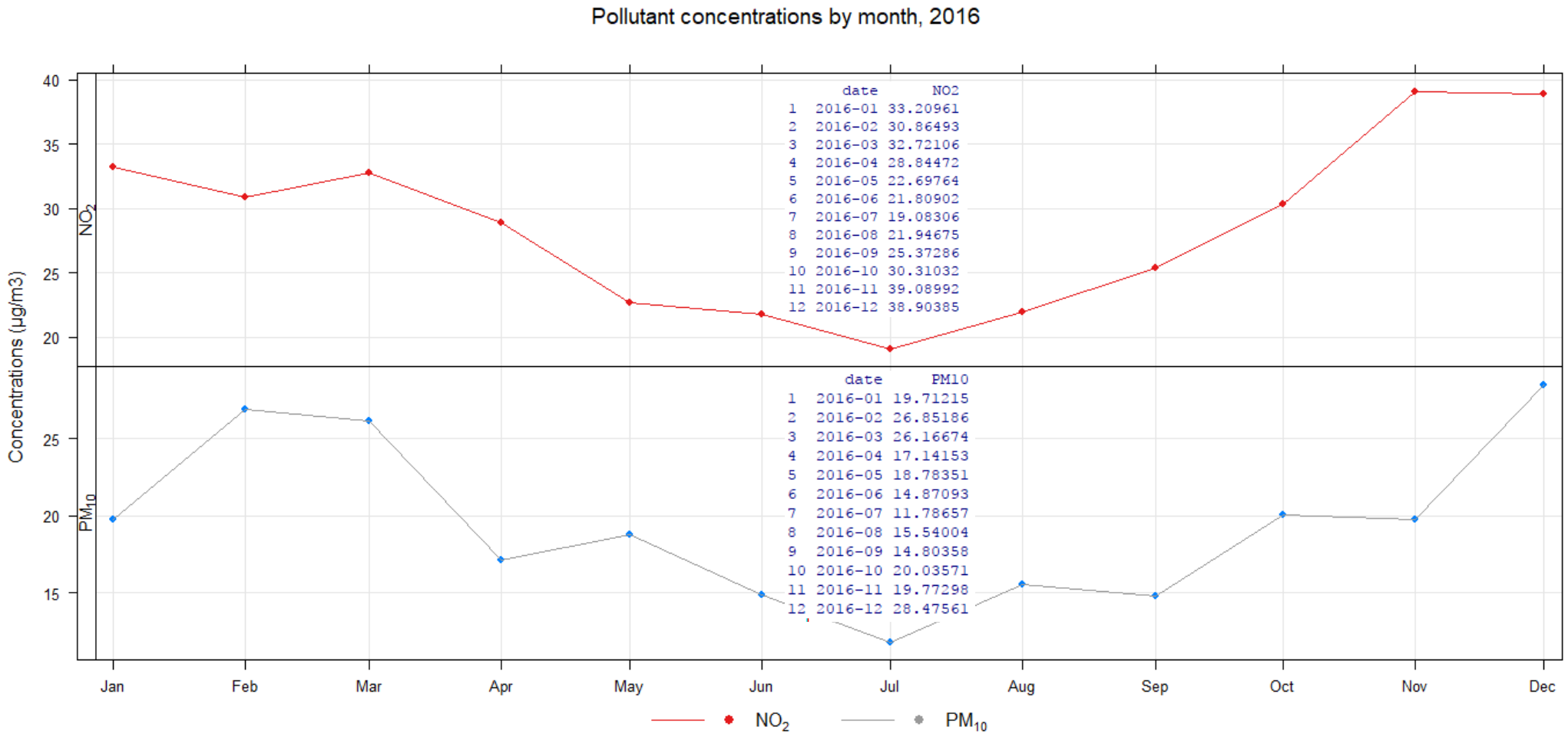
Figure B2 – Continuous Monitoring Results: 1-hr mean PM_{10} Concentrations, HO2 Horsham Park Way, 2016



Min = minimum; Max = maximum, mean, 1st Qu. = First quantile; 3rd Qu. = Third quantile; NA's = missing data

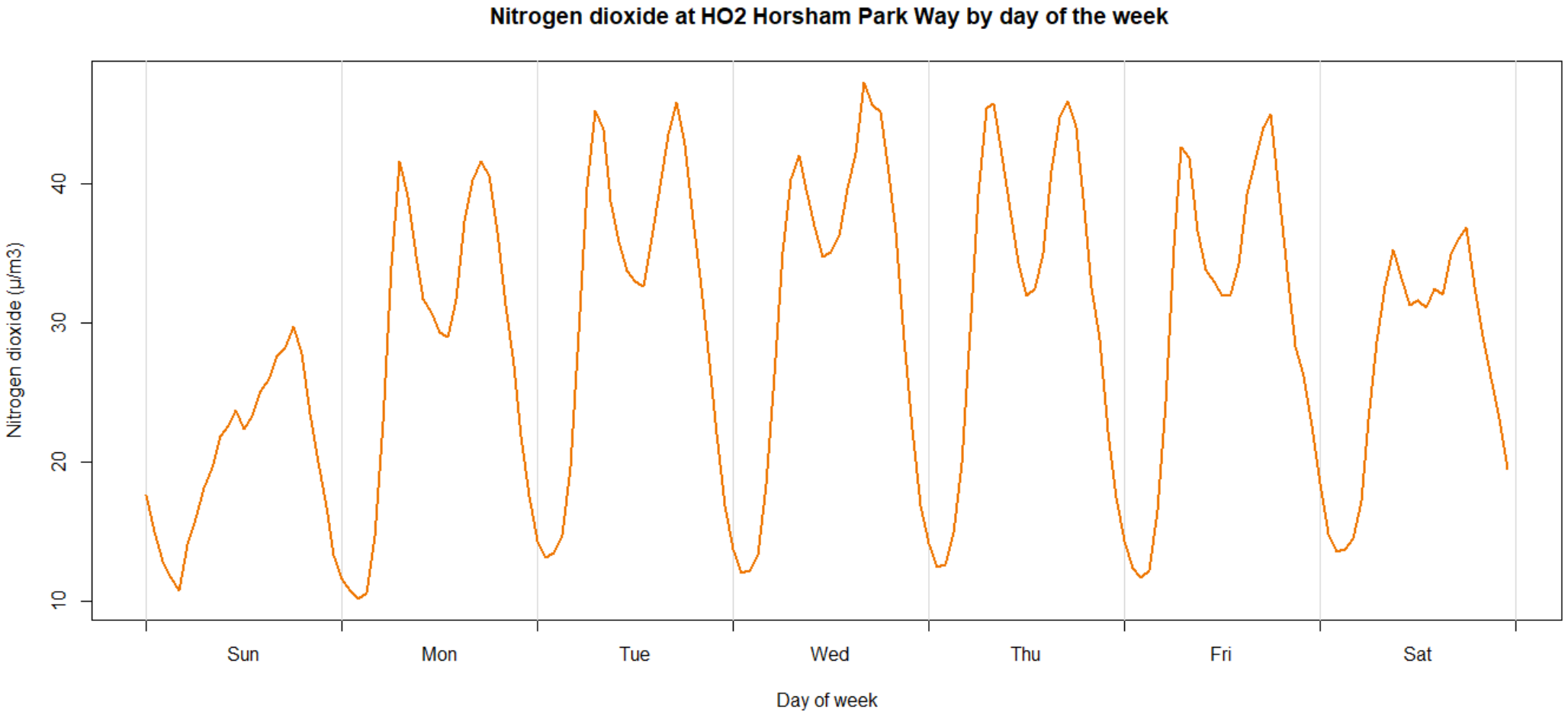
Data plotted using openair.

Figure B3 – Continuous Monitoring Results: Monthly Concentrations for NO_2 and PM_{10} at HO2 Horsham Park Way, 2016



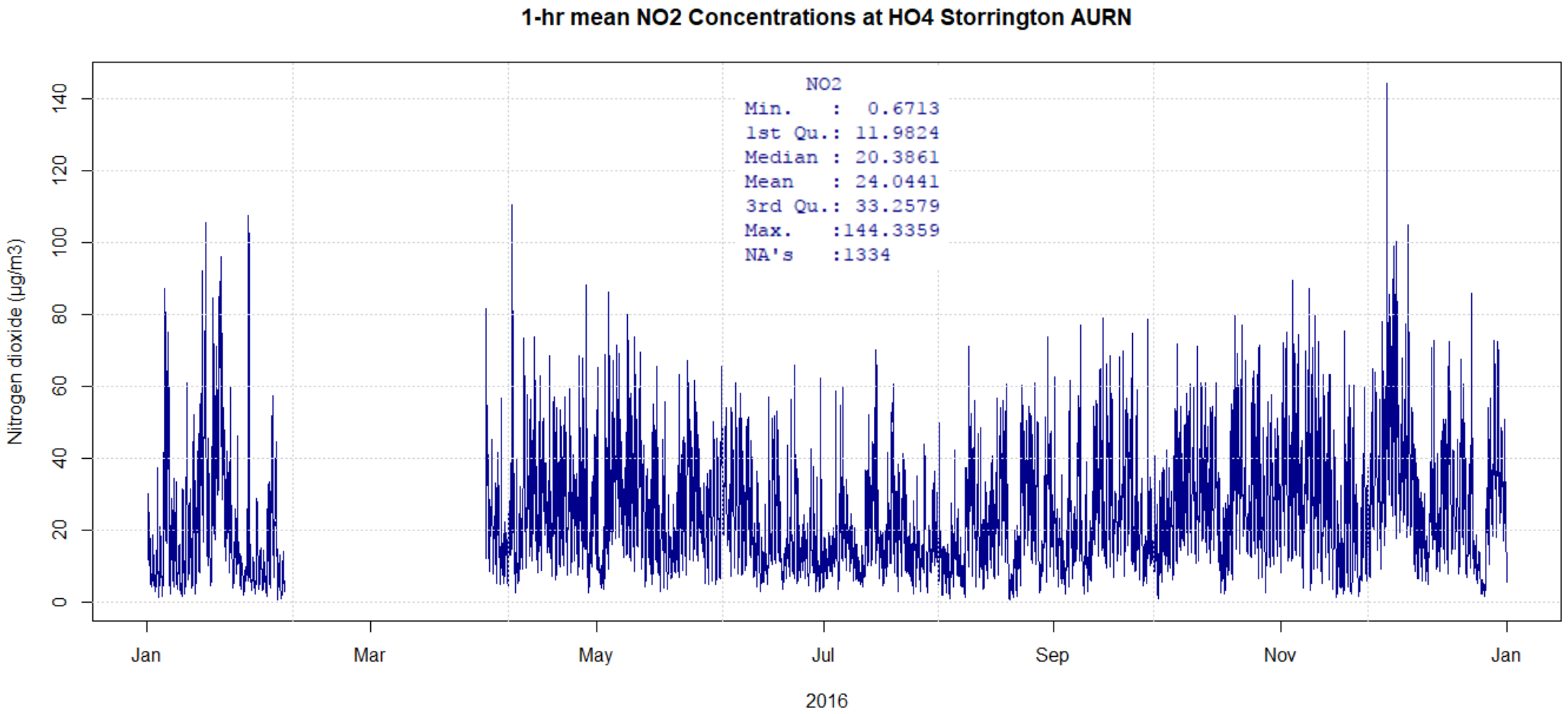
Data plotted using openair.

Figure B4 – Continuous Monitoring Results: Day of Week Concentrations for NO_2 at HO2 Horsham Park Way, 2016



Data plotted using openair.

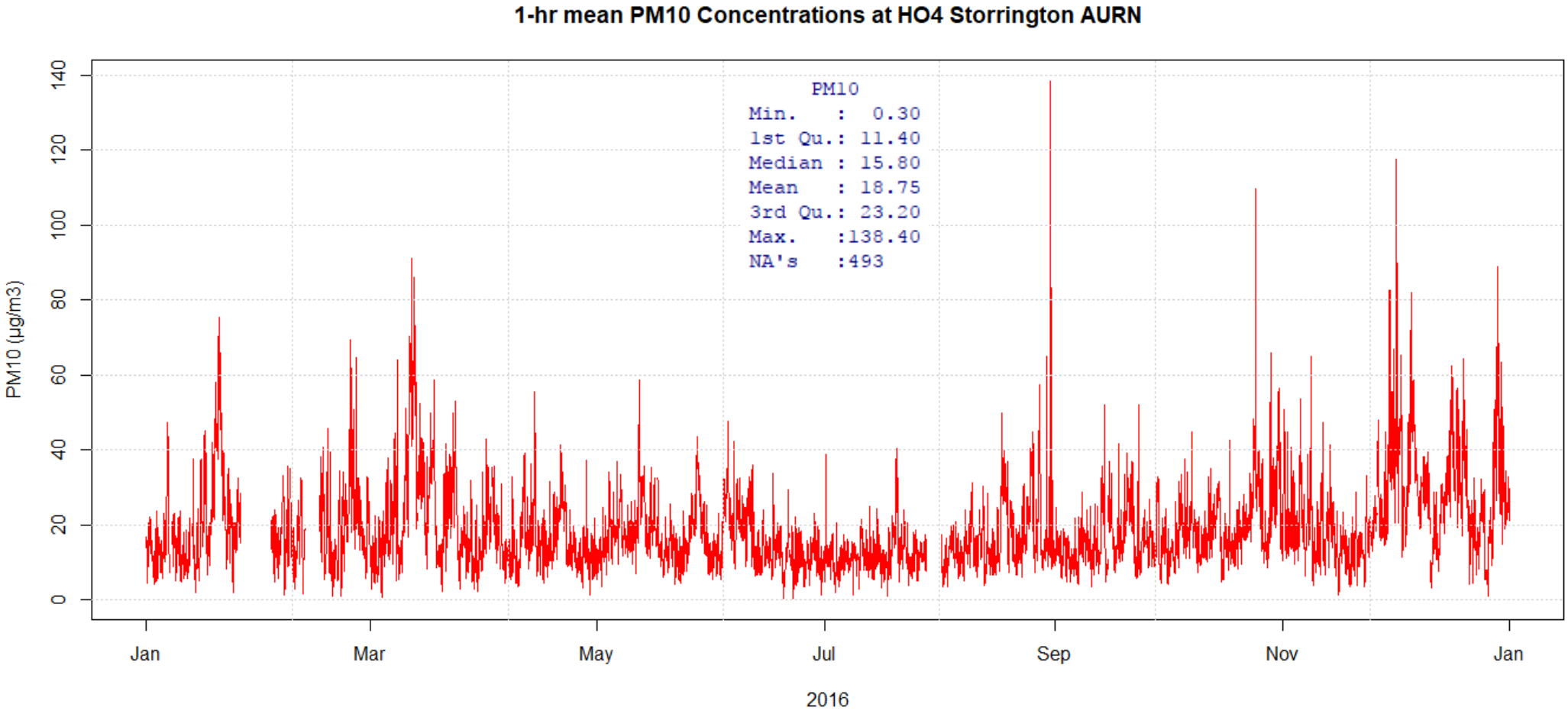
Figure B5 – Continuous Monitoring Results: 1-hr mean NO_2 Concentrations, HO4 Storrington AURN, 2016



Min = minimum; Max = maximum, mean, 1st Qu. = First quantile; 3rd Qu. = Third quantile; NA's = missing data

Data plotted using openair.

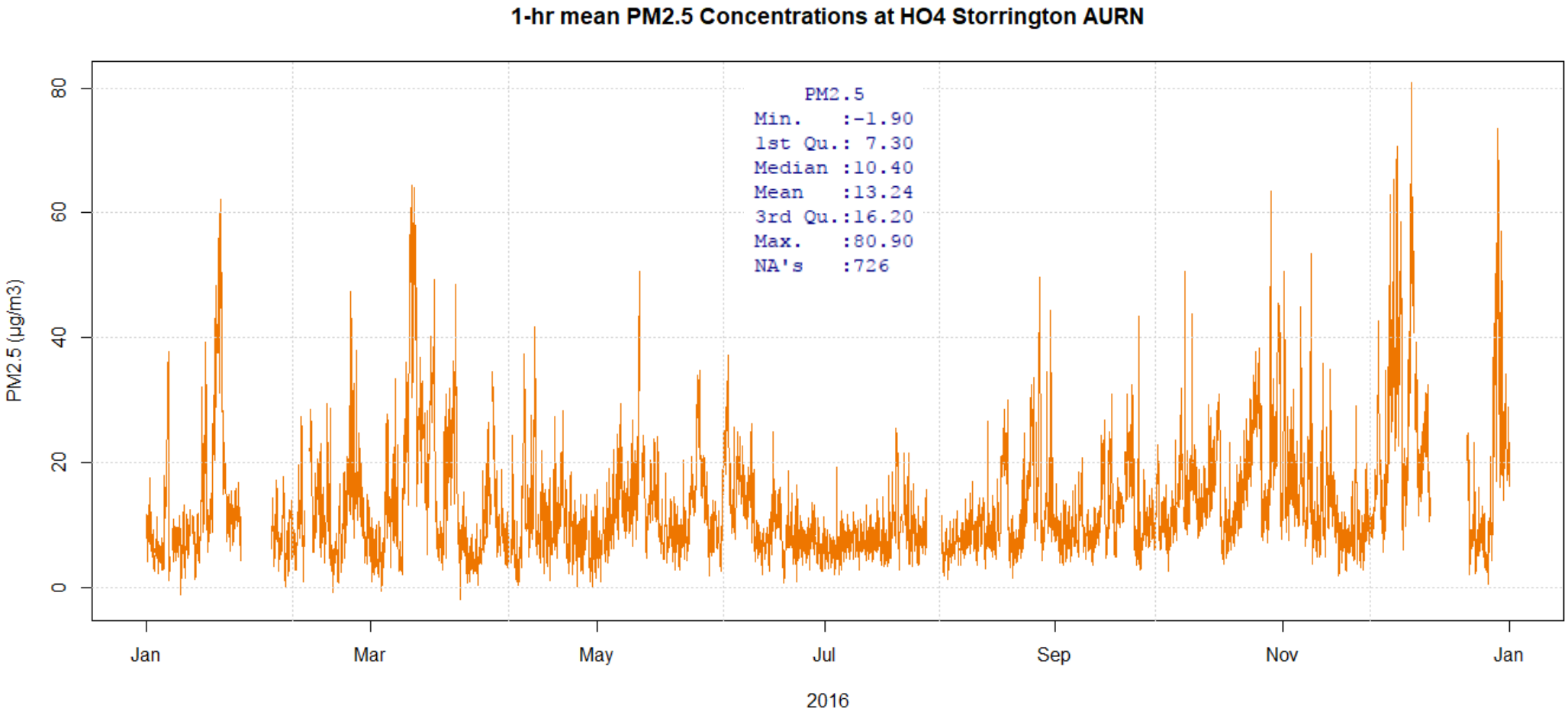
Figure B6 – Continuous Monitoring Results: 1-hr mean PM_{10} Concentrations, HO4 Storrington AURN, 2016



Min = minimum; Max = maximum, mean, 1st Qu. = First quantile; 3rd Qu. = Third quantile; NA's = missing data

Data plotted using openair.

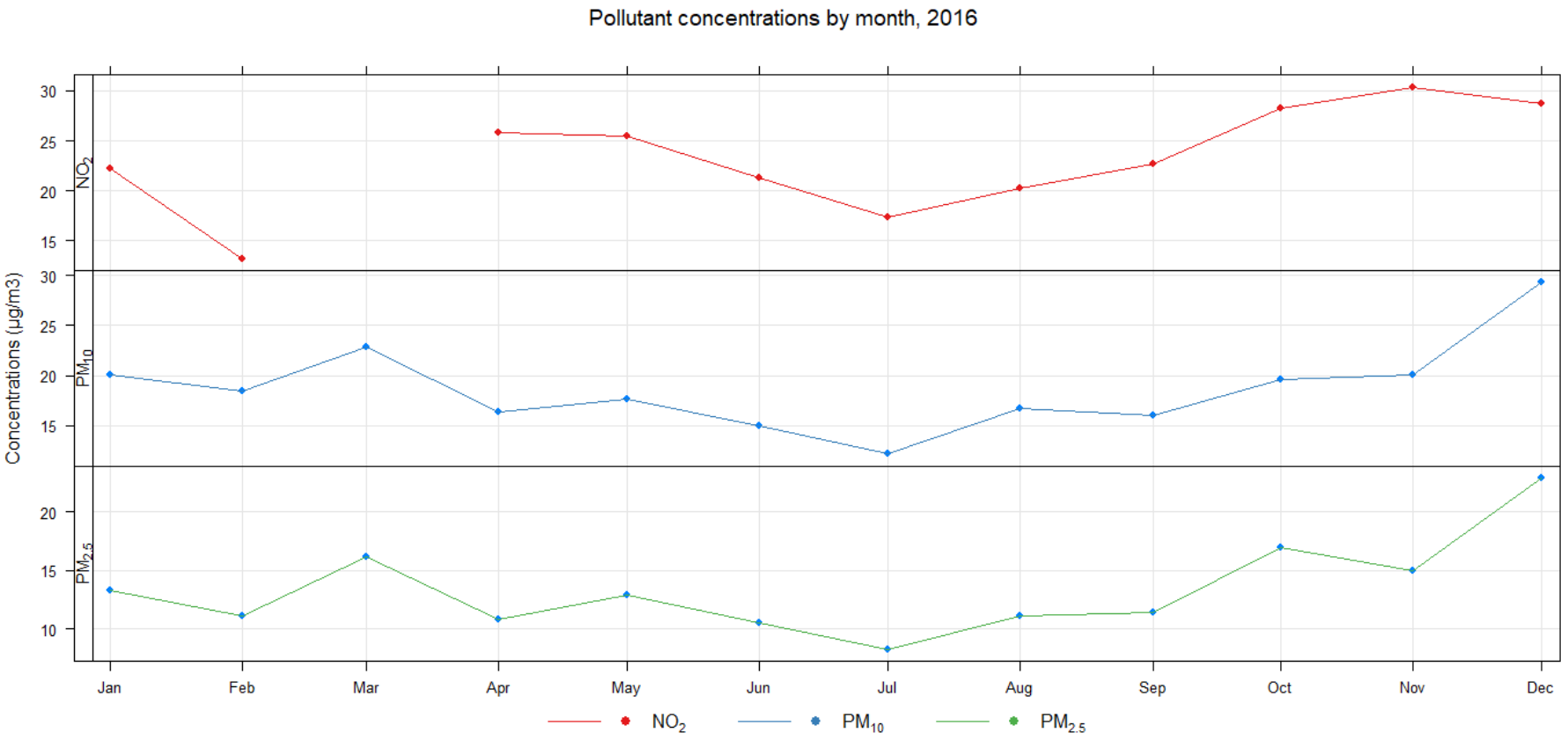
Figure B7 – Continuous Monitoring Results: 1-hr mean $PM_{2.5}$ Concentrations, HO4 Storrington AURN, 2016



Min = minimum; Max = maximum, mean, 1st Qu. = First quantile; 3rd Qu. = Third quantile; NA's = missing data

Data plotted using openair.

Figure B8 – Continuous Monitoring Results: Monthly Concentrations for NO_2, PM_{10} and $PM_{2.5}$ at HO4 Storrington AURN, 2016



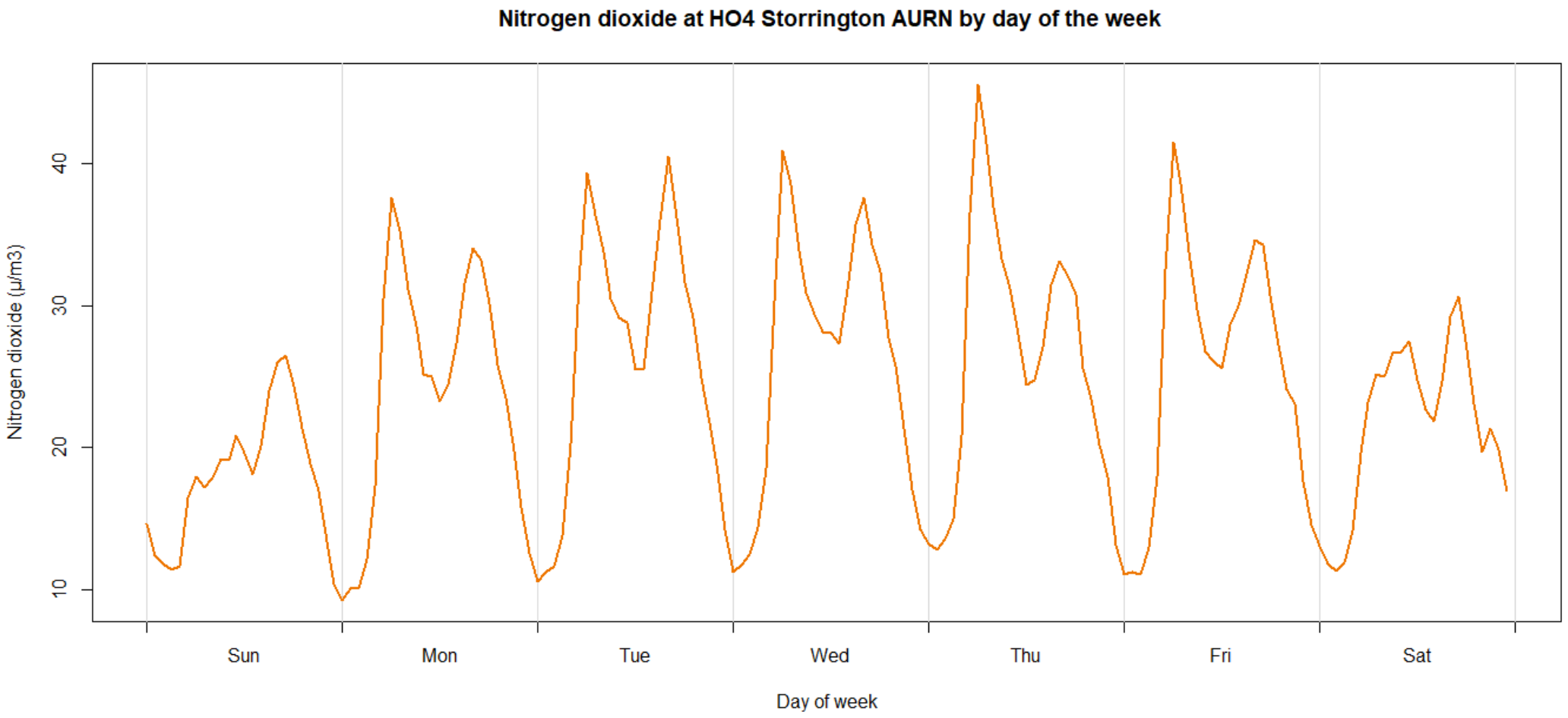
	date	NO2
1	2016-01	22.19658
2	2016-02	13.24091
3	2016-03	NaN
4	2016-04	25.85033
5	2016-05	25.49189
6	2016-06	21.25639
7	2016-07	17.34049
8	2016-08	20.31595
9	2016-09	22.71438
10	2016-10	28.24397
11	2016-11	30.39069
12	2016-12	28.74733

	date	PM10
1	2016-01	20.11558
2	2016-02	18.47368
3	2016-03	22.83684
4	2016-04	16.30839
5	2016-05	17.67010
6	2016-06	14.91341
7	2016-07	12.12330
8	2016-08	16.67435
9	2016-09	15.96268
10	2016-10	19.65081
11	2016-11	20.11944
12	2016-12	29.31708

	date	PM2.5
1	2016-01	13.318259
2	2016-02	11.146050
3	2016-03	16.171370
4	2016-04	10.844609
5	2016-05	12.950626
6	2016-06	10.568567
7	2016-07	8.229937
8	2016-08	11.095310
9	2016-09	11.367188
10	2016-10	17.018378
11	2016-11	14.988301
12	2016-12	22.914800

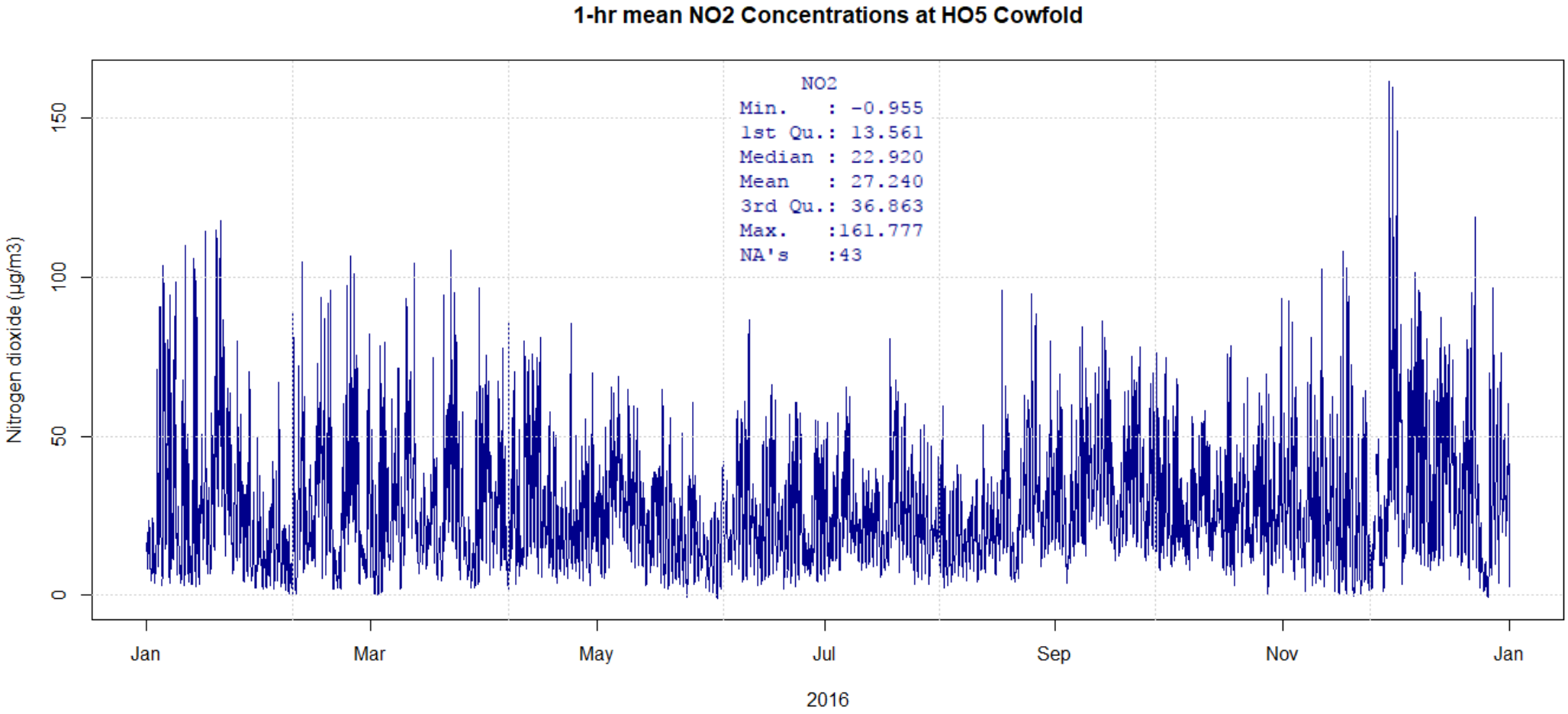
Data plotted using openair.

Figure B9 – Continuous Monitoring Results: Day of Week Concentrations for NO_2 at HO4 Storrington AURN, 2016



Data plotted using openair.

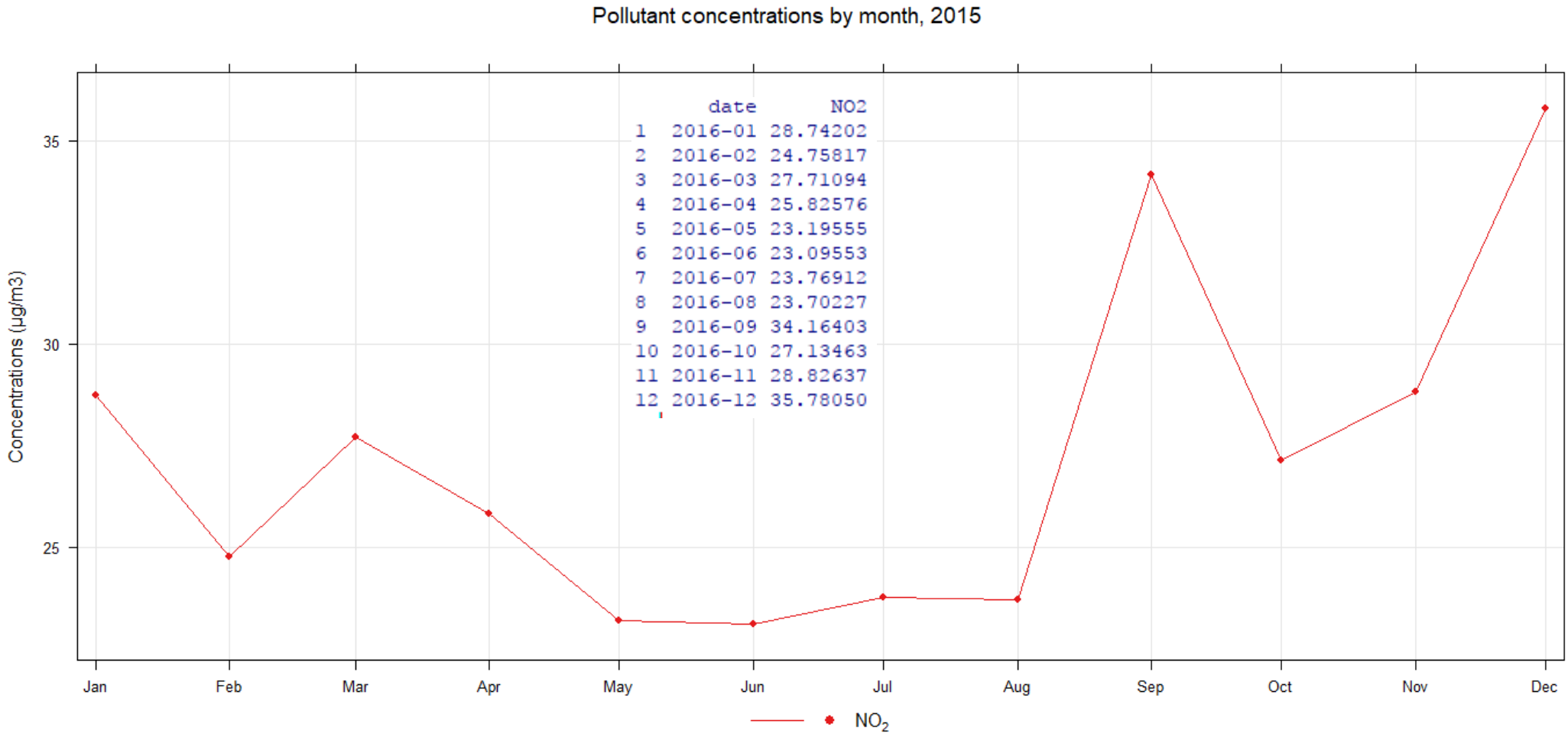
Figure B10 – Continuous Monitoring Results: 1-hr mean NO_2 Concentrations, HO5 Cowfold, 2016



Min = minimum; Max = maximum, mean, 1st Qu. = First quantile; 3rd Qu. = Third quantile; NA's = missing data

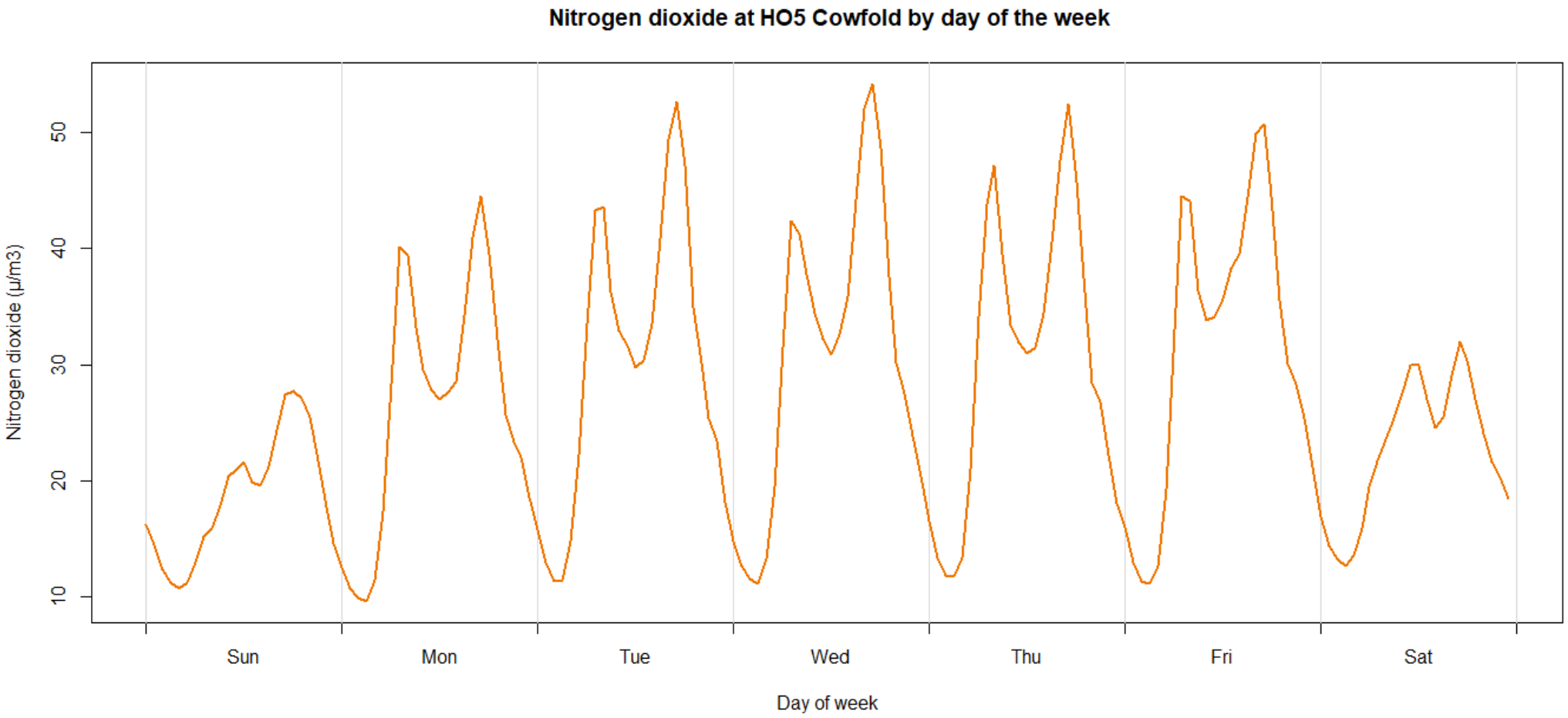
Data plotted using openair.

Figure B11 – Continuous Monitoring Results: Monthly Concentrations for NO_2 at HO5 Cowfold, 2016



Data plotted using openair.

Figure B12 – Continuous Monitoring Results: Day of Week Concentrations for NO_2 at HO5 Cowfold, 2016



Data plotted using openair.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

Diffusion Tube Bias Adjustment Factors

The diffusion tubes are sourced from Environmental Scientifics Group (ESG) in Didcot using the 50% TEA in acetone preparation method. The national bias adjustment factor was obtained from Defra national bias adjustment factor database (spreadsheet version number 03/17v2 published in March 2017) based on 30 co-location studies. The bias adjustment factor given for this methodology was 0.77.

Factor from Local Co-location Studies

Co-location studies are undertaken at three automatic analyser sites in Park Way Horsham, Cowfold and Storrington AURN. All three stations represent roadside sites. Using the AEA Precision and Accuracy spreadsheet tool a local bias adjustment factor of 0.88 for Park Way, 0.72 for Storrington and 0.77 for Cowfold site have been calculated. Results of the 2015 co-location studies are given in Table C1, Table C2 and Table C3 below. The three co-location studies were used to calculate the overall local bias adjustment factor of 0.78.

Table C1 – Co-location Study Data for HO2 Horsham Park Way, 2016

Location	Diffusion Tube Data Capture for Periods Used (site Park Way)	Continuous Monitor Data Capture for Periods Used	Diffusion Tube Annual Mean (µg/m^3)	Continuous Monitor Annual Mean (µg/m^3)	Ratio
HO2 Horsham Park Way	100%	99%	33	29	0.88

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2016	03/02/2016	33.5	34.6	34.3	34	0.6	2	1.4
2	03/02/2016	04/03/2016	33.1	35.6	34.4	34	1.3	4	3.1
3	04/03/2016	01/04/2016	40.9	38.2	39.7	40	1.4	3	3.4
4	01/04/2016	29/04/2016	34.4	31.6	30.9	32	1.9	6	4.6
5	29/04/2016	24/05/2016	31.0	27.3	28.3	29	1.9	7	4.8
6	24/05/2016	01/07/2016	28.9	27.6	27.0	28	1.0	3	2.4
7	01/07/2016	29/07/2016	25.5	25.8	23.1	25	1.5	6	3.7
8	29/07/2016	27/08/2016	27.3	24.7	26.4	26	1.3	5	3.3
9	27/08/2016	28/09/2016	32.0	31.8	31.9	32	0.1	0	0.2
10	28/09/2016	25/10/2016	32.5	33.3	31.6	32	0.9	3	2.1
11	25/10/2016	30/11/2016	37.8	39.4		39	1.1	3	10.2
12	30/11/2016	06/01/2017	41.1	41.8	41.0	41	0.4	1	1.1
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
32	99.1	Good	Good
31.2	99.9	Good	Good
33.9	99.6	Good	Good
28.4	99.9	Good	Good
24	100	Good	Good
22	99.9	Good	Good
19	100	Good	Good
22	99.9	Good	Good
25	99.5	Good	Good
27	47.2	Good	or Data Capture
38	91.8	Good	Good
40.8	99.9	Good	Good
	Overall survey -->	Good precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

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 11 periods of data
Bias factor A: 0.88 (0.83 - 0.93)
Bias B: 14% (7% - 21%)
Diffusion Tubes Mean: 33 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 29 (27 - 30) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A: 0.88 (0.83 - 0.93)
Bias B: 14% (7% - 21%)
Diffusion Tubes Mean: 33 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 29 (27 - 30) µgm^{-3}

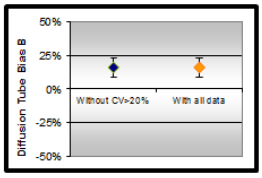


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Table C2 – Co-location Study Data for HO4 Storrington AURN, 2016

Location	Diffusion Tube Data Capture for Periods Used (site Storrington 8,9,10 AURN)	Continuous Monitor Data Capture for Periods Used	Diffusion Tube Annual Mean (µg/m^3)	Continuous Monitor Annual Mean (µg/m^3)	Ratio
HO4 Storrington AURN	100%	99%	34	24	0.72

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2016	03/02/2016	29.5	26.3	29.0	28	1.7	6	4.3
2	03/02/2016	01/03/2016	32.0	33.4	29.1	32	2.2	7	5.4
3	01/03/2016	30/03/2016	39.7	37.4	36.1	38	1.8	5	4.5
4	30/03/2016	26/04/2016	39.2	38.5	35.9	38	1.7	5	4.3
5	26/04/2016	24/05/2016	33.9	32.1	30.4	32	1.8	5	4.3
6	24/05/2016	27/06/2016	36.1	36.8	35.0	36	0.9	3	2.3
7	27/06/2016	28/07/2016	27.9	27.3	24.9	27	1.6	6	3.9
8	28/07/2016	26/08/2016	29.8	29.7	30.9	30	0.7	2	1.7
9	26/08/2016	30/09/2016	34.3	34.8	33.8	34	0.5	1	1.2
10	30/09/2016	25/10/2016	38.4	38.5	29.7	36	5.1	14	12.6
11	25/10/2016	30/11/2016	39.3	41.6	40.6	41	1.2	3	2.9
12	30/11/2016	04/01/2017	38.2	36.8	36.9	37	0.8	2	1.9
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
22.3	99.1	Good	Good
14.1	12.2	Good	or Data Capture
	0	Good	or Data Capture
25.8	93.7	Good	Good
25	99.1	Good	Good
23	100	Good	Good
17	99.3	Good	Good
19	99.6	Good	Good
23	99.9	Good	Good
28	99.8	Good	Good
29.6	100	Good	Good
29.4	99.4	Good	Good
	Overall survey -->	Good precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

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 10 periods of data
Bias factor A: 0.72 (0.67 - 0.77)
Bias B: 39% (30% - 49%)
Diffusion Tubes Mean: 34 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 24 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 24 (23 - 26) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 10 periods of data
Bias factor A: 0.72 (0.67 - 0.77)
Bias B: 39% (30% - 49%)
Diffusion Tubes Mean: 34 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 24 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 24 (23 - 26) µgm^{-3}

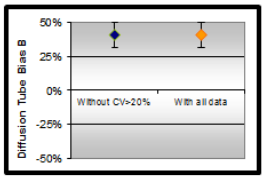

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Table C3 – Co-location Study Data for HO5 Cowfold, 2016

Location	Diffusion Tube Data Capture for Periods Used (site Cowfold AU A,B,C)	Continuous Monitor Data Capture for Periods Used	Diffusion Tube Annual Mean (µg/m3)	Continuous Monitor Annual Mean (µg/m3)	Ratio
HO5 Cowfold	100%	100%	35	27	0.77

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2016	03/02/2016	32.5	37.6	36.9	36	2.8	8	6.9
2	03/02/2016	03/03/2016	34.9	35.9	35.6	35	0.5	1	1.3
3	03/03/2016	31/03/2016	35.8	34.3	38.6	36	2.2	6	5.4
4	31/03/2016	26/04/2016	35.7	37.5	37.9	37	1.2	3	2.9
5	26/04/2016	24/05/2016	34.0	31.1	35.4	34	2.2	7	5.4
6	24/05/2016	30/06/2016	31.1	32.2	26.9	30	2.8	9	6.9
7	30/06/2016	28/07/2016	31.7	32.6	29.8	31	1.4	5	3.6
8	28/07/2016	27/08/2016	29.8	28.7	30.6	30	1.0	3	2.4
9	27/08/2016	29/09/2016	37.5	38.5	38.9	38	0.7	2	1.8
10	29/09/2016	25/10/2016	33.1	33.2	32.8	33	0.2	1	0.5
11	25/10/2016	29/11/2016	34.0	40.1	43.6	39	4.9	12	12.1
12	29/11/2016	04/01/2017	42.3	45.3	41.9	43	1.9	4	4.6
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
27.1	99.7	Good	Good
25.2	99.7	Good	Good
28.5	99.9	Good	Good
26.6	99.8	Good	Good
25	99.7	Good	Good
22	99.2	Good	Good
24	98.8	Good	Good
23	99	Good	Good
33	99.2	Good	Good
27	99.5	Good	Good
27	99.8	Good	Good
36	99.9	Good	Good
Overall survey -->		Good precision	Good Overall DC

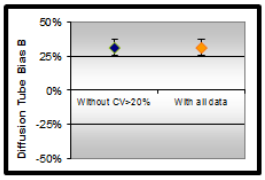
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

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: 0.77 (0.73 - 0.8)
Bias B: 30% (24% - 36%)
Diffusion Tubes Mean: 35 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 27 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 27 (26 - 28) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A: 0.77 (0.73 - 0.8)
Bias B: 30% (24% - 36%)
Diffusion Tubes Mean: 35 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 27 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 27 (26 - 28) µgm^{-3}



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Version 04 - February 2011

Discussion of Choice of Factor to Use

Local bias adjustment factor of 0.78 for 2016 monitoring data was derived from three separate co-location sites within Horsham district: HO2 Horsham Park Way (0.88, obtained using 11 periods of data), HO4 Storrington AURN (0.72, obtained using 10 periods of data) and HO5 Cowfold (0.77, obtained using 12 periods of data). The national bias adjustment factor for 2015 is 0.77.

Regarding the choice between the local and national factor, the technical guidance LAQM.TG (16) recommends the use of a local bias adjustment factor where concentrations measured in a co-location study are similar to those in the wider survey, where a co-location study had good precision and data capture for diffusion tubes and where the continuous monitoring results used in a co-location study were of high quality.

Data capture for the diffusion tube monitoring survey in 2016 was between 75-100% (9-12 months) for all sites except one (Horsham 19N had a data capture of 67% and the results from this site were 'annualised'). Data capture for the co-location tubes was 100%.

The three co-location studies are carried out at roadside locations. Majority of diffusion tube sites in the monitoring survey (43 out of 47) are roadside sites.

All three co-location studies had good data capture and tube precision.

Therefore, the local bias adjustment factor has been used in preference to a factor obtained from the national database.

The use of bias adjustment factors over the past few years has varied. A summary of factors used since 2007 is provided below in Table C4.

Table C4 – Co-location Study Data 2007 – 2016

Year	Local or National	Bias adjustment factors	Comments
2007	Local	0.9	Local bias was calculated from the HO2 Horsham Park Way co-location study. Diffusion tubes were prepared to the 10% TEA in water method and analysed by Bureau Veritas Laboratories.
2008	National	0.93	The national bias was considered more representative for the diffusion tube survey as a whole. The locally-derived bias from the HO2 Horsham Park Way co-location study was 0.9 based on 10 periods of data. Diffusion tubes were prepared using 50% TEA in acetone method and analysed by Bureau Veritas in Glasgow.
2009	National	0.81	The national bias was considered more representative for the diffusion tube survey as a whole. The locally-derived bias from the HO2 Horsham Park Way co-location study was 0.88 based on 10 periods of data. Diffusion tubes were prepared using 20% TEA in water method and analysed by Environmental Scientifics Group (formerly Bureau Veritas) in Glasgow.
2010	Local	0.81	The local bias was considered more representative for the diffusion tube survey as a whole. There was close agreement between the national and local bias adjustment factors at 0.84 and 0.81 respectively. The local bias adjustment factor was derived from two separate co-location sites: HO2 Horsham Park Way (based on 11 periods of data) and HO4 Storrington AURN (based on 10 periods of data); both studies produced the same bias factors. Diffusion tubes were prepared using 20% TEA in water method and analysed by Environmental Scientifics Group (formerly Bureau Veritas) in Glasgow.
2011	Local	0.78 & 0.8	The local bias was considered more representative for the diffusion tube survey as a whole. There was close agreement between the national and local bias adjustment factors. The national bias factor was 0.82 based on 5 studies. Three local bias adjustment factors were obtained: 0.78 for HO2 Horsham Park Way (based on 11 periods of data), 0.78 for HO4 Storrington AURN (based on 11 periods of data) and 0.8 for HO5 Cowfold (based on 9 periods of data). Diffusion tubes were prepared using 20% TEA in water method and analysed by Environmental Scientifics Group (formerly Bureau Veritas) in Glasgow.

Year	Local or National	Bias adjustment factors	Comments
2012	National and Local	0.79 (national); 0.89, 0.77 & 0.82 (local)	As there was limited agreement between the national and local bias adjustment factors the results have been corrected using both factors. The national bias factor was 0.79 based on 26 studies. Three local bias adjustment factors were obtained: 0.89 for HO2 Horsham Park Way (based on 11 periods of data), 0.77 for HO4 Storrington AURN (based on 12 periods of data) and 0.82 for HO5 Cowfold (based on 12 periods of data). Diffusion tubes were prepared using 50% TEA in acetone method and analysed by Environmental Scientifics Group in Didcot.
2013	National and Local	0.8 (national); 0.92, 0.82 & 0.71 (local)	As there was limited agreement between the national and local bias adjustment factors the results have been corrected using both factors. The national bias factor was 0.8 based on 28 studies. Three local bias adjustment factors were obtained: 0.92 for HO2 Horsham Park Way (based on 12 periods of data), 0.82 for HO4 Storrington AURN (based on 12 periods of data) and 0.71 for HO5 Cowfold (based on 11 periods of data). Diffusion tubes were prepared using 50% TEA in acetone method and analysed by Environmental Scientifics Group in Didcot.
2014	National	0.81	The national bias was considered more representative for the diffusion tube survey as a whole. There was close agreement between the national and local bias adjustment factors. The national bias factor was 0.81 based on 30 studies. Two local bias adjustment factors were obtained: 0.85 for HO2 Horsham Park Way (based on 11 periods of data), 0.78 for HO4 Storrington AURN (based on 5 periods of data) and 0.78 for HO5 Cowfold (based on 6 periods of data). The factors for Storrington and Cowfold co-location studies were excluded due to poor data capture for both studies. Diffusion tubes were prepared using 50% TEA in acetone method and analysed by Environmental Scientifics Group in Didcot.
2015	Local	0.81	Diffusion tubes were exposed for 9-10 months in 2015 so a local bias factor derived from the Cowfold co-location study was considered better matched than using an annual (national database) factor. The value of the national database factor was similar to that of the local factor (0.81 based on 21 studies available at the time the report was written and 0.79 based on 29 studies available later in the year).
2016	Local	0.78	The local bias derived from the three co-location studies was considered to be more representative for the diffusion tube survey. All three co-location studies are carried out at roadside locations and majority of the diffusion tube sites in the survey are roadside sites. All three co-location studies had good data capture and tube precision in 2016. The national bias factor was 0.77 based on 30 studies.

Short-term to Long-term Data Adjustment

Annualisation (short to long term data adjustment) was applied to data capture below 75%.

The adjustment has been undertaken for the automatic analyser at Horsham Park Way, which returned poor data capture for PM_{10} and for two diffusion tube monitoring sites: Henfield 1n (Golden Square, jct of A2037 Barrow Hill and A281 Brighton Rd) and Storrington 19n (jct of A283 Manley's Hill and School Hill).

The calculations presented below were carried out in line with LAQM Technical Guidance LAQM Guidance TG(16) Box 7.9.

Nitrogen Dioxide

Continuous Monitoring Data

Data capture for NO_2 was above 75% at all three continuous monitoring sites, therefore the data did not require annualisation.

Diffusion Tube Monitoring Data

Table C5 – Short to Long Term Adjustment for NO_2 for Henfield 1n Diffusion Tube Site

Long Term Site	Site Type	Annual Mean 2016 (Am)	Period Mean 2016 (Pm)	Ratio (Am/Pm)
Brighton Preston Park	Urban Background	17.24	17.41	0.990
Eastbourne	Urban Background	12.33	12.27	1.005
Lullington Heath	Rural Background	7.88	7.85	1.004
Rochester Stoke	Rural Background	13.44	13.00	1.034
Thurrock	Urban Background	28.09	27.35	1.027
			Average Annualisation Factor	1.012

Annualised Site	Site Type	Data Capture (%)	Unadjusted Annual Mean Concentration (µg/m^3)	Annualised Annual Mean Concentration (µg/m^3)	Bias Adjusted & Annualised Annual Mean Concentration (µg/m^3)
Henfield 1n	Roadside	66.7	36.3	36.7	28.7

Table C6 – Short to Long Term Adjustment for NO_2 for Storrington 19n Diffusion Tube Site

Long Term Site	Site Type	Annual Mean 2016 (Am)	Period Mean 2016 (Pm)	Ratio (Am/Pm)
Brighton Preston Park	Urban Background	17.24	16.47	1.047
Eastbourne	Urban Background	12.33	11.37	1.085

Lullington Heath	Rural Background	7.88	7.34	1.074
Thurrock	Urban Background	28.09	25.94	1.083
			Average Annualisation Factor	1.072

Annualised Site	Site Type	Data Capture (%)	Unadjusted Annual Mean Concentration (µg/m^3)	Annualised Annual Mean Concentration (µg/m^3)	Bias Adjusted & Annualised Annual Mean Concentration (µg/m^3)
Storrington 19n	Roadside	66.7	71.2	76.4	59.8

Particulate Matter PM_{10}

Table C7 – HO2 Horsham Park Way Continuous Monitoring Station – Short to Long Term Adjustment for PM_{10}

Long Term Site	Site Type	Data Capture (%)	Annual Mean 2016 (Am) (µg/m^3)	Period Mean 2015 (Pm) (µg/m^3)	Ratio (Am/Pm)
Reading New Town	Urban Background	96.2	13.2	13.3	0.99
Rochester Stoke	Rural Background	87.2	15.8	16.1	0.98
Thurrock	Urban Background	96.4	17.3	17.5	0.98
				Average Annualisation Factor	0.99

Annualised Site	Site Type	Data Capture (%)	Unadjusted Annual Mean Concentration (µg/m^3)	Annualised Annual Mean Concentration (µg/m^3)
HO2 Horsham Park Way	Roadside	71.9	19.6	19.3

PM10 Monitoring Adjustment

The PM_{10} monitoring data from the HO2 Horsham Parkway analyser has been corrected in accordance with the Volatile Correction Model (VCM)[14] using data from three default selected FDMS sites – Reigate and Banstead 1 co-location (RG5), Sutton – Worcester Park (ST6) and the FDMS Site 3, which was the average of remaining sites within range. The FDMS Site 3 correction included 68ngratified data.

QA/QC of Automatic Monitoring

Data collection and ratification for the Park Way and Cowfold monitoring stations is undertaken by the Environmental Research Group, Kings College, through a contract with the Sussex Air Partnership. For more information, please visit the Sussex Air Quality Partnership website at http://www.sussex-air.net. The operation and data management for both stations is carried out to the AURN standards, however, the data

[14] http://www.volatile-correction-model.info/Default.aspx

quality could be further improved if independent inter calibrations site audits were carried out (these are a requirement for AURN sites).

The Storrington monitoring station is an AURN affiliated site managed primarily by AEA Technology in accordance with the 'QA/QC Procedures for the UK Automatic Urban and Rural Air Quality Monitoring Network (AURN)'.

Calibrations and checks at all stations are undertaken every four weeks by external Local Site Operators and the analysers are maintained under contract with instrument suppliers/manufacturers for all three stations.

QA/QC of Diffusion Tube Monitoring

Laboratories participate in two QA/QC schemes. The new AIR-PT Scheme (a continuation of the Workplace Analysis Scheme for Proficiency (WASP)) is run by LGC and supported by the Health & Safety Laboratory. The other scheme is a monthly field intercomparison exercise managed by the AEA. Defra advises that local authorities should use diffusion tubes supplied by laboratories that have demonstrated satisfactory performance under the QA/QC schemes.

ESG Didcot is a UKAS accredited laboratory and participates in both QA/QC schemes described above. The list of those laboratories which have performed satisfactorily in the AIR-PT scheme is provided to local authorities on the LAQM Support website[15]. In the latest available AIR-PT results, rounds AR012 (January to February 2016), AR 013 (April to May 2016), AR015 (July to August 2016) and AR016 (September to October 2016) ESG Didcot have scored 100%, 75%, 75% and 100% respectively. The percentage score reflects the results deemed to be satisfactory based upon the z-score of < ± 2. Based on 30 studies from ESG Didcot utilising the 50% TEA, 87% of all local Authority co-location studies in 2016 were rated as 'good' (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%).

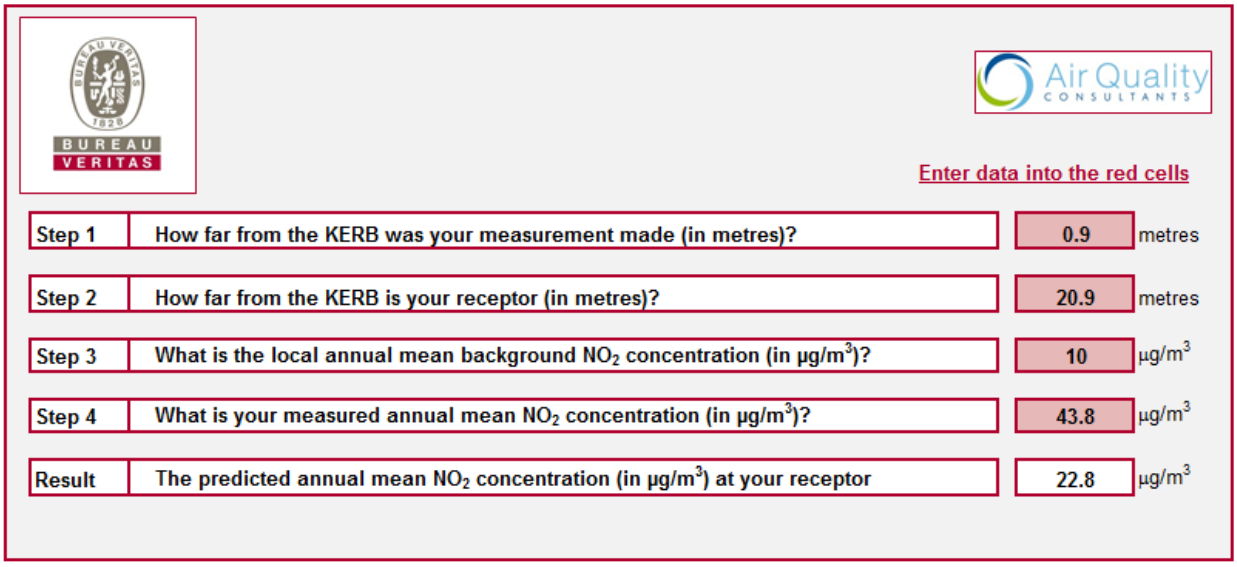
Regarding the inter-comparison co-location study, the study from Marylebone Road from the national database in 2016 was rated as 'good' (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%).

Monitoring Results – Distance Correction

Site – Storrington 14n – Cobden, Manleys Hill (Washington Road), Storrington

[15] https://laqm.defra.gov.uk/assets/airptrounds7to18apr2015feb2017.pdf

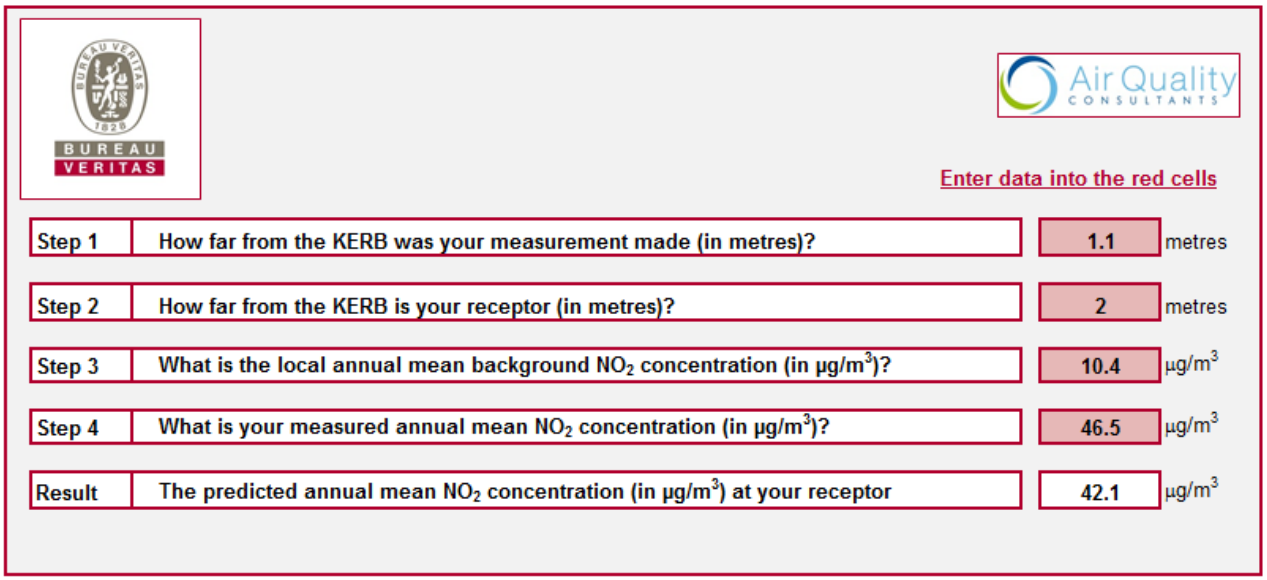
Figure C1 – Nitrogen Dioxide Fall off with Distance Calculation – Diffusion Tube Storrington 14n (2016)



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	0.9	metres
Step 2	How far from the KERB is your receptor (in metres)?	20.9	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	10	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	43.8	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	22.8	µg/m^3

Figure C2 – Nitrogen Dioxide Fall off with Distance Calculation – Diffusion Tube Cowfold 7n (2016)

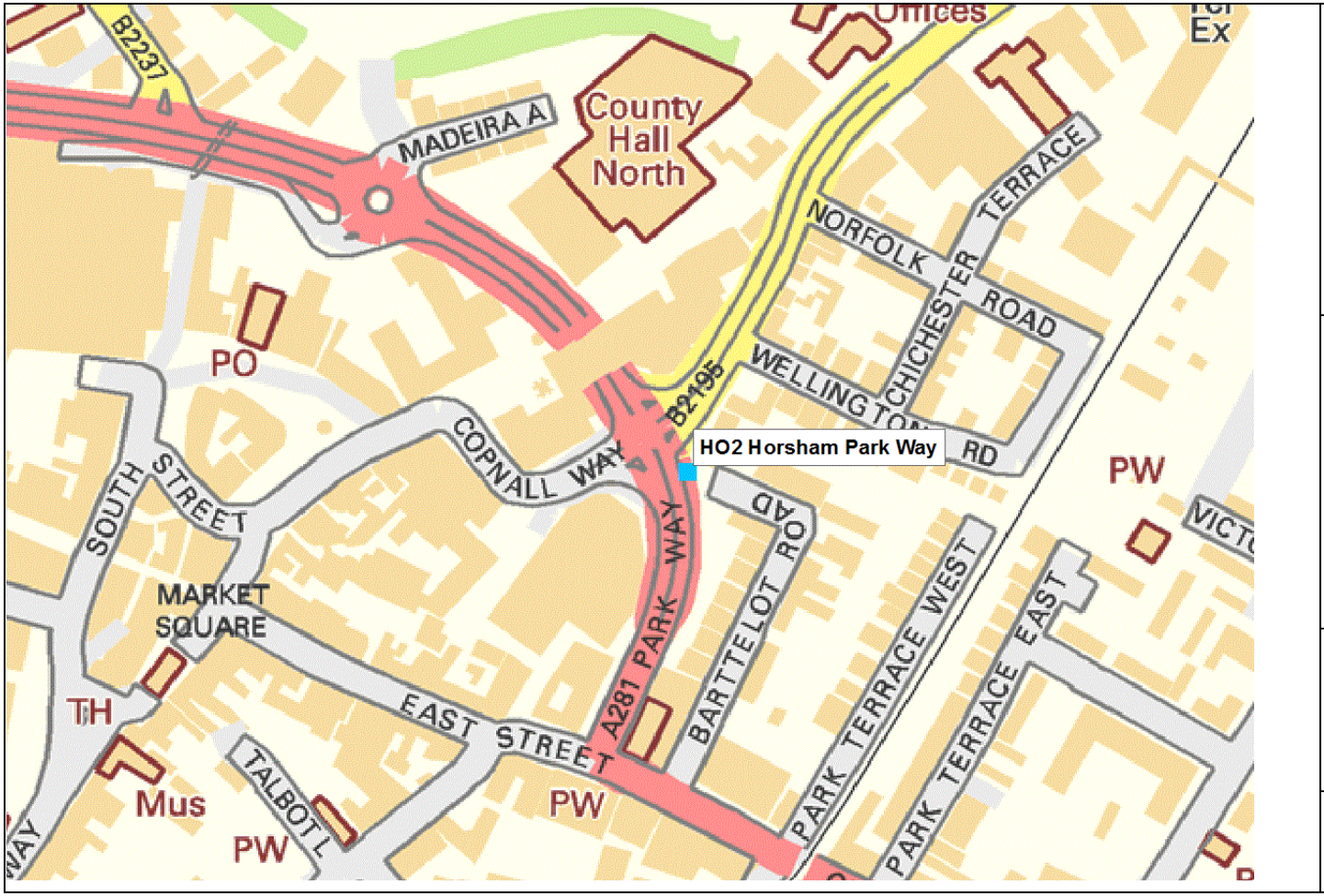


Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	1.1	metres
Step 2	How far from the KERB is your receptor (in metres)?	2	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	10.4	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	46.5	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	42.1	µg/m^3

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D1 – Location of Horsham Monitoring Station

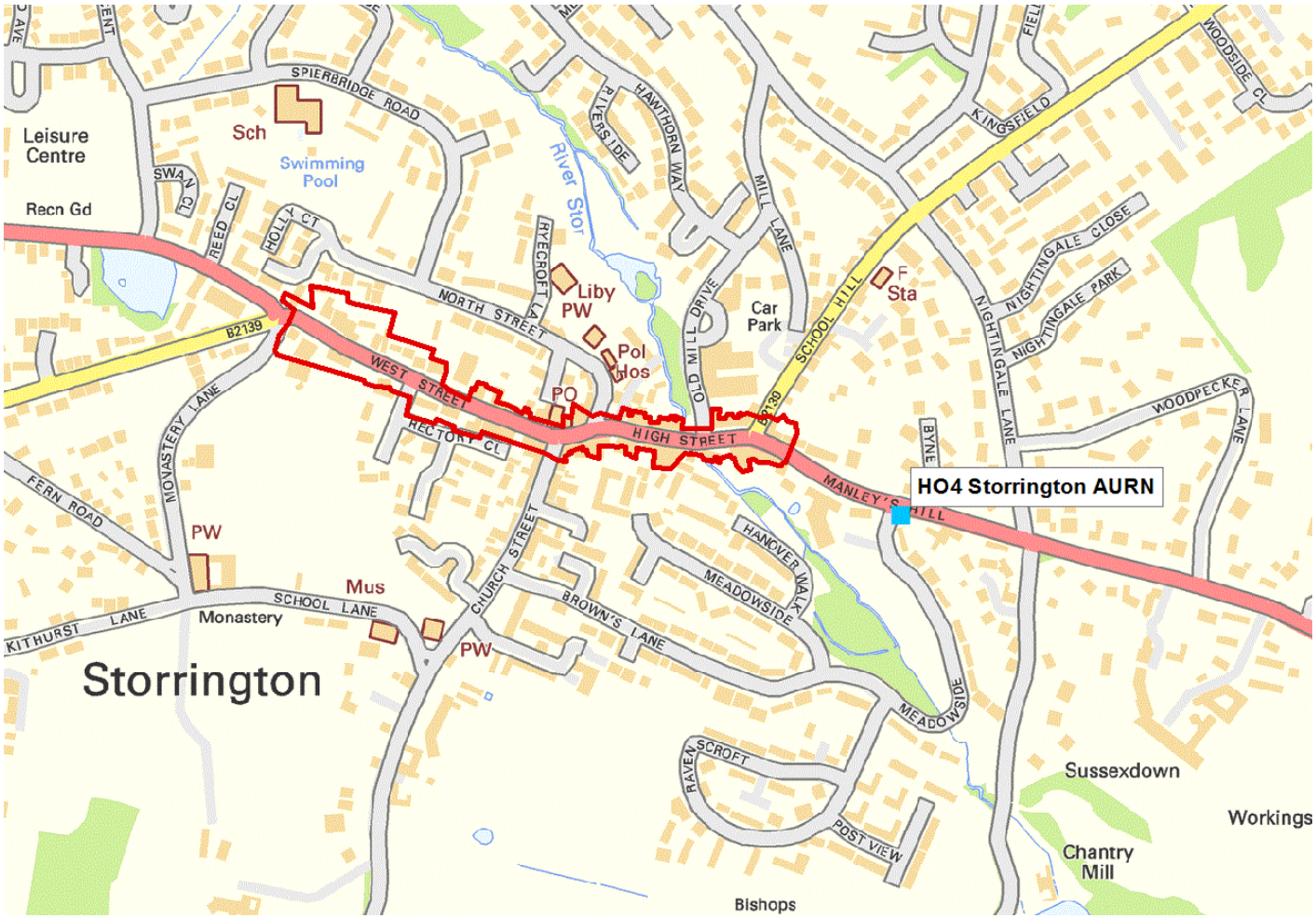


Legend

Continuous Monitoring Site

Scale	Title
Not To Scale	Automatic Monitoring Sites – Horsham
Date **June 2017**	**Figure No. D1**

Figure D2 – Location of Storrington Air Quality Monitoring Station

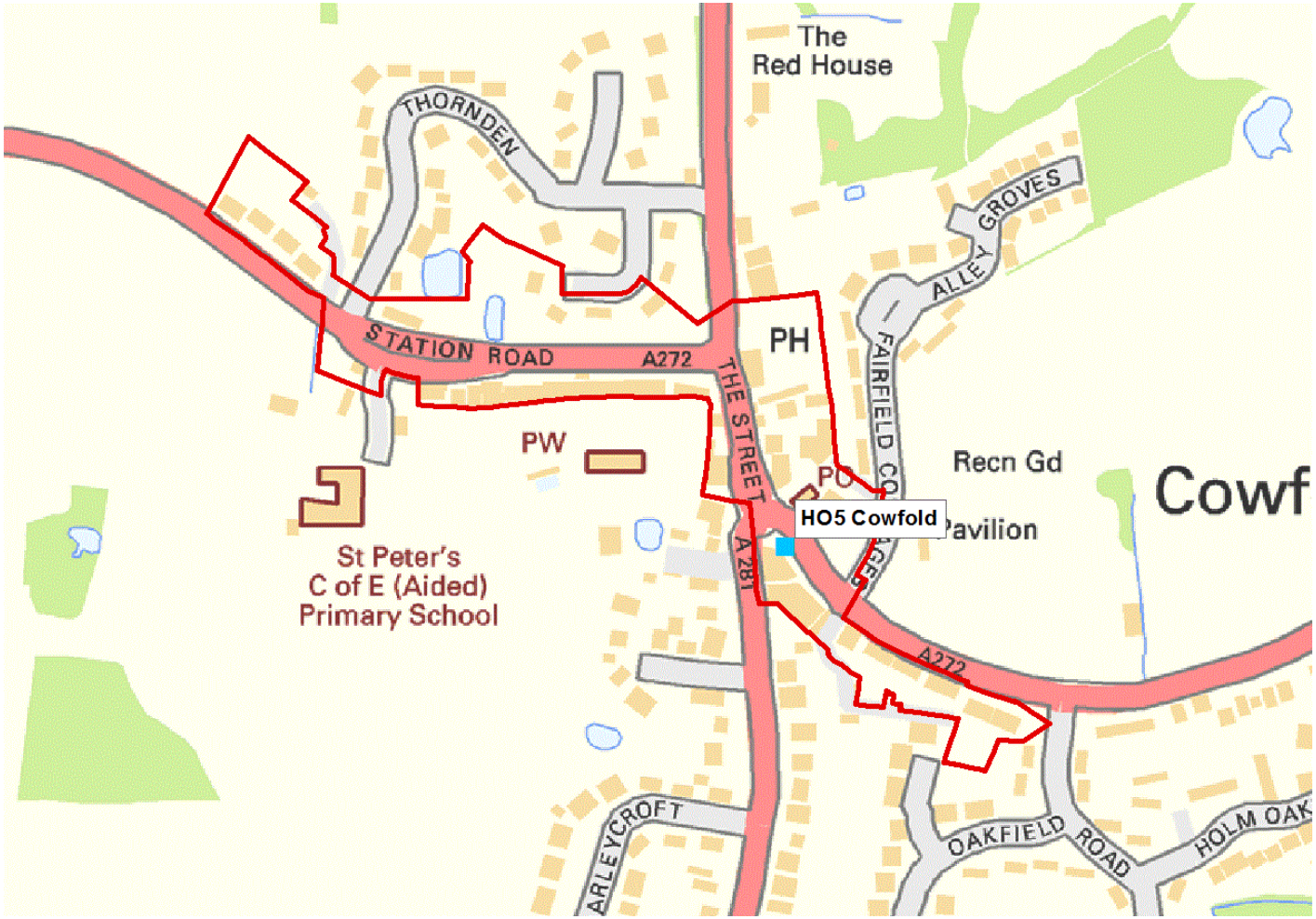


Legend

- Continuous Monitoring Site
- AQMA Boundary

Scale	**Title**
Not To Scale	Automatic Monitoring Sites – Storrington
Date	**Figure No. D2**
June 2017	

Figure D3 – Location of Cowfold Air Quality Monitoring Station

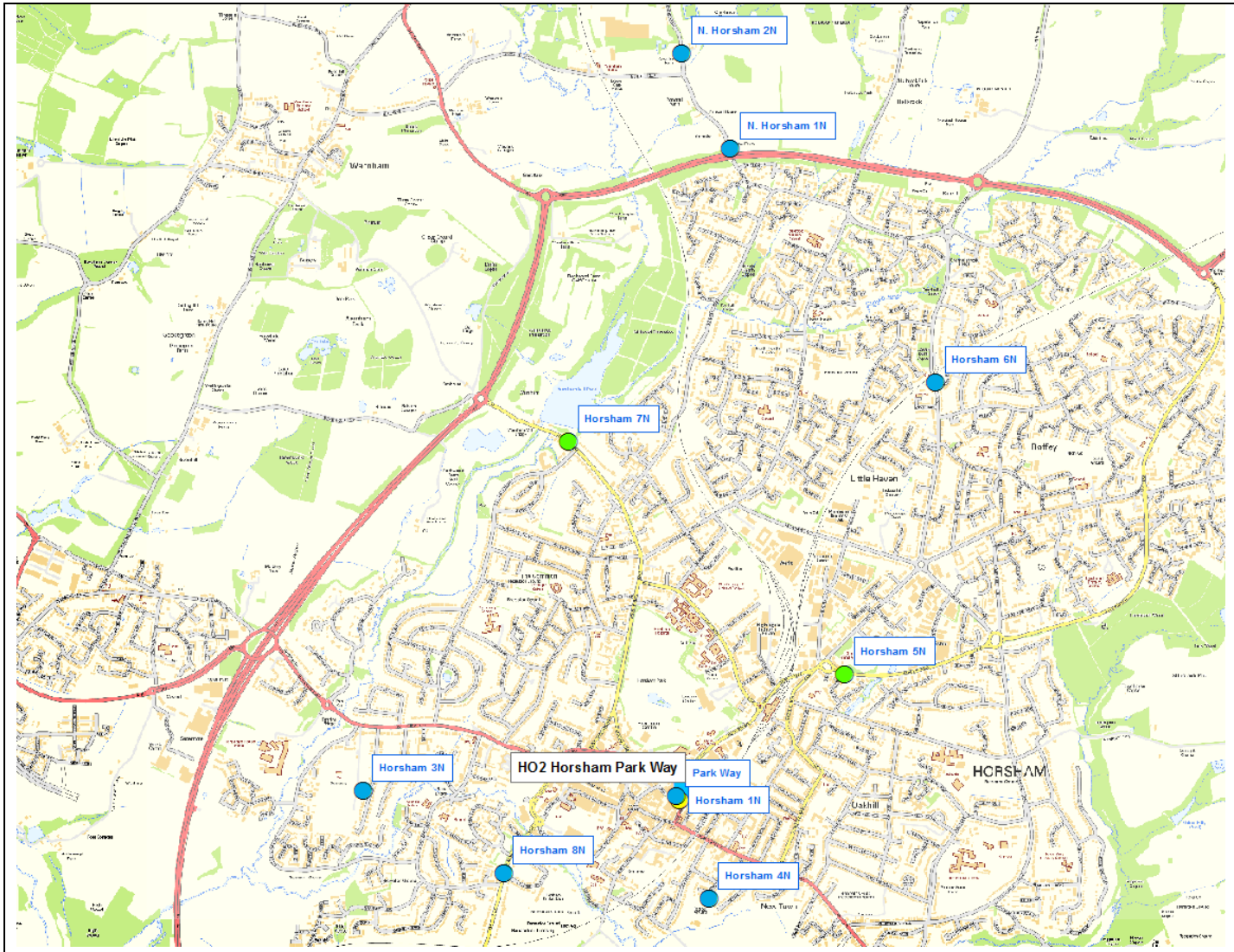


Legend

- Continuous Monitoring Site
- AQMA Boundary

Scale	**Title**
Not To Scale	Automatic Monitoring Sites – Cowfold
Date	**Figure No. D3**
June 2017	

Figure D4 – Locations of Diffusion Tube Monitoring Sites – Horsham



Legend

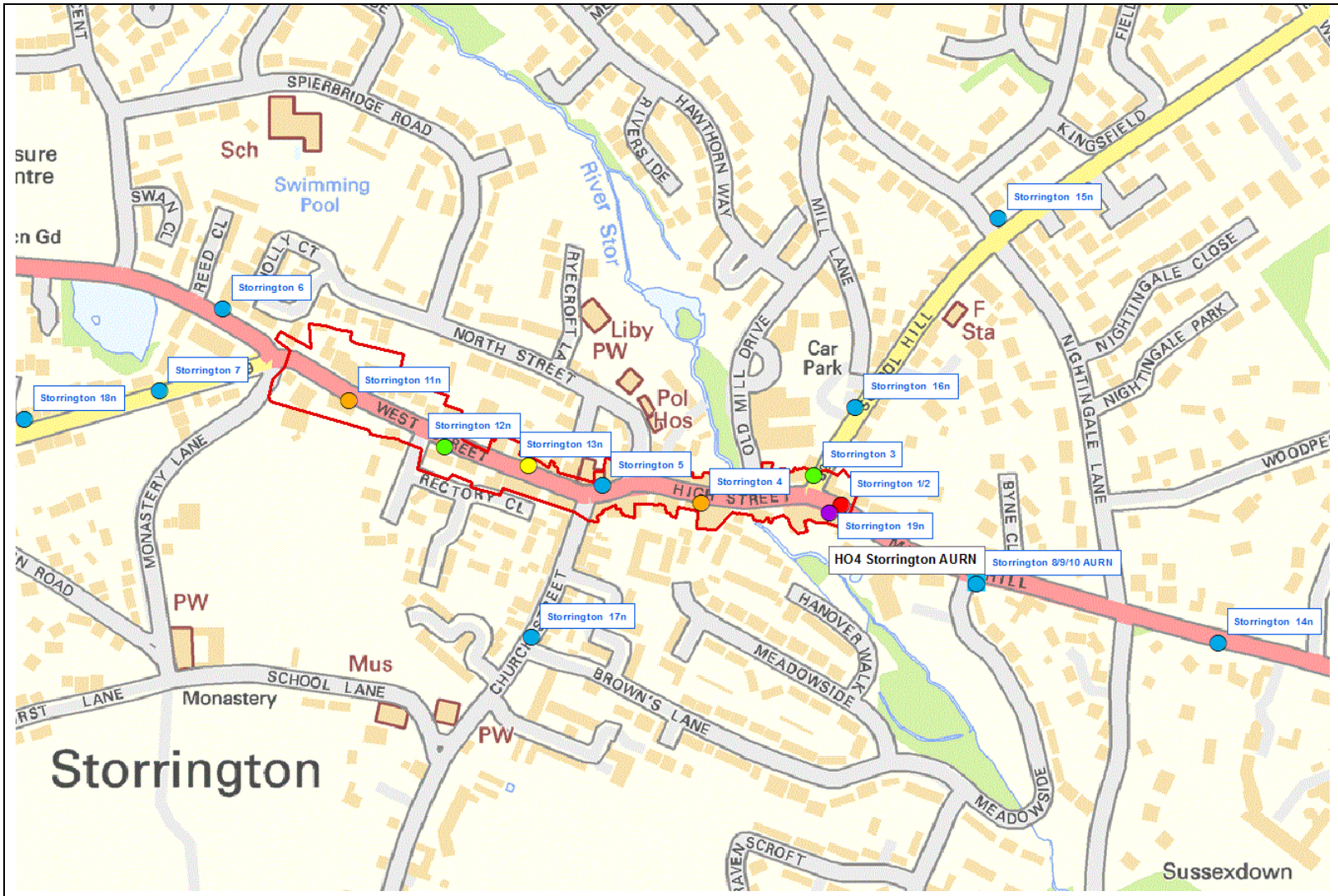
Diffusion Tube Monitoring Site

2016 Concentration, µg/m3

- 10.0 - 28.0
- 28.0 - 32.0
- 32.0 - 36.0
- 36.0 - 40.0
- 40.0 - 44.0
- 44.0 - 60.0
- Continuous Monitoring Site

Scale	**Title**
Not To Scale	Non-Automatic Monitoring Sites – Horsham
Date	**Figure No. D4**
June 2017	

Figure D5 – Locations of Diffusion Tube Monitoring Sites – Storrington



Legend

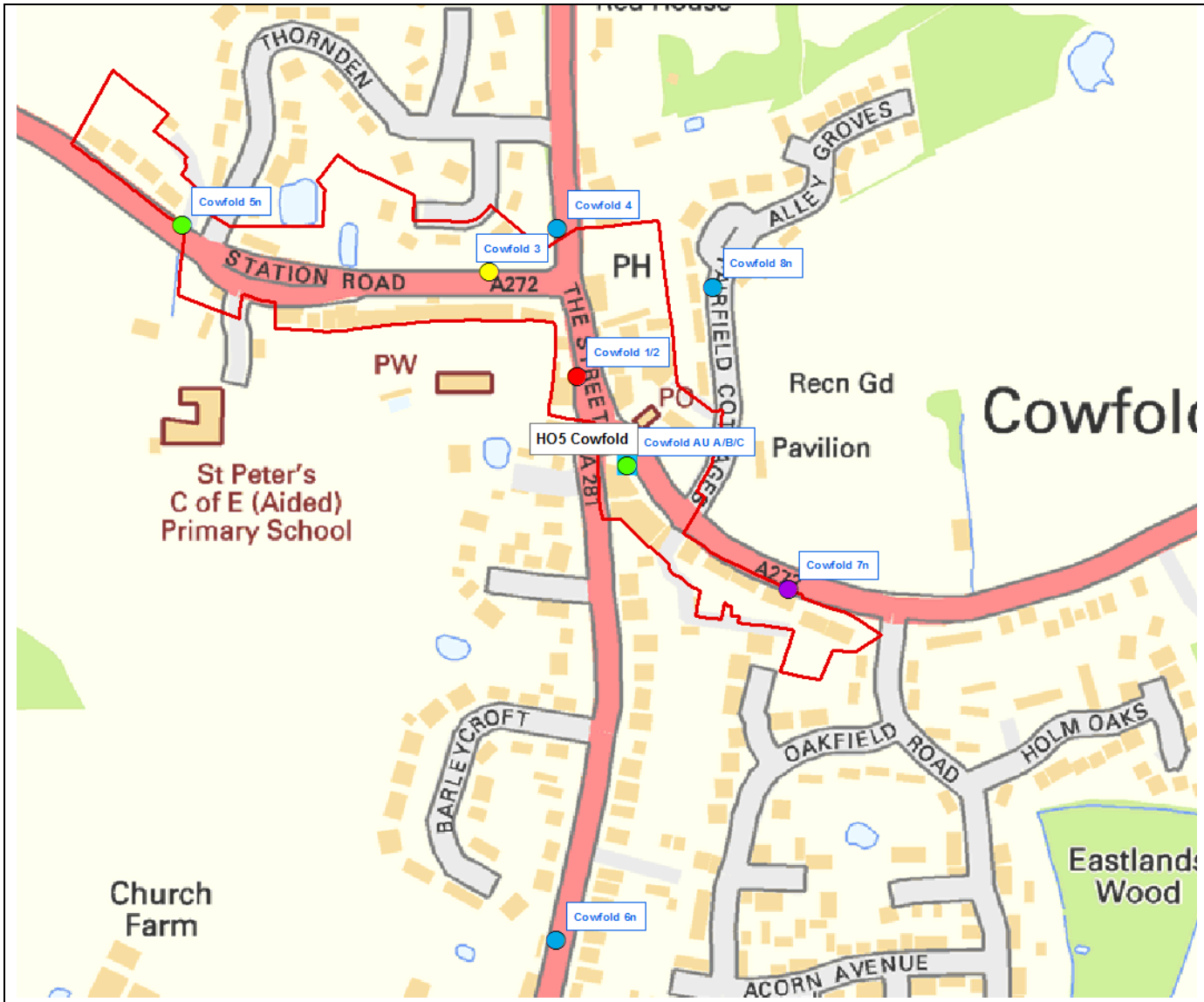
Diffusion Tube Monitoring Site

2016 Concentration, µg/m3

- 10.0 - 28.0
- 28.0 - 32.0
- 32.0 - 36.0
- 36.0 - 40.0
- 40.0 - 44.0
- 44.0 - 60.0
- Continuous Monitoring Site
- AQMA Boundary

Scale	**Title**
Not To Scale	Non-Automatic Monitoring Sites – Storrington
Date	**Figure No. D5**
June 2017	

Figure D6 – Locations of Diffusion Tube Monitoring Sites – Cowfold



Legend

Diffusion Tube Monitoring Site

2016 Concentration, µg/m3

- 10.0 - 28.0
- 28.0 - 32.0
- 32.0 - 36.0
- 36.0 - 40.0
- 40.0 - 44.0
- 44.0 - 60.0
- Continuous Monitoring Site
- AQMA Boundary

Scale	**Title**
Not To Scale	Non-Automatic Monitoring Sites – Cowfold
Date	**Figure No. D6**
June 2017	

Figure D7 – Locations of Diffusion Tube Monitoring Sites – Henfield

Legend

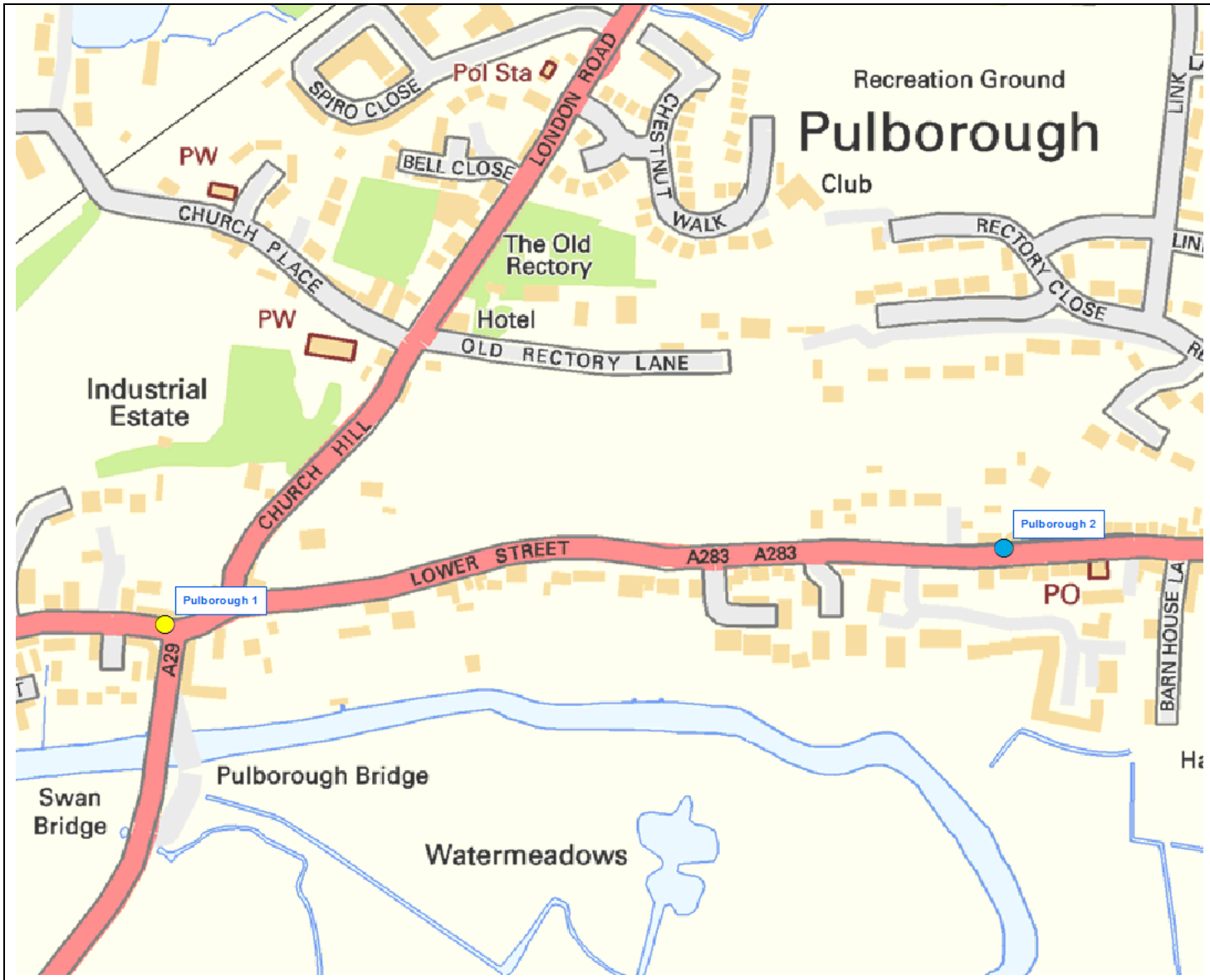
Diffusion Tube Monitoring Site

2016 Concentration, µg/m3

- 10.0 - 28.0
- 28.0 - 32.0
- 32.0 - 36.0
- 36.0 - 40.0
- 40.0 - 44.0
- 44.0 - 60.0

Scale	**Title**
Not To Scale	Non-Automatic Monitoring Sites – Henfield
Date	**Figure No. D7**
June 2017	

Figure D8 – Locations of Diffusion Tube Monitoring Sites – Pulborough



Legend

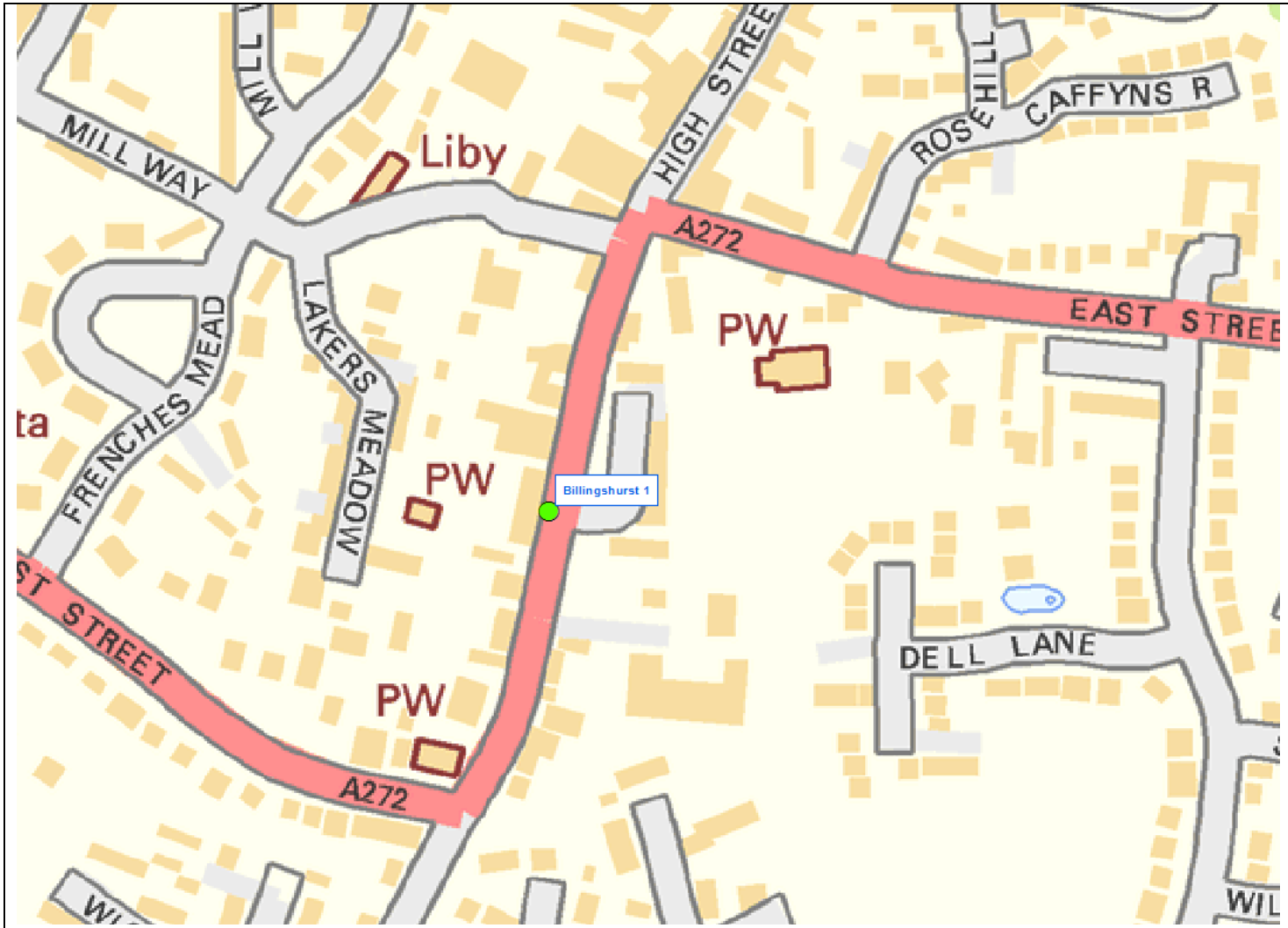
Diffusion Tube Monitoring Site

2016 Concentration, µg/m3

- 10.0 - 28.0
- 28.0 - 32.0
- 32.0 - 36.0
- 36.0 - 40.0
- 40.0 - 44.0
- 44.0 - 60.0

Scale	**Title**
Not To Scale	Non-Automatic Monitoring Sites – Pulborough
Date	**Figure No. D8**
June 2017	

Figure D9 – Locations of Diffusion Tube Monitoring Sites – Billingshurst



Legend

Diffusion Tube Monitoring Site

2016 Concentration, µg/m3

- 10.0 - 28.0
- 28.0 - 32.0
- 32.0 - 36.0
- 36.0 - 40.0
- 40.0 - 44.0
- 44.0 - 60.0

Scale Not To Scale	**Title** Non-Automatic Monitoring Sites – Billingshurst
Date June 2017	**Figure No. D9**

Figure D10 – Locations of Diffusion Tube Monitoring Sites – Crawley

Legend

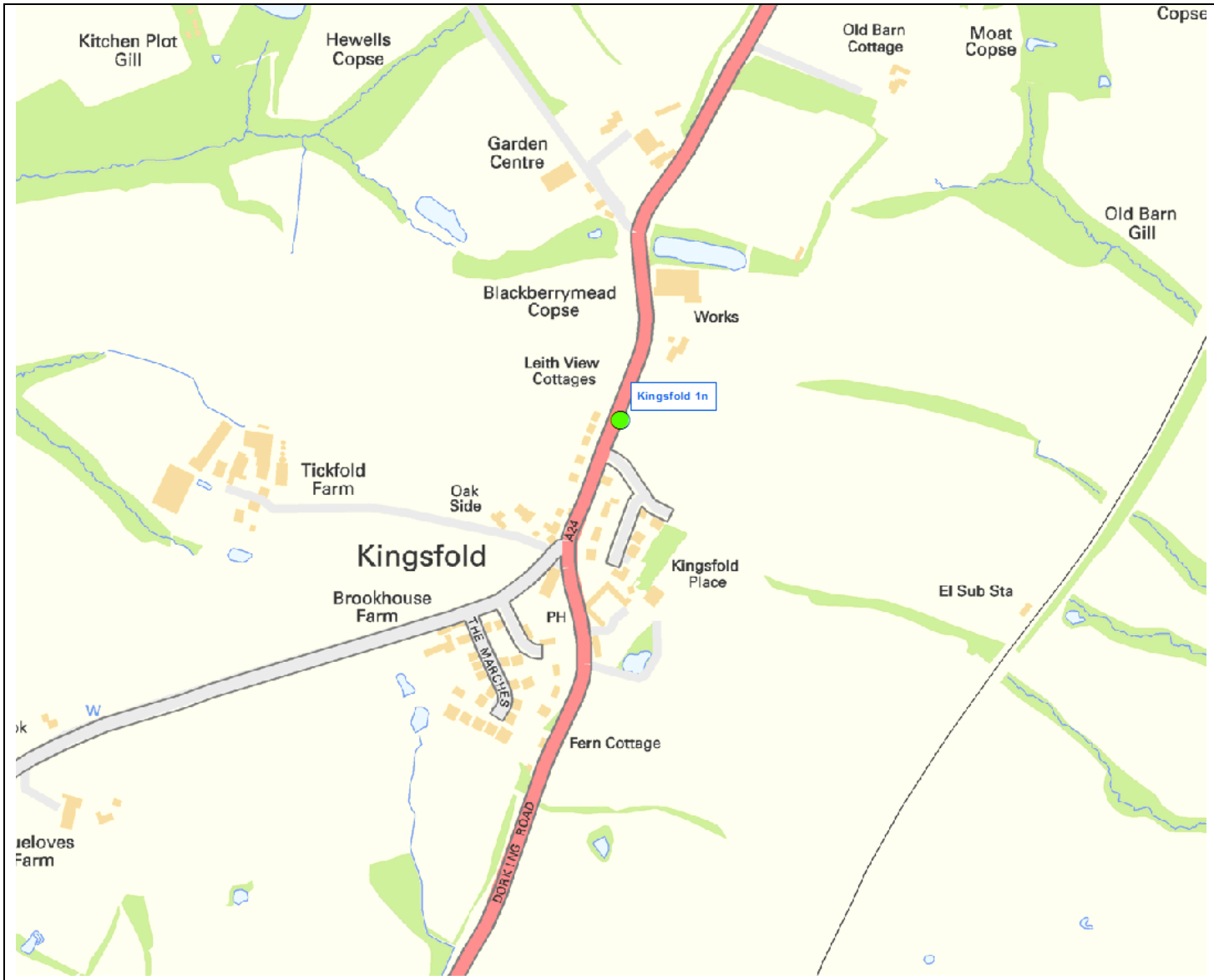
Diffusion Tube Monitoring Site

2016 Concentration, µg/m3

- 10.0 - 28.0
- 28.0 - 32.0
- 32.0 - 36.0
- 36.0 - 40.0
- 40.0 - 44.0
- 44.0 - 60.0

Scale Not To Scale	**Title** Non-Automatic Monitoring Sites – Crawley
Date June 2017	**Figure No. D10**

Figure D11 – Locations of Diffusion Tube Monitoring Sites – Kingsfold



Scale	Title
Not To Scale	Non-Automatic Monitoring Sites – Kingsfold
Date	**Figure No. D11**
June 2017	

Appendix E: Industrial Processes

Within Horsham District Council there are a number of industrial processes that are controlled through permits issued under the Environmental permitting regime. Depending on the nature of the process, permits are issued either by the Environment Agency or by Horsham District Council

There are 8 Part A1 installations in the Horsham District Council area operating under permits issued by the Environment Agency. Details of these processes are given in Table E1 below. There are also 42 Part B/A2 processes in the district with permits issued by Horsham District Council ; details of those are provided in Table E2 .

Table E1 – Industrial Processes with Permits Issued by the Environment Agency, 2016

Biffa Waste Services Ltd Brookhurstwood Landfill Langhurstwood Road Warnham West Sussex RH12 4QD Permits : BV9896IY, RP3232UU, HP3238GW	Island Gas Ltd Storrington Oilfield East of A283 Cootham Storrington Pulborough Permit XP3031CF Permit SP3533UN
Cemex UK Materials Ltd Small Dole Leachate Treatment Plant Small Dole Landfill Henfield Road Small Dole West Sussex BN59XJ Permit LP3031LK	Kinswood Eggs Limited Lackenhurst Lane Brooks Green Horsham RH13 0JO
Faccenda Group Limited Homefield Poultry Farm Broadford Bridge Road Billingshurst RH14 9EB Permit KP3237MP	Viridor Waste Management Small Dole Landfill Henfield Road Small Dole Permit BV9900IS
Four Seasons Fuel Four Seasons Farm Coneyhurst Nr. Billingshurst RH14 9DG Permit SP3632UN	

Table E2 – Industrial Processes with Permits Issued by HDC in 2016

Horsham DC Processes 2015/16

Permit No.	Name	Process Type	Date Issued	Status	Grid Reference
Part B Processess					
WOB2	Godfreys of Horsham	Waste Oil Burner	15/06/1992	Current	515684, 126710
WOB7	Wiggs Auto-Repairs	Waste Oil Burner	12/06/2013	Current	509461, 115215
WOB5	Daves Commercials Ltd	Waste Oil Burner	14/02/2011	Current	524726, 117682
PPC1	Paula Rosa Kitchens	Timber Activities	30/04/2004	Current	509356, 115063
EPR4	Eurovia	Mobile Roadcoating	08/05/2013	Current	517107, 130838
EPR8	Eurovia	Mobile Roadcoating	25/10/2013	Current	517107, 130838
PPC10	Cemex	Bulk Cement	07/05/2008	Current	510035, 114152
PPC11	Hawkins	Animal Incineration	02/01/2004	Current	520793, 121379
EPR19	Thakeham Tiles	Bulk Cement	24/03/1993	Current	510343, 115074
PPC22	Frosts Body Repair Centre	Vehicle Refinishing	31/01/1994	Current	521509, 112645
EPR33	Apollo Motor Company	Vehicle Refinishing	14/11/2011	Current	516988, 136798
PPC34	Harwoods Bodyshop Five Oaks	Vehicle Refinishing	29/01/2007	Current	509877, 128507
PPC53	PJ Brown Ltd	Mobile Crusher	18/03/2008	Current	524039, 139393
EPR5	Edburton (Metrotrak)	Mobile Crusher	03/06/2013	Current	522381, 111584
EPR41	Revival, Southwater	Dry Cleaning	01/12/2005	Current	515746, 126351
EPR13	Dudman Group Ltd, Storrington	Bulk Cement	10/01/2013	Current	509219, 113677
PPC50	Edburton (Apollo)	Mobile Crusher	10/04/2007	Current	522381, 111584
EPR43	Taylors Dry Cleaners	Dry Cleaning	10/09/2007	Current	516284, 131098
EPR44	Pulborough Cleaners	Dry Cleaning	17/09/2007	Current	505192, 186007
EPR45	Hurst Cleaners	Dry Cleaning	17/09/2007	Current	508689, 126127
EPR46	Rapide Dry Clean	Dry Cleaning	24/09/2007	Current	516813, 130733
EPR47	Johnson Cleaners UK Ltd	Dry Cleaning	17/02/2010	Current	517339, 130595
EPR48	JD Cleaners (Henfield) Ltd	Dry Cleaning	17/02/2010	Current	521486, 116009
EPR49	Gem Cleaners, Storrington	Dry Cleaning	10/02/2010	Current	508955, 114461
PPC54	Washington Coachworks Ltd	Vehicle Refinishing	03/04/2008	Current	512105, 113826
EPR15	Hanson Concrete, Foundry Lane	Cement Storage	22/11/2010	Current	518037, 131450
Part B Petrol Filling Stations					
PSS1	Horsham Service Station, Redkiln Way	Petrol Storage	10/11/1997	Current	518630, 131620
PSS2	J Sainsbury PFS, Worthing Road, Horsham	Petrol Storage	19/08/1998	Current	516870, 130396
PSS3	Tesco PFS, Broadbridge Heath	Petrol Storage	02/06/2008	Current	515065, 130944
PSS4	Harwoods Garages Ltd, Pulborough	Petrol Storage	23/11/1998	Current	504978, 119042
PSS6	Motor Fuel Group, Beeding Garage	Petrol Storage	18/02/2009	Current	519674, 110411
PSS7	Shell UK Ltd, Hop Oast, Horsham	Petrol Storage	21/12/1998	Current	516066, 128571
PSS8	Shell Uk Ltd, Broadbridge Heath	Petrol Storage	21/12/1998	Current	515446, 131355
PSS10	Storrington Service Station	Petrol Storage	23/11/1998	Current	508383, 114431
PSS11	Elite Garages Ltd, Pulborough	Petrol Storage	13/05/1999	Current	504793, 118862
PSS12	Elite Garages Ltd, Mannings Heath	Petrol Storage	11/05/1999	Current	519933, 128705
PSS14	Shell Service Station (804) Henfield	Petrol Storage	03/03/1999	Current	521480, 115741
PSS18	Harwoods Garages Ltd, Five Oaks	Petrol Storage	26/02/2007	Current	509916, 128496
PSS19	Godfreys of Horsham, Southwater	Petrol Storage	22/02/1999	Current	515683, 126711
PSS20	Buck Barn Garage, West Grinstead	Petrol Storage	25/03/2013	Current	516496, 122631
IPPC A2					
IPPC3	Wienerberger Ltd, Warnham Works	Brickworks	23/05/2006	Current	517057, 134348
IPPC7	Ibstock Brick, Laybrook Factory	Brickworks	1/18/2011	Current	511388, 118887

Appendix F: Summary of Air Quality Objectives in England

Table F1 – Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

Glossary of Terms

Abbreviation	Description
AIR-PT	Proficiency Testing scheme for laboratories involved in air quality analysis
AQAP	Air Quality Action Plan – A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air Quality Annual Status Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
CYC	Charge-Your-Car eV charge point network
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EH	Environmental Health
EV	Electric Vehicle
FDMS	Filter Dynamics Measurement System
HDC	Horsham District Council
HDPF	Horsham District Planning Framework
HE	Highways England
IWP	Integrated Works Programme
LAQM	Local Air Quality Management
LSTF	Local Sustainable Transport Fund
LE	Low Emission
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
OLEV	Office for Low Emission Vehicles
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance/Quality Control
STIP	Strategic Transport Investment Programme
ULEV	Ultra-Low Emission Vehicles
WASP	Workplace Analysis Scheme for Proficiency
WSCC	West Sussex County Council
TEA	Triethanolamine

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