Brighton & Hove City Council

# 2020 Air Quality Annual Status Report (ASR)

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

## June 2020


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| Local Authority Officer | Samuel Rouse |
| Department | Transport |
| Address | Hove Town Hall, Norton Road, BN3 3BQ |
| Telephone | 01273 292256 |
| E-mail | samuel.rouse@brighton-hove.gov.uk |
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***Pictures in Order of Appearance***

*Title Page: A23 London Road*

*A270: New England Road,*
*A2010: Terminus Road & Brighton Station.*

*Fireplace: a potential source of smoke.*

*Part of the B2066 Ultralow Emissions Zone for Buses looking west and east.*

# Executive Summary: Air Quality in Our Area

Brighton & Hove is committed to working with partners to ensure that the City will be a place where improved health and wellbeing is experienced by all. Poor air quality has negative impacts on public health, with potentially serious consequences for individuals, families and the population as a whole. Identifying problem areas and ensuring that actions are taken to improve air quality forms an important element in protecting the health and wellbeing of Brighton & Hove residents. Improving air quality is often a complex issue, presenting a multi-agency challenge – so it is essential that various departments including; Transport,
Public Health, Safer Communities, Housing and Education work together effectively to deliver improvements where they are needed.

Most recent monitoring across Sussex suggests airborne particles meet English health standards across the region. 2019 monitoring suggests across Brighton and Hove World Health Organisation long term guidelines for particles are being met. Improvements over the next five years will benefit everyone's health.

Nitrogen dioxide continues to exceed or be close to exceeding national air quality standards along four main transport corridors (A23, A270, B2066 and A2010) to and from Brighton & Hove City Centre, the haulage route from the port (A259-A293) via South Portslade and Rottingdean High Street (B2123). Next steps will be to consider a review of the 2013 nitrogen dioxide Air Quality Management Area followed by a revised Air Quality Action Plan for public consultation.

This report acknowledges the work of field officers in changing monitoring samples during 2019. Also thanks to Transport Research Laboratory (TRL) for providing calibrated data from Brighton & Hove's automatic monitoring stations.

## Air Quality in Brighton & Hove City Council

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 and an influencing factor with respiratory diseases. Air pollution particularly affects the most vulnerable

in society: children and older people, and those with heart and lung conditions. There is often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2]. Poor quality housing resides next to roads and junctions where pollution is relatively high. Brighton & Hove's urban area has one of the highest population densities in England. Cleaner air will benefit the health of a cosmopolitan city including athletes to those recovering from illness. Behavioural change can help reduce pollution where people live. Better air quality is an inclusive cause that can bind diverse communities.

The annual health cost to society of the impacts of Particulate Matter (PM less than 2.5 microns) in the UK is estimated to be around £16 billion[3]. Locally nitrogen dioxide ($NO_2$) is the most plentiful pollutant and health damage costs[4] are greater where population density is high and there is increased likelihood of public exposure to pollution.

Air Quality Management Areas are declared for $NO_2$ because this is the only pollutant that exceeds UK air quality standards. Action to improve air quality will need to work towards and surpass set standards for $NO_2$. Whilst particles do not exceed UK standards improving beyond World Health Organisation (WHO) guidelines will be a health benefit. The mixture of pollution human's inhale is a burden on health and we should not see pollution in the gas or particle phases as separate concerns. Some pollutants such as ground levels ozone ($O_3$) result from chemical reactions in the atmosphere in the presence of sunlight. As ozone episodes are regional reporting is beyond the scope of this report on local air quality.

In Brighton & Hove road traffic emissions (cars, lorries, vans, taxis and buses) dominate roadside levels of nitrogen dioxide. Domestic and communal gas combustion mostly for heating also contributes to nitrogen dioxide in residential areas.

Tiny airborne particles travel long distances between regions for example ammonia released from agricultural activities in April, industry and fires year round. Due to its transboundary nature $PM_{2.5}$ is not a statutory requirement for Local Air Quality Management. In recent years the ASR aligns with the Joint Strategic Needs Assessment[15] and the Public Outcomes Framework[16] that include health sections on airborne $PM_{2.5}$. Across Europe **gas** emissions from combustion (traffic and industry)

contribute to **nitrate particles** in the air. In the spring this can cause moderate or high particulate days across regions.

Local sources of particulate and soot include:

- Construction or roadwork activities including dust from excavation and diesel emissions from non-road mobile machinery
- Older or tampered vehicles without effective diesel particulate traps
- Tyre and brake wear proportional to driving style and axle weight
- Two-stroke engines such as smaller motorbikes
- Some cooking outlets
- Burning in a stove or fireplace
- Bonfires or smouldering refuse
- Barbeques when wind speeds are low (high pressure can establish fair weather with calm conditions)
- Outdoor events using static diesel generators
- Celebrations such as New Year and Guy Fawkes Night emit particles and metals to the air a few evenings every year.

Alternative emission free entertainments to fireworks include light projections, LED displays and drone dances.

The travel, heating and consumer choices people make influence pollution in their local area. This report sets out evidence of the state of local airborne pollution including the last calendar year, 2019.

The city council's nitrogen dioxide ($NO_2$) Air Quality Management Area found[5] is being reviewed with summary steps set out below. The City Council participates in the Sussex Air Quality Partnership, liaises with Highways England, the South Downs National Park Authority the Environment Agency and Public Health England as required. The 2019 Sussex Air Pollution Monitoring Report sets out the regional picture and complements this report on local air quality.

## Actions to Improve Air Quality

The City Council shall agree any required amendments to its Air Quality Management Areas (AQMAs)[6] and Smoke Control Areas[7]. To meet the statutory timetable[8], within twelve months of amending an AQMA a new Air Quality Action Plan (AQAP) will be delivered to Defra. Within this schedule the council may choose to fast track the AQAP allowing time for public and stakeholder consultation and committee consideration. The AQAP will need to be aligned with Local Transport Plan 5, The Climate Assembly and any committee approved plans to limit vehicles in some areas.

Progress has been made with the transport choices people make; active travel and high bus patronage. Further reductions in vehicle trips and vehicle emissions are required in combination with no emission heating and sustainable food choices.

Progress has been made with reducing bus emission with new procurements and exhaust retrofits. Further funds are required to build on progress made to date and bring forward the requirements of the Ultralow Emissions Zone (currently late-2024). Food distribution, internet deliveries and servicing have an increased emissions share and there is potential to use technology to reduce the number of vehicle trips.

## Conclusions and Priorities

Main considerations for Environment Transport and Sustainability committee:

**Step One:** Legal designation of new Air Quality Management Area(s),

**Step Two:** Agree a new Air Quality Action Plan that aims to deliver $NO_2$ compliance throughout the AQMA(s) designated. Considering the last five years of evidence (including 2019) the local review of air quality has identified the following categories relating to the 2013 AQMA:

**Transport corridors within the 2013 AQMAs with continued exceedance of $NO_2$ Air Quality Assessment Level (AQAL):**

- **A270:** East of York Grove to the junction with Coombe Road i.e. New England Road-Lewes Road and Hollingdean Road
- **A2010:** Clock Tower to Terminus Road
- **B2066:** ULEZ that is North Street-Castle Square and Western Road
- **A23:** South of the Railway Viaduct to Edward Street
- **A259:** Wellington Road and the **A293** to Southern Cross approach (Portslade Haulage route)
- **B2123:** Rottingdean High Street

**Smaller hotspots within existing AQMAs where exceedance continues 2019:**

- The Drove hill climb
- Preston Road north of Preston Road
- Frederick Street North Laine

**Compliant but not low enough for a sufficient duration to revoke the AQMA:**

- North end of Sackville Road joining the Old Shoreham Road Junction
- Seven Dials
- Main Railway Station frontage including Surrey Street
- Eastern Road close the Royal County Hospital
- Upper slope of Trafalgar Road North Laine

**Confirmed compliance at residential receptors <10% of the $NO_2$ standard for three years or <20% of the $NO_2$ standard for at least one year. Based on monitoring and mapping appropriate to revoke the AQMA:**

- West Street south of Cranbourne Street
- Boundary Road, Portslade
- St James Street
- Old Steine
- A259 Kingsway
- Palmeira Square, Church Road Hove to Sackville Road

**Assessment outside extant AQMAs that suggests lower levels that do not justify new or expanded AQMA designations:**

- Woodingdean next to the junction of Warren Road and Falmer Road (B2123)
- Rottingdean Marine Drive (A259) to the east of the current designation
- King George VI Avenue
- The A27 (T)
- Defra's automatic station BH0, Preston Park
- University of Brighton automatic station, Falmer
- Archive monitoring Stammer, Foredown, Hangleton, Hove and North of Brighton City Centre

The reported situation for local air quality considers the long term situation including the last full calendar year. It does not include the period of travel restrictions during Covid-19 lockdown that came into effect March 2020. In many cases during 2019 the highest levels of $NO_2$ and $PM_{2.5}$ were recorded in the first three or four months of the calendar year. Early indications suggest this also happened 2020. Our schedule is to present a new Air Quality Management area to committee late 2020.

Broadly 2019 showed improved levels of pollution compared with the previous three years (2016 to 2018). Defra states that trends should be based on at least five years

of verified monitoring data. Long term trends are included in this report for the transport corridors listed above. The comprehensive table of recent results includes new sites that do not have long term trends. Some monitors are situated at background which provides an indication of regional or suburban air quality remote from road traffic. The majority of monitors are positioned to resolve the area that exceeds the $NO_2$ standards set out in the national air quality strategy. A number of major developments await planning permission.

## Local Engagement and How to get Involved

Everyone can do a little bit to help improve local air quality by making sustainable; travel, heating and food choices:

**Transport Choice hierarchy:**

- Reduce daily travel such as daily commuting; work from home, stay in touch with colleagues and family by using video apps (this can help free up road space helping the free flow of trade and timely deliveries)
- Active travel: including scooters and roller boots. The City Council working with partners is actively increasing space for walking and cycling
- Electric mobility with e-bikes or small e-cars
- Choose vehicles with a smaller footprint and lower axle weight (for a smaller rate of tyre, brake and road wear)
- Larger vehicles for carrying bulk cargo or more than two passengers to reduce the number of vehicle trips

**Heating Choice hierarchy for Developers and Households**

- Passive house design for temperature control and ventilation
- Emissions free options: solar, ground air and marine source heat pumps
- Wired Electric Developments exchanging energy and internet between buildings and vehicles
- Ultralow NOx gas boilers using renewable bio-methane

- Ultralow NOx gas boilers using natural gas, less sustainable than the renewable and emission free options further up the hierarchy
- Low NOx boilers or Combined Heat and Power Plants with emissions to air, to be discouraged in and around the city centre AQMA where residential dwellings are at different heights
- Certified stoves that can legally burn wood in a Smoke Control Area are not emissions free, but will produce less smoke compared to an open fireplace

**Sustainable Food Choices to minimise impacts on air quality**

- Grow and prepare your own food
- Minimise waste and compost organics
- Local produce reduces food mileage
- Cook in batches, enjoy left overs, stock take before buying –helps to reduce waste and the number of vehicle trips
- Local deliveries with bicycle, cargo bikes or electric mobility
- Minimise the need for distribution in and around the AQMA
- Less meat consumption across the population can reduce emissions of ammonia, methane, the need for diesel distribution and lorry chillers.

**References to cleaner air community**

Brighton Bike Share[9]

“Bricycles” Brighton and Hove Cycling Campaign[10]

Breathe in Brighton[11]

British Lung Foundation Air Pollution[12]

British Heart Foundation Air Pollution[13]

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# 1 Local Air Quality Management

This report provides an overview of air quality in Brighton & Hove City Council including 2019. 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 Brighton & Hove City Council to improve air quality and progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

# 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 standard. In the past the local authority consolidated zones to avoid having ten or more AQMAs, with continued further assessment the areas can be resolved. 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 compliance with the objectives.

A summary of AQMAs declared by Brighton & Hove City Council in 2013 can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online[14].

We propose to review AQMA-1 this year (see monitoring section).

AQMA-2 in Rottingdean will remain.

## 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 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | At Declaration | | Now | | Name | Date of Publication | Link |
| AQMA 1 Brighton & Hove and Portslade | August 2013 (A23 and Lewes Road first declared 2004) | NO2 Annual Mean | Brighton Hove & South Portslade | Extensive area inland from the sea front following several major roads inland for some distance (for review) | NO | 83 | µg/m3 | 58(1) | µg/m$^3$ | Brighton & Hove City Council Air Quality Action Plan for review | 2015 | Updated by Table 2.2. |
| AQMA 1 Brighton & Hove and Portslade | August 2013 | NO2 1 Hour Mean | Brighton Hove & South Portslade | Extensive area inland from the sea front following several major roads inland for some distance (for review) | NO | 114 | µg/m3 | 77(2) | µg/m$^3$ | Brighton & Hove City Council Air Quality Action Plan for review | 2015 | Updated by Table 2.2. |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AMQA 2 Brighton & Hove Rottingdean High Street | August 2013 | NO2 Annual Mean | Rottingdean High Street | Rottingdean High St from the A259 junction to the T-junction with Vicarage Lane | YES | 46 | µg/m3 | 36(3) | µg/m$^3$ | Rottingdean HS | 2019 | Updated by Table 2.2. |

☒ **Brighton & Hove City Council confirm the information on UK-Air regarding their AQMA(s) is up to date any changes before the end of the calendar year shall be amended following Defra's ASR schedule of end June 2020.**

During 2019 the maximum recorded values for each declared AQMA refer to:

(1) AQMA1 Annual Mean diffusion tube E07-2019, Lewes Road Facade = 58 µg/m$^3$
(2) AQMA1 Hourly Mean applies on the Pavement and at Kerbside, diffusion tube C11-12 = 77 µg/m$^3$ and C18-2019 62 µg/m$^3$
(3) AQMA 2 Annual Mean diffusion tube E29-2018 Rottingdean Facade Low Height = 36 µg/m$^3$

## 2.2 Progress and Impact of Measures to address Air Quality in Brighton & Hove City Council

Defra's appraisal of last year's ASR (dated July 2019) set out the number of monitoring sites the council had reported in 2019. It was noted where monitoring was inside and outside the extant AQMA. Defra's comments acknowledged widespread exceedance of $NO_2$ standards across Brighton & Hove, Portslade and Rottingdean. The appraisal noted that the last Air Quality Action Plan was 2015 and review would be required from 2020 in addition to the summaries set out in table 2.2. Defra recognises the challenges the City Council has in funding additional measures to achieve compliance and deliver majority or complete revocation of AQMA-1. The appraisal asks for completion of tables consistent with the template provided. Better information on the quality assurance and quality control of the monitoring data including annualisation calculations is requested. In this report, two monitoring locations have between three and nine months of data, for audit purposes the annualisation calculations are provided in Appendix C using Defra's new tool created for that purpose.

Brighton & Hove City Council has taken forward a number of long term measures in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on measures will be presented in the forthcoming Air Quality Action Plan. Completed measures include the successful bike scheme and the phases out of euro-III and euro-IV buses operating via the low emission zone.

Brighton & Hove City Council expects new local air quality measures to be considered by committee within one year of any agreed amendment to the extant AQMAs.

The principal challenges and barriers to implementation that Brighton & Hove City Council anticipates facing are a lack of funds for $NO_2$ plans. Air quality compliance will need to be aligned with the Climate Assembly and the council's desire for fewer vehicles in some places. It is essential that actions to work towards carbon neutrality by 2030 are not detrimental for local air quality and vice versa. For example encouragement of wood burning as a carbon neutral source of renewable energy is not beneficial for urban air quality. A policy that favours lower MPG diesel vehicles is

unlikely to be beneficial for $NO_2$ in towns. On average the well to wheel carbon footprint of diesel and petrol cars is similar. In most cases diesel cars and vans emit much higher rates oxides of nitrogen (compared with petrol). Diesel vehicles are the main contributors to $NO_2$ in UK towns and cities.

The city has been successful in wining funds from the Office of Low Emission Vehicles (OLEV) for electromotive slow and rapid chargers on street. Between 2012 and 2016 the council had a successful streak of winning funding with the Department for Transport's (DfT) Green Bus Fund and the Clean Vehicle Transport Fund. Since that time Brighton and Hove City Council has not been on Defra's short list of Local Authorities requiring $NO_2$ plans. This has been a factor in the judgement of bids to Defra's Air Quality Fund. Between 2017 and 2020 there has been a lack of funding to progress measures to support the local air quality action plans focused on the AQMAs.

Since Covid-19 travel restriction DfT emergency funds have enabled new temporary spaces for cycling and walking for example along the Old Shoreham Road and Madeira Drive.

Additional actions not yet funded will be required to achieve compliance to enable revocation of the AQMAs. If local service fleets are not electric, heavy vehicles will need to meet the euro-VI emission standard as soon as possible.

## Table 2.2 – Progress on Measures to Improve Air Quality

The Air Quality Action Plan is due for review following amended Air Quality Management areas scheduled for late 2020. The table below gives ideas and examples of measures delivered and ongoing. The new action plan will need to work towards compliance with air quality standards and guidelines and align with the Local Transport Plan 5, the Climate Assembly and any plans to limit vehicles in some areas.

| Measure No. | Measure | EU Category | EU Classification | Date Measure Introduced | Organisations involved | Funding Source | Key Performance Indicator | Reduction in Pollutant / Emission from Measure | Progress to Date | Estimated / Actual Completion Date | Comments / Barriers to implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Ultralow Bus Emission Zone | Promoting Low Emission Transport | Ultralow Bus Emission Zone | 2018 | Unitary Authority Highways liaising with bus operators & Traffic Regulation Condition (TRC) | SCRIF and operator procuremen t | NOx emission reduction on vehicles plying trade through the AQMA | Meet the Euro-VI Emissions Standard through the ULEZ | NO2 reduced from 63 (2012) to 46 µg/m3 (2019) | Requires exhaust fit grants to accelerate compliance as soon as possible | Bus Operators asked for time to comply with Euro-VI. |
| 2 | Exhaust Fit of Diesel Buses | Promoting Low Emission Transport | Low Emission Zone (LEZ) | 2013 | BHCC and DfT Clean Bus Transport Fund Brighton & Hove Bus Company | DfT's Clean Bus Transport Fund | NOx emission reduction on very frequent vehicles plying trade through the AQMA | 72% NOx reduction on Euro-IV. >90% reduction NOx reduction from Euro-III | 73 frequent double deckers fitted | Phase II Completed Jan-2017 | DfT no longer has the retrofit grant. Brighton & Hove not on Defra's list of NO2 plans |
| 3 | Procureme nt of Euro-VI buses with micro-engines Breathe Brighton | Promoting Low Emission Transport | Company Vehicle Procurement - Prioritising uptake of low emission vehicles | From 2014 | Brighton & Hove Bus Company Big Lemon | New batch of vehicles every year | Hybrid Euro-VI vehicles | >90% Reduction in NOx if replacing euro-V | Complete | Phase I & II and III delivered | After Covid-19 less private sector funds for fleet improvement |
| 5 | Exhaust Fit of Taxi Minibus and Saloons | Promoting Low Emission Transport | Taxi emission incentives | 2017 | BHCC DfT Clean Vehicle Transport Fund Citycabs and Radiocabs Low Carbon Vehicle Partnership | DfT's Clean Vehicle Transport Fund | NOx emission reduction on high mileage vehicles plying trade through the AQMA and on school services | 77% reduction in NOx emissions on minibus | Fitted 16/22 taxis (minibuses and saloons with SCRT). Track test at Millbrook. | Early 2018 | Access to working vehicles to carry our SCRT design and fits is challenging. Operators not used to Ad-blue dosing |
| 6 | Taxi Licencing to work towards lower emission vehicles | Promoting Low Emission Transport | Taxi Licensing conditions | 2014 | BHCC Taxi Licence Forum Seeking Joint Venture Across the Sussex Air Group | Requireme nt of taxi licencing | Work towards licencing of no emissions taxis across more than one local authority | Aim for 100% reduction in NOx emissions | Meetings to Discuss | Ongoing | Business as usual delays improvement |
| 7 | Anti-Idling Signs at Taxi Ranks and Bumper Stickers | Traffic Management | Anti-idling enforcement | 2014 | EP and Taxi Licence Forum | 2015-2017 | Stickers and Anti-Idling Signs in the AQMA | Raise awareness on Idling emission and pollution | Delivered | Delivered | Good example of working between EP and Taxi Licencing |
| 8 | Light Phasing at Junctions to reduce travel time in the AQMA | Traffic Management | UTC, Congestion management, traffic reduction | To be Discussed | BHCC and Traffic Controller | Potential Developer Contributio ns | Explore where queuing duration can be reduced in the AQMA | Residential Façade Monitors on junction approaches | Initial Meeting Proposed | 2018 | AQ input required on planned Highway projects |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | Rapid Vehicle Charging SE Network | Promoting Low Emission Transport | Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | 2015 and 2019 | Sussex Air Group Parking | Office of Low Emission Vehicles | High use of local electromotive rapid chargers | Electric Vehicles have zero NOx emission | Implemented | Implemented | Required OLEV funding to start network |
| 10 | Alternative Vehicle Infrastructure | Promoting Low Emission Transport | Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | 2017 | At new Developments on Street and at fuel stations | Office of Low Emission Vehicles & Developer Contributions | Availability of electric chargers and hydrogen | Zero Emission at Tailpipe | Good start with fast and rapid chargers | Common Place for 2020s | Awareness and fund raising |
| 11 | Air Quality Assessment of New Transport Schemes | Transport Planning and Infrastructure | Public transport improvements-interchanges stations and services | 2015 | Air Quality input to Highways | Part of Project Work | Improve traffic flow, reduce queuing and launch, where possible reduce emission enclosure, increase distance between exhaust and residential façade | To be monitored | Advice on Valley Gardens Scheme | Phase I 2018 | Other considerations of Highways Schemes |
| 12 | Assess Environmental Capacity of Key Transport Corridors Through the AQMA | Traffic Management | Public transport improvements-interchanges stations and services | 2015 | Air Quality Advice to Highways and Bus Company | Air Quality Officer Duty | Advise on emission standards & traffic limits in order to achieve NO2 compliance | How much change is required to meet 35 µg/m3 NO2 at relevant receptors | Requires specific updates to the advanced dispersion model ADMS Urban | 2020 | Time and Resource |
| 13 | Actively seek renewable solutions and grid balancing, avoid combustion plant in or above the AQMA | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | 2015 | Air Quality Advice Planning Policy, Development Control | Air Quality Officer Duty | Electricity grid balancing seek alternatives to combustion | 100% reduction in NOx emissions or avoidance of new emissions | Discussion with Planning Policy and Major Development Areas | Ongoing | Business as Usual unlikely to deliver future Improvement |
| 14 | Any new combustion plant in or close to the AQMA condition as ultra-low NOx | Promoting Low Emission Plant | Emission control equipment for small and medium sized stationary combustion sources / replacement of combustion | 2015 | Air Quality Advice Planning Policy, Development Control | Developer Responsibility | No permissions for low or moderate NOx plant in the AQMA | 90% reduction in NOx emissions or avoidance of new emissions | Conditions on Planning Applications | Constant | Standard Practice tends to be applied regardless of long standing AQMA designation |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | sources | | | | | | | | |
| 15 | Flue determinations above roof apex required for emissions to air to insure effective dispersion | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | 2015 | Air Quality Advice Planning Policy, Development Control | Developer Responsibility | Flue or Chimney heights agreed with planning or refused | Dispersion of emissions above the building canopy needs to be effective | Included in the Planning Process | Constant | Effective Chimney Heights can be refused due to visual or architectural considerations |
| 16 | Ensure Development does not have negative impact on local air quality and Public exposure especially around the AQMA | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | 2007 | Air Quality Advice Planning Policy, Development Control | Developer Responsibility | Best Practice | Developments that are beneficial for emissions and air quality compared with previous land use | Development of urban sites that have a lower pollution footprint than the previous land use: light industrial, petrol station, car park | Ongoing | Traffic contribution on some new developments |
| 17 | Any domestic fuel burning to use smokeless and seasoned fuels with Defra exempt stoves and appliances | Public Information | Via the Internet | 2015 | Air Quality, Regulatory Services, Defra | Household Responsibility | Advice given when complaints and enquiries received | Effective for reducing particulate and carbon monoxide exposure in the home | Improved Awareness | Constant | Lack of awareness of the AQMA and health sensitivities |
| 18 | Households are trade to avoid fires for refuse disposal especially around the SCA and AQMA | Public Information | Via the Internet | 2015 | Regulatory Services | Household Responsibility | Web Information response to complaints | Appropriate waste disposal for City Centre. Waste less. | Improved Awareness | Constant | Lack of awareness of the AQMA and health sensitivities |
| 19 | Planning Policy to Support Ultralow Emission Vehicles | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | 2016 | Air Quality advice to planning | Mitigation Option in planning policy | Update to planning policy | Potential to reduce and mitigate emissions | Discussion with Planning | Constant | NPPF needs to require developer contributions in support of air quality action plans |
| 20 | Lessons learned from events, road closures | Traffic Management | UTC, Congestion management, traffic reduction | To be Considered | Living Streets, Sustrans School Travel. | Access and Defra Air Quality Grant | Track days in the year when AQMA road links are closed. Could increase as City Centre is used for | Short term improvements | Monitored Background levels at roadside when road is closed for an event | Ongoing | Festivals and Car Free days - Awareness re applications and events. In the interests of economy |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | event space. | | | | and air quality. |
| 21 | Review of the LEZ ULEZ | Promoting Low Emission Transport | Low Emission Zone (LEZ) | bus ULEZ 2108 next steps 2020 | Air Quality and Highways to report to committee | To be determined | Progress current LEZ | >90% improvement in NOx compared to Euro-V | Preliminary Discussions with Highways and Bus Company | 2018 | Cost of accelerating the uptake of ULEVs and market availability of specific products - light, efficient and no emission |
| 22 | Lower Emission form Constructio n | Freight and Delivery Management | Freight Consolidation Centre | 2015 | Planning and Highways | 2017 | Frequent and Long Term HGV working on construction project meet Euro-VI emissions standard | >90% improvement in NOx compared to Euro-V | Agreed on Construction Environment Management Plan for Royal County Hospital | 2017/18 | Viable on long term builds initially. Will become more commonplace. |
| 23 | Progress Emission Standard for Haulage serving the Harbour | Freight and Delivery Management | Other | 2016 | EP and Harbours Authority grants considered | Fleet Replaceme nt schedule | Emissions Standard of Haulage through Portslade | Increased Percentage of Euro-VI | Initial Dialogue | 2020 | Engagement from the Harbours Authority - fleet can be national as well as local |
| 24 | Consider Impact of Pedestrian Crossing Points on Traffic Flow | Traffic Management | Other | 2015 | Air Quality Officer Traffic Control, Transport Schemes Road Safety and Planning | Part of Project Work | Better flow of traffic, preference to avoid crossings that stop traffic | Avoidance of NOx emissions on vehicle launch from a standing start | Discussed at technical workshops road & safety consultations | 2018 | |
| 25 | Consider Impact that Central Parking Spaces have on the AQMA | Traffic Management | UTC, Congestion management, traffic reduction | EP and Parking | Air Quality Officer and Parking | Air Quality Officer Duty | Review Parking Location | Potential to avoid traffic emissions through the AQMA (not including the sea front) | Consider as question of an updated dispersion model | 2020 | |
| 26 | Freight Consolidati on Centres "last mile services" to avoid heavy freight movements in the AQMA | Freight and Delivery Management | Freight Consolidation Centre | 2015 | Local Transport Plan and Construction Environment Management Plans | Developer Responsibil ity | Reduction in heavy Haulage movements in the AQMA | Substantial reduction in NOx from freight | LTP short list | 2018 | Requires funding to progress |
| 27 | Minimise uphill emissions | Promoting Low Emission Transport | Public Vehicle Procurement - Prioritising uptake of low emission vehicles | EP and Bus Company | Air Quality Officer | Hybrid Buses | Bus Flow and Emission Rates | >90% reduction in uphill bus emissions | New buses and retrofitted buses have SCRT, use auto engine shut off and plan for better bus flow | 2018 | Stopping and hill starts are adverse for uphill emissions |
| 28 | Taxi Rank Site Choice - to have regard to ambient air quality | Promoting Travel Alternatives | Other | 2015 | Hackney Carriage and EP | Conditionin g of Licencing | New taxi ranks at locations unlikely to cause complaint or contribute to NO2 at residential | Taxis to provide transport alternative | Discussion with Planning | 2018 | Limited space for taxi ranks away from dwellings |
| 29 | Coach Strategy | Freight and Delivery | Delivery and Service plans | 2015 | Highways | Done | Visiting Tourist Coaches held on | Avoidance of emission in AQMA | Effective holding area fewer | Done | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Management | | | | | Madeira Drive | engine off when waiting | complaints | | |
| 30 | Alter position of traffic emissions in Rottingdean High Street | Transport Planning and Infrastructure | Other | 2019 | Highways, Air Quality and Local Parish Council | Transport Project | Achieve 35 µg/m3 at all monitors in the Rottingdean AQMA | Avoid traffic emissions in the narrowest section of the High Street | Discussion re chicanes and keep clear zones Funding approved | 2018 | £40,000 funding is limited |
| 31 | Avoid introducing new residential dwellings to an existing area of pollution exceedance | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | 2007 | EP and Planning Policy, Development Control | Part of Planning Process | Number of Dwellings in Area of Exceedance | Exposure Avoidance | Planning Conditions and Mitigation | Constant | Pressure to Build including at Roadside |
| 32 | If new combustion plant could impact on the AQMA either avoid or condition as ultra-low NOx | Promoting Low Emission Plant | Emission control equipment for small and medium sized stationary combustion sources / replacement of combustion sources | 2015 | EP and Planning Policy, Development Control | Ongoing | No permissions for low or moderate NOx plant in the AQMA | 70% reduction in NOx emissions or avoidance of new emissions | Conditions on Planning Applications | Constant | Standard Practice tends to be applied regardless of position relative to the AQMA |
| 33 | Active Travel Programme | Promoting Travel Alternatives | Intensive active travel campaign & infrastructure | Transport and Health Joint Working Group | Transport and Health Joint Working Group | Private Sponsor | Increase active travel to work and education | More healthy workers | Funding Secured | 2017 | Officer Allocated |
| 34 | Bike Share | Transport Planning and Infrastructure | Public cycle hire scheme | 2017 | Transport Travel | 2017 | Increase in cycling | Uptake Successful | Scheme Starting Summer 2017 | 2017 | Sponsor agreement took time |
| 35 | Educational Anti-Idling Campaign | Traffic Management | Anti-idling enforcement | 2017 | EP, Enforcement Officers, Sussex Air Group, Sustrans | 2019 | Educational Engagement | Travel Awareness and Anti-Idling Sings at NO2 hotspots with queuing traffic | Cllr Support | 2018 | Seeking Financial Support from various sources |
| 36 | Routing of HGV assigned to construction of Royal Sussex County Hospital | Freight and Delivery Management | Route Management Plans/ Strategic routing strategy for HGV's | 2016 | Highways Planning, EP and Lang O'Rourke | 2017-2023 | Construction Environment Management Plan (CEMP) Traffic to minimise movements in AQMA | Reduce congestion and emissions impacts in and around the AQMA | Starts with Construction Project | 2017/2018 | Waiting at Consolidation Centre |

## 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 $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases. Whilst the tiny airborne particles are not defined by composition or toxicology, when inhaled they can be drawn deep into the respiratory tract, crossing over into the blood stream. $PM_{2.5}$ is reffered to in section 6.49 of the Joint Strategic Needs Assessment (JSNA)[15] and is linked with the Public Health Outcomes Framework (PHOF)[16]. PHOF sets out a vison for public health "to protect the nations health and improve the health of the poorest fastest".

Here are some examples of Brighton & Hove City Council measures to address microscopic particulates measured as $PM_{2.5}$: [1]

- The phasing out of pre euro-V emission buses substantially reduces particulate emissions from the frequent bus fleet. Council, taxi and haulage fleets have also made progress in phasing our pre euro-5 vehicles.
- Construction Environment Management Plans have progressively more stringent emissions standards for Non-Road Mobile Machinery including bulldozers, dumpers and cranes.
- Static diesel generators are discouraged for works and events, especially those that are likely to last more than a few days.
- Members have requested that officers consider declaration of a citywide Smoke Control Area (SCA). Defra's update to the Environment Bill, modernisation of the Clean Air Act and any associated guidance will be relevant.
- In the interests of communal health the council issued public statements discouraging indoor and outdoor domestic burning during the Covid-19 pandemic[17].

[1]

- To complement Defra's automatic urban rural monitoring network (site at Preston Park) the City Council monitors for $PM_{2.5}$ adjacent to Lewes Road and North Street. The monitoring sites are either roadside or background and do not relate to Smoke Control area status. The tally of days with higher levels of $PM_{2.5}$ each year is given in Table A6.

It is not advisable to make comparison between different monitrong methods for example automatic monitorng statons; BH6 and BH10 compared with BH0. Since late 2019 new particulate monitorng methods are bieng trailed, co-located with the automatic moitorng stations and installed in High Street settings.

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

## 3.1 Summary of Monitoring Undertaken

The chapter includes explanations and presentation of monitoring carried out for pollution in the particulate and gas phase for automatic analysers and passive diffusion tubes monitoring methods.

### 3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with set standards for the protection of human health.

Brighton & Hove City Council undertook automatic (continuous) monitoring at two sites during 2019. Table A.1 in Appendix A shows the details of the sites. Local authorities do not have to report annually on the following pollutants; 1-3 butadiene, benzene, carbon monoxide and lead, as local circumstances indicate trace levels are not a problem. National monitoring results for a wide range of pollutants including; oxide of nitrogen fine particles and ground level ozone are available via the automatic urban rural network[18].

Maps showing the location of the monitoring sites in Brighton & Hove are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

### 3.1.2 Non-Automatic Monitoring Sites

Brighton & Hove City Council undertook non- automatic (passive) monitoring of $NO_2$ with 56 samples through the year during 2019, Table A.2 in Appendix A shows the details of the sites. One site had triplicate co-located tubes with the automatic analyser BH10 on North Street. Monitoring locations E23 and E29 in Rottingdean High Street are at the same grid reference, at different heights; 2.4 and one metre to indicate concentration differences at ground floor level. For 2019, 53 separate passive monitoring locations are mapped out for $NO_2$.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes,

including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

For easier understanding monitors are grouped along Transport Corridors within the AQMAs. For example monitors along one Transport Corridor correlate, confirming ribbons of pollution due to traffic flow for a kilometre or more.

## 3.2 Individual Pollutants

Across the city $NO_2$ shows an improvement in 2019 compared with previous years. Some areas show faster improvement and further work is required to determine cause and effect. The A2010 that includes Queens Road, Surrey Street and Terminus Road has seen a marked improvement in nitrogen dioxide since the removal of the taxi pick up and drop off outside the station. An improvement next to Eastern Road would suggest the peak of construction activity at the Royal Sussex Hospital occurred prior to 2019. Lower flows of traffic along the Lewes Road may relate to lane closure associated with the Preston Barracks construction. There were fewer road works on the A270 south of the Vogue Gyratory compared to 2017/18.

The air quality monitoring results presented in this section are, where relevant, adjusted for bias[19], “annualisation” (where the data capture falls below 75% and more than 25% that is between three and nine months of the year), and distance correction[20]. Further details on adjustments are provided in Appendix C. Defra advises that tends will be based on at least five years of data. New monitors that have valid results for recent years are not included in the trend graphs.

### 3.2.1 Nitrogen Dioxide ($NO_2$)

Table A.3 in Appendix A compares the ratified and adjusted monitored $NO_2$ annual mean concentrations for the past 5 years with the air quality objective of 40µg/$m^3$ as an annual mean. For recent years there are a number of monitors outside of the AQMA notably at background and at roadside sites in Rottingdean and Woodingdean. All exceedances recorded during 2019 (and the previous five years) occur within the 2013 Air Quality Management Area. The concentration data presented in Table A.3 represents pollutant concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required.

All monitors up to and including 2019 have been ratified with the appropriate verification procedure set out in Defra's Local Air Quality Management Technical Guidance 2016 (LAQM TG16)[21]. Further details for audit are included in Appendix C for data quality assurance and control. All monitors (if not at background) are positioned at relevant kerbside or roadside public exposure (sometimes referred to as relevant receptors) and do not require an estimate of concentration to the nearest receptor as set out in LAQM TG16. Monitoring and modelling carried out in recent years is sufficient to revoke some parts of the 2013 AQMA that are summarised at the beginning of this report. Further detailed maps of the proposed AQMA will be submitted to committee following submission of this report to Defra. Continued exceedances (up to 2020) are recorded along the following transport corridors or hotspots:

- **A270:** East of York Grove to the junction with Coombe Road i.e. New England Road-Lewes Road and Hollingdean Road
- **A2010:** Clock Tower to Terminus Road
- **B2066:** ULEZ that is North Street-Castle Square and Western Road
- **A23:** South of the Railway Viaduct to Pavilions Parade near Edward Street
- **A259:** Wellington Road and **A293** to Southern Cross (Portslade Haulage route)
- **B2123:** Rottingdean High Street

- The Drove hill climb
- Preston Road north of Preston Road
- Frederick Street North Laine

Two locations; Upper North Street and London Road between Cheapside and Oxford Street have annual means greater than 60µg/$m^3$, which indicates possible exceedance of the 1-hour mean (if emissions sources do not change during the calendar year).

The model map included in section D predicts exceedance of the $NO_2$ limit value in the carriageway of trunk roads i.e. A23 north of Patcham and the A27 Brighton & Hove Ring Road. The trunk roads through Brighton & Hove do not have dwelling places at the kerb where people spend time equivalent to the averaging time of the air quality standard. To avoid the need for a future AQMA it is advisable that planning permission is not granted for new residential use within fifteen metres of the trunk roads within Brighton and Hove City Council's area. Improvements to air

quality require emissions reductions, most especially amongst the highest population density and within confined spaces.

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.4 in Appendix A compares the ratified continuous monitored $NO_2$ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m$^3$, not to be exceeded more than 18 times per year.

### 3.2.2 Particulate Matter ($PM_{10}$)

Over many years the Council monitored the relatively course $PM_{10}$ ((particulate matter with an aerodynamic diameter of 10 µm or less) and found concentrations to be well within the annual mean concentrations air quality standard of 40µg/m$^3$. $PM_{10}$ has heath impacts on the upper respiratory tract. In recent years there has been extra health interest in much smaller particles that can penetrate deeper into the body when inhaled. $PM_{10}$ is more likely to be produced form abrasive processes such as brake and tyre wear resuspension of soiled surfaces, excavation and demolition or poorly controlled fires such as those releasing fly ash. Ordinarily airborne $PM_{10}$ tends not to travel as far in the atmosphere (compared with $PM_{2.5}$), for this reason local sources tend to be a higher proportion of the total compared with $PM_{2.5}$.

Prior to 2016 monitoring indicated local levels of $PM_{10}$ at 27µg/m$^3$. Previous results are presented in past Progress Reports. The Technical Guidance: LAQM TG16, the Air Quality Index[22] and WHO[23] offer potential conversion factors for $PM_{10}$ to $PM_{2.5}$ or vice versa. With regard to these references the factor to scale from $PM_{2.5}$ to $PM_{10}$ varies between 1.42 and 2. The ratio varies between continetal, coastal, arid and wet environments. Taking the highest factor a $PM_{2,5}$ level of 10 whould suggest $PM_{10}$ concentration of 20 µg/m$^3$.

$PM_{2,5}$ recorded at ten and $PM_{10}$ at twenty are are equivalent to the World Health Organsation guidelines that are more stingent than English standards set out in the devolved air quality strategy.

In 2019 Eastbourne reported $PM_{2,5}$ at 10 µg/m$^3$ and $PM_{10}$ at 16 or17. µg/m$^3$ suggesting a ratio of 1.65 for a smaller urban area with less constuction activity.

In 2019 $PM_{10}$ was recorded at 19 in Chichester, 22 in Hastings, and 24 in Shoreham suggesting aggreagate and shipping influences on courser particles around the docks.

Using innovative techniques local studies can examine the influence of sea salt and other varaibles on the reationship between $PM_{2.5}$ and $PM_{10.}$

Based on the number of days in the year that exceeded the WHO 24-hour guideline for $PM_{2,5}$ or the moderate days recorded by the air quality index it is unlikely the $PM_{10}$ air quality objective of 50µg/$m^3$ (35 days allowed) was exceeded in Brighton & Hove during 2015 for more than two days.

### 3.2.3 Particulate Matter ($PM_{2.5}$) and Meteorology

Table A.7 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years.

Compared with larger conurbation such as London and Paris or heavy industrial zones like Scunthorpe and Part Tablot Brighton & Hove has low levels of $PM_{2.5.}$ Monitorng over many years provided evidence that Hove was compliant with stingent standards for Poly Aromatic Hyrdrocarons as presented in past Progress Reports.

South-westerly winds from the Atlantic often bring fresh air to the city. That said for monnths at a time high pressure weather can block the influence of the Ocean. In the spring and summer the City can experience prolonged periods without rain . . Compared with other UK cities Brighton & Hove shares air and particles with the continent relatively often.

Established high pressures or gentle easterly wind flows are conditions that can form moderate and high particulate days across the region. Furhter urbanisation, increased population density and climate change can influence the number of days with particles and fine dusts in the future.

Monitored $PM_{2.5}$ suggest lower concetrations compared with 2015, with a slower improvements are roadside since that time. Further work is required to determine how $PM_{2.5}$ varies across the city and to distinguish between local and distant sources.

### 3.2.4 Sulphur Dioxide ($SO_2$)

The council's area is compliant with all standards for Sulphur Dioxide. Sulphates have become less common as airborne particles since the introduction of ultralow sulphur diesel in 2007 and the common use of diesel particulate traps with the euro-V emission standard from 2009. Brighton & Hove does not have the local source of $SO_2$ such as ferries at Dover or the crude oil refinery at Fawley. $SO_2$ is monitored by the automatic rural network at Lullington Heath in the South Downs National Park. The site complies with hourly, daily and fifteen minute standards for $SO_2$. In 2019 the annual mean was 1.1µg/$m^3$. Local $SO_2$ monitoring is available from the University of Brighton[24], results online suggest quarterly concentrations are often close to 3 or 4 µg/$m^3$. The monitor's location is the same as for particles and oxides of nitrogen and is mapped in section D.

# Appendix A: Monitoring Results

## Table A.1 One - Details of Automatic Monitoring Sites

| Site ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? | Monitoring Technique | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Inlet Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| BH6 | Lewes Road South of Vogue Gyratory | Roadside | 532082 | 105694 | NO,$NO_2$, $PM_{2.5}$ | YES | API Chemiluminescent, TEOM for $PM_{2.5}$ | 1 | 1.5 | 3 |
| BH10 | North Street near Ship Street | Roadside | 530995 | 104271 | NO, $NO_2$, $PM_{2.5}$ | YES | API Chemiluminescent TEOM for $PM_{2.5}$ | 0 | 6 | 3.5 |
| BH0 | Preston Park AURN | Urban Background | 530526 | 106218 | NO, $NO_2$, $PM_{2.5}$, $O_3$ | NO | API Chemiluminescent, Partisol for $PM_{2.5}$ until 2019 | N/A | 200 | 5 |
| LL1 | Lullington Health AURN | Rural | 553800 | 101600 | $NO_2$, $O_3$, $PM_{10}$, $SO_2$ | NO | API Chemiluminescent | N/A | N/A | 3 |
| UB | University of Brighton | Suburban | 534647 | 108503 | $NO_2$, $PM_1$,$PM_{2.5}$, $PM_{10}$, $SO_2$, nitrous acid, formaldehyde | NO | Differential Optical Absorption Spectroscopy | N/A | ~150 | 3.5 |

**Notes:**

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable

(3) Lullington Heath is outside of Brighton & Hove City Council, but is representative station of air quality in the more remote parts of the South Downs National Park.

## Table A.2 One – Details of Non-Automatic Monitoring Sites Corridor A2010 Queens Road Terminus Road Seven Dials

| Site ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube collocated with a Continuous Analyser? | Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| C12-10 | Queens Road north of Clock | Roadside | 530900 | 104451 | $NO_2$ | YES AQMA1 | 0 | 4.2 | NO | 3 |
| C12-13 | Main Station Taxi Rank | Roadside | 531014 | 104874 | $NO_2$ | YES AQMA1 | 0 | 2.8 | NO | 2.5 |
| C28-10 | Frederick Place | Roadside | 531032 | 104843 | $NO_2$ | YES AQMA1 | 0 | 2.8 | NO | 2.4 |
| W01-05 | Queens Road | Roadside | 530969 | 104785 | $NO_2$ | YES AQMA1 | 0 | 4.5 | NO | 2.8 |
| W02-14 | Surrey Street | Roadside | 530963 | 104837 | $NO_2$ | YES AQMA1 | 0 | 5.3 | NO | 2.6 |
| W03-06 | Terminus Road Hill | Roadside | 530963 | 104994 | $NO_2$ | YES AQMA1 | 0 | 3.5 | NO | 3 |
| W08-06 | Buckingham Place-Seven Dials | Roadside | 530586 | 105104 | $NO_2$ | YES AQMA1 | 0 | 8.4 | NO | 3.5 |

**Notes 1 & 3 same for each sub table:**

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

(3) Site ID refers to sample changes areas C = Central, W = West, E = East. The suffix refers to the year that monitoring started at that location.

4) Monitor C28-10 is in North Laine that adjoins the A2010 corridor, Queens Road and Brighton Railway Station frontage

## Table A.3 Two – Details of Non-Automatic Monitoring Sites Corridor B2066 Ultralow Emission Zone

| Site ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube collocated with a Continuous Analyser? | Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| C04-10 | Lower North Street-Castle Square | Roadside | 531228 | 104088 | $NO_2$ | YES AQMA1 | 0 | 5.7 | NO | 2.7 |
| C10-12 | North Street BH10 Triplicate | Roadside | 530995 | 104271 | $NO_2$ | YES AQMA1 | 0 | 6.1 | YES | 2.5 |
| C11-07 | North Street Central | Roadside | 530947 | 104284 | $NO_2$ | YES AQMA1 | 0 | 6.5 | NO | 3 |
| C11-12 | North Street Clock Tower | Kerbside | 530890 | 104302 | $NO_2$ | YES AQMA1 | 0 | 2.7 | NO | 2.5 |
| C13-14 | Lower Dyke Road-Churchill Square | Roadside | 530770 | 104363 | $NO_2$ | YES AQMA1 | 0 | 3.3 | NO | 3.1 |
| W10-06 | Western Road | Roadside | 530302 | 104415 | $NO_2$ | YES AQMA1 | 0 | 4.5 | NO | 3.2 |

## Table A.4 Three – Details of Non-Automatic Monitoring Sites Corridor A23 London Road Valley Gardens and Adjoining

| Site ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube collocated with a Continuous Analyser? | Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| C02-09 | Old Steine | Roadside | 531361 | 104006 | $NO_2$ | YES AQMA1 | 0 | 5.2 | NO | 2.7 |
| C03-96 | St James Street | Roadside | 531439 | 104045 | $NO_2$ | YES AQMA1 | 0 | 3.8 | NO | 2.7 |
| C05-12 | Pavilion Gardens BG | Urban Background | 531230 | 104260 | $NO_2$ | NO | >100 | 102 | NO | 2.8 |
| C09-05 | Marlborough Place | Roadside | 531302 | 104392 | $NO_2$ | YES AQMA1 | 0 | 4.3 | NO | 3.2 |
| C15-05 | Gloucester Place re-instated 2014 | Roadside | 531401 | 104669 | $NO_2$ | YES AQMA1 | 0 | 8.4 | NO | 3 |
| C16-13 | York Place | Roadside | 531400 | 104844 | $NO_2$ | YES AQMA1 | 0 | 4.9 | NO | 2.8 |
| C17-12 | Cheapside nr Pelham Street | Roadside | 531364 | 104982 | $NO_2$ | YES AQMA1 | 0 | 3.4 | NO | 2.4 |
| C18-10 | London Road near Oxford St | Kerbside | 531376 | 105012 | $NO_2$ | YES AQMA1 | 0 | 3 | NO | 2.8 |
| C18-19 | Oxford Street-London Road | Roadside | 531369 | 105042 | $NO_2$ | YES AQMA1 | 0 | 3.3 | NO | 2.5 |
| C19-09 | Oxford Street-Ditchling Road | Roadside | 531472 | 105161 | $NO_2$ | YES AQMA1 | 0 | 3.4 | NO | 2.6 |
| C20-05 | Ditchling Road-Viaduct Terrace | Roadside | 531496 | 105315 | $NO_2$ | YES AQMA1 | 0 | 4.7 | NO | 2.2 |
| C21-05 | Viaduct Terrace | Roadside | 531451 | 105356 | $NO_2$ | YES AQMA1 | 0 | 3.6 | NO | 3.1 |
| C23-05 | London Road-Preston Circus | Roadside | 531189 | 105375 | $NO_2$ | YES AQMA1 | 0 | 5.4 | NO | 3 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| E01-10 | Preston Road-Preston Circus | Roadside | 531101 | 105498 | $NO_2$ | YES AQMA1 | 0 | 4.5 | NO | 2.8 |
| E02-09 | Preston Road-Preston Drove | Roadside | 530233 | 106515 | $NO_2$ | YES AQMA1 | 0 | 4 | NO | 2.7 |
| E02-12 | The Drove | Roadside | 530063 | 106368 | $NO_2$ | YES AQMA1 | 0 | 2.6 | NO | 2.5 |
| E06-05 | Beaconsfield nr Road-Preston Circus | Roadside | 531102 | 105615 | $NO_2$ | YES AQMA1 | 0 | 4 | NO | 2.6 |
| E16-96 | Grand Parade Middle | Roadside | 531465 | 104629 | $NO_2$ | YES AQMA1 | 0 | 4.4 | NO | 2.6 |
| E16-15 | Grand Parade Middle West Façade | Roadside | 531426 | 104514 | $NO_2$ | YES AQMA1 | 0 | 5 | NO | 3.2 |
| E17-03 | Grand Parade University Building | Roadside | 531394 | 104338 | $NO_2$ | YES AQMA1 | 0 | 3.2 | NO | 2.8 |
| E18-07 | Eastern Road near Hospital | Roadside | 532759 | 103810 | $NO_2$ | YES AQMA1 | 0 | 3.5 | NO | 2.9 |

**Table A.5 Four – Details of Non-Automatic Monitoring Sites Corridor A270 New England Road and Lewes Road**

| Site ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube collocated with a Continuous Analyser? | Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| C24-05 | New England Road-Preston Circus | Roadside | 531101 | 105443 | $NO_2$ | YES AQMA1 | 0 | 3.6 | NO | 3 |
| C25-10 | New England Road-Argyle Road | Roadside | 530985 | 105419 | NO2 | YES AQMA1 | 0 | 3.5 | NO | 2.7 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| W04-06 | Chatham Place-New England Road | Roadside | 530808 | 105340 | $NO_2$ | YES AQMA1 | 0 | 3.4 | NO | 3 |
| W05-06 | Old Shoreham Road- Hill | Roadside | 530778 | 105362 | $NO_2$ | YES AQMA1 | 0 | 3.6 | NO | 3.2 |
| E07-19 | Lewes Road Elm Grove Junction | Roadside | 531838 | 105349 | $NO_2$ | YES AQMA1 | 0 | 2.9 | NO | 2.8 |
| E08-96 | Lewes Road Inverness Road | Roadside | 532090 | 105752 | $NO_2$ | YES AQMA1 | 0 | 4.4 | NO | 2.6 |
| E10-15 | Vogue Gyratory Island | Roadside | 532126 | 105838 | $NO_2$ | YES AQMA1 | 0 | 3 | NO | 2.7 |
| E12-02 | Hollingdean Road | Roadside | 532021 | 105946 | $NO_2$ | YES AQMA1 | 0 | 4.9 | NO | 2.7 |
| E14-19 | Lewes Road nr Coombe Road | Roadside | 532377 | 106314 | $NO_2$ | YES AQMA1 | 0 | 3.4 | NO | 2.9 |
| E15-12 | Lewes Road Coombe Terrace | Roadside | 532300 | 106159 | $NO_2$ | YES AQMA1 | 0 | 3.7 | NO | 2.6 |

**Table A.6 Five – Details of Non-Automatic Monitoring Sites Corridor A259-A293 Portslade and A2023 Hove**

| Site ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube collocated with a Continuous Analyser? | Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| W16-09 | Wellington Road-Basin Road | Roadside | 526248 | 104857 | $NO_2$ | YES AQMA1 | 0 | 7 | NO | 2.7 |
| W17-09 | Wellington Road-Church Road | Roadside | 525931 | 104961 | $NO_2$ | YES AQMA1 | 0 | 3 | NO | 2.7 |
| W18-10 | Vale Park, Portslade BG | Urban Background | 525970 | 105230 | $NO_2$ | NO | ~50 | 97 | NO | 2.8 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| W19-09 | Trafalgar Road, Portslade facade | Roadside | 525658 | 105695 | $NO_2$ | YES AQMA1 | 0 | 3.9 | NO | 2.8 |
| W21-10 | Sackville Road-Old Shoreham Rd | Roadside | 528389 | 105930 | $NO_2$ | YES AQMA1 | 0 | 3.4 | NO | 2.8 |

**Table A.7 Six – Details of Non-Automatic Monitoring Sites Corridor B2123 Rottingdean Woodingdean and A259 Rottingdean**

| Site ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube collocated with a Continuous Analyser? | Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| E22-09 | High Street Rottingdean East Side | Roadside | 536970 | 102280 | $NO_2$ | YES AQMA2 | 0 | 0.2 | NO | 2.6 |
| E23-10 | High Street Rottingdean West Side | Kerbside | 536966 | 102273 | $NO_2$ | YES AQMA2 | 0 | 0.2 | NO | 2.6 |
| E25-18 | Marine Drive, Rottingdean | Roadside | 537014 | 102238 | $NO_2$ | NO | 0 | 2.7 | NO | 2.8 |
| E27-18 | Woodingdean Falmer Road | Roadside | 535634 | 105890 | $NO_2$ | NO | 0 | 3 | NO | 2.4 |
| E29-18 | Under E23 | Kerbside | 536966 | 102273 | $NO_2$ | YES AQMA2 | 0 | 0.1 | NO | 1 |

## Table A.8 One – Annual Mean $NO_2$ Monitoring Results Automatic Analysers

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $NO_2$ Annual Mean Concentration ($\mu g/m^3$) (3) (4) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| BH6 | 532082 | 105694 | Roadside | Automatic | 97.5 | 97.5 | 39 | **46.2** | **51.1** | 37.8 | 26.9 |
| BH10 | 530995 | 104271 | Roadside | Automatic | 99.5 | 99.5 | **52.5** | **47.1** | **50.3** | **49.5** | **45.7** |
| BH0 | 530526 | 106218 | Urban Background | Automatic | 96.6 | 96.6 | 14.8 | 16.5 | 16.9 | 16.3 | 15.2 |
| LL1 | 553800 | 101600 | Rural | Automatic | 97.5 | 97.5 | 7 | 7.8 | 8.2 | 7.6 | 7.2 |

☒ **Diffusion tube data has been bias corrected**

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

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance adjustment**

**Notes:**

Exceedances of the $NO_2$ annual mean objective of 40µg/$m^3$ are shown in **bold**.

$NO_2$ annual means exceeding 60µg/$m^3$, indicating a potential exceedance of the $NO_2$ 1-hour mean objective are shown in **bold and underlined.**

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(5) The fixings of C18-19 and E08-19 below were required to be moved a short distance should not be compared directly with previous years sampled at a different position (with a different Site ID)

## Table A.9 Two– Annual Mean $NO_2$ Monitoring Results Corridor A2010 Queens Road Terminus Road Seven Dials

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $NO_2$ Annual Mean Concentration ($\mu g/m^3$) (3) (4) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| C12-13 | 531014 | 104874 | Roadside | Diffusion Tube | 100 | 100 | 39.2 | **44.7** | **43.1** | **40.5** | 32.0 |
| C13-14 | 530770 | 104363 | Roadside | Diffusion Tube | 100 | 100 | **41.7** | **41.5** | **41.6** | **40.5** | 36.6 |
| C28-10 | 531032 | 104843 | Roadside | Diffusion Tube | 100 | 100 | **44.6** | **43.1** | **46** | **42.9** | 37.7 |
| W01-05 | 530969 | 104785 | Roadside | Diffusion Tube | 92 | 92 | **41.3** | **45.7** | **43.1** | **41.1** | 34.0 |
| W02-14 | 530963 | 104837 | Roadside | Diffusion Tube | 100 | 100 | 34.5 | 37.9 | 37.9 | 39.2 | 34.0 |
| W03-06 | 530963 | 104994 | Roadside | Diffusion Tube | 100 | 100 | **42.2** | **40.4** | **42.6** | **40.4** | 37.5 |

## Table A.10 – Three Annual Mean $NO_2$ Monitoring Results Corridor B2066 Ultralow Emission Zone

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $NO_2$ Annual Mean Concentration ($\mu g/m^3$) (3) (4) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| C04-10 | 531228 | 104088 | Roadside | Diffusion Tube | 100 | 100 | **50.1** | **49** | **43.8** | **48.2** | **43.5** |
| C10-12 | 530995 | 104271 | Roadside | Diffusion Tube | 100 | 100 | **52.5** | **48.3** | **45.2** | **45.5** | **41.3** |
| C11-07 | 530947 | 104284 | Roadside | Diffusion Tube | 100 | 100 | **59.8** | **60.3** | **57.3** | **54.6** | **48.5** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C11-12 | 530890 | 104302 | Kerbside | Diffusion Tube | 92 | 92 | **91.9** | **100.3** | | **90.8** | **77.4** |
| W10-06 | 530302 | 104415 | Roadside | Diffusion Tube | 92 | 92 | **42.9** | **41.9** | **40.9** | **41.4** | 38.0 |

**Table A.11 –Four Annual Mean $NO_2$ Monitoring Results Corridor A23 London Road Valley Gardens and Adjoining**

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $NO_2$ Annual Mean Concentration (µg/m$^3$) (3) (4) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| C02-09 | 531361 | 104006 | Roadside | Diffusion Tube | 100 | 100 | - | | | 30.8 | 29.0 |
| C03-96 | 531439 | 104045 | Roadside | Diffusion Tube | 100 | 100 | 33 | 35.3 | 34.1 | 35.5 | 29.3 |
| C05-12 | 531230 | 104260 | Urban Background | Diffusion Tube | 92 | 92 | 22.5 | 26.1 | 23.6 | 22 | 21.0 |
| C09-05 | 531302 | 104392 | Roadside | Diffusion Tube | 100 | 100 | **47.3** | **48.4** | **47.4** | **47.2** | **41.1** |
| C15-05 | 531401 | 104669 | Roadside | Diffusion Tube | 100 | 100 | **43.1** | **44.3** | 35.2 | 37.1 | 38.0 |
| C16-13 | 531400 | 104844 | Roadside | Diffusion Tube | 100 | 100 | **43.8** | **45.1** | **44.6** | 38.9 | 37.7 |
| C17-12 | 531364 | 104982 | Roadside | Diffusion Tube | 100 | 100 | **61.3** | **55.4** | **44.5** | **53.9** | **49.0** |
| C18-10 | 531376 | 105012 | Kerbside | Diffusion Tube | 92 | 92 | **75.7** | **72.2** | **63.1** | **57** | **52.6** |
| C18-19(5) | 531369 | 105042 | Roadside | Diffusion Tube | 92 | 92 | **60.2** | **64.3** | **58.1** | **54.7** | **61.8** |
| C19-09 | 531472 | 105161 | Roadside | Diffusion Tube | 92 | 92 | **43.2** | **43.8** | **44.9** | 39.2 | 36.5 |
| C20-05 | 531496 | 105315 | Roadside | Diffusion Tube | 100 | 100 | 39.7 | **41.3** | **40.5** | **40.7** | 36.8 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C21-05 | 531451 | 105356 | Roadside | Diffusion Tube | 100 | 100 | **54.6** | **52.2** | **49.7** | **45.8** | **44.6** |
| C23-05 | 531189 | 105375 | Roadside | Diffusion Tube | 100 | 100 | **43.9** | **46** | **47** | **43.1** | **39.5** |
| E01-16 | 531101 | 105498 | Roadside | Diffusion Tube | 100 | 100 | | 37.8 | **39.9** | **41.9** | 34.3 |
| E02-09 | 530233 | 106515 | Roadside | Diffusion Tube | 100 | 100 | 39 | **41.3** | **40.3** | **41.1** | 34.7 |
| E02-12 | 530063 | 106368 | Roadside | Diffusion Tube | 100 | 100 | **41.5** | **42.2** | **44.4** | **44.7** | **39.8** |
| E06-05 | 531102 | 105615 | Roadside | Diffusion Tube | 100 | 100 | 35.6 | 37.6 | **39.3** | 38.1 | 32.5 |
| E16-96 | 531465 | 104629 | Roadside | Diffusion Tube | 92 | 92 | 37.5 | **42.4** | **39.4** | **41.4** | **42.3** |
| E16-15 | 531426 | 104514 | Roadside | Diffusion Tube | 92 | 92 | **42.7** | **49.3** | **51.1** | **44.8** | 38.8 |
| E17-03 | 531394 | 104338 | Roadside | Diffusion Tube | 100 | 100 | **51** | **46.1** | **44.2** | **46.8** | **43.8** |
| E18-07 | 532759 | 103810 | Roadside | Diffusion Tube | 100 | 100 | 35.4 | **43.6** | **42.2** | 35 | 28.8 |

**Table A.12 –Five Annual Mean $NO_2$ Monitoring Results Corridor A270 New England Road and Lewes Road**

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $NO_2$ Annual Mean Concentration (µg/m$^3$) (3) (4) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| C24-05 | 531101 | 105443 | Roadside | Diffusion Tube | 100 | 100 | - | **52.4** | **54.8** | **51.1** | **44.0** |
| C25-10 | 530985 | 105419 | Roadside | Diffusion Tube | 100 | 100 | **45.3** | **50.2** | **47.8** | **44.3** | **42.7** |
| W04-06 | 530809 | 105340 | Roadside | Diffusion Tube | 100 | 100 | **38.4** | **42** | **41** | **39.9** | 39.0 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W05-06 | 530778 | 105362 | Roadside | Diffusion Tube | 92 | 92 | **46.3** | **47.2** | **44.9** | **44.5** | 38.1 |
| E07-19[5] | 531838 | 105349 | Roadside | Diffusion Tube | 100 | 100 | **54.9** | **57.4** | **48** | **55.5** | **58.0** |
| E08-96 | 532090 | 105752 | Roadside | Diffusion Tube | 100 | 100 | **57.1** | **55.4** | **55.7** | **52.6** | **48.7** |
| E10-15 | 532126 | 105838 | Roadside | Diffusion Tube | **67** | **67** | **45.4** | **40.9** | **43** | **40.8** | 38.0 |
| E12-02 | 532021 | 105946 | Roadside | Diffusion Tube | 100 | 100 | **45.2** | **45.6** | **46.2** | **45.3** | **41.1** |
| E14-19 | 532377 | 106314 | Roadside | Diffusion Tube | 100 | 100 | 35.7 | 37.4 | 37.2 | 39.3 | 35.0 |
| E15-12 | 532300 | 106159 | Roadside | Diffusion Tube | 92 | 92 | 39.7 | **43.7** | 38.6 | **40.7** | 37.4 |

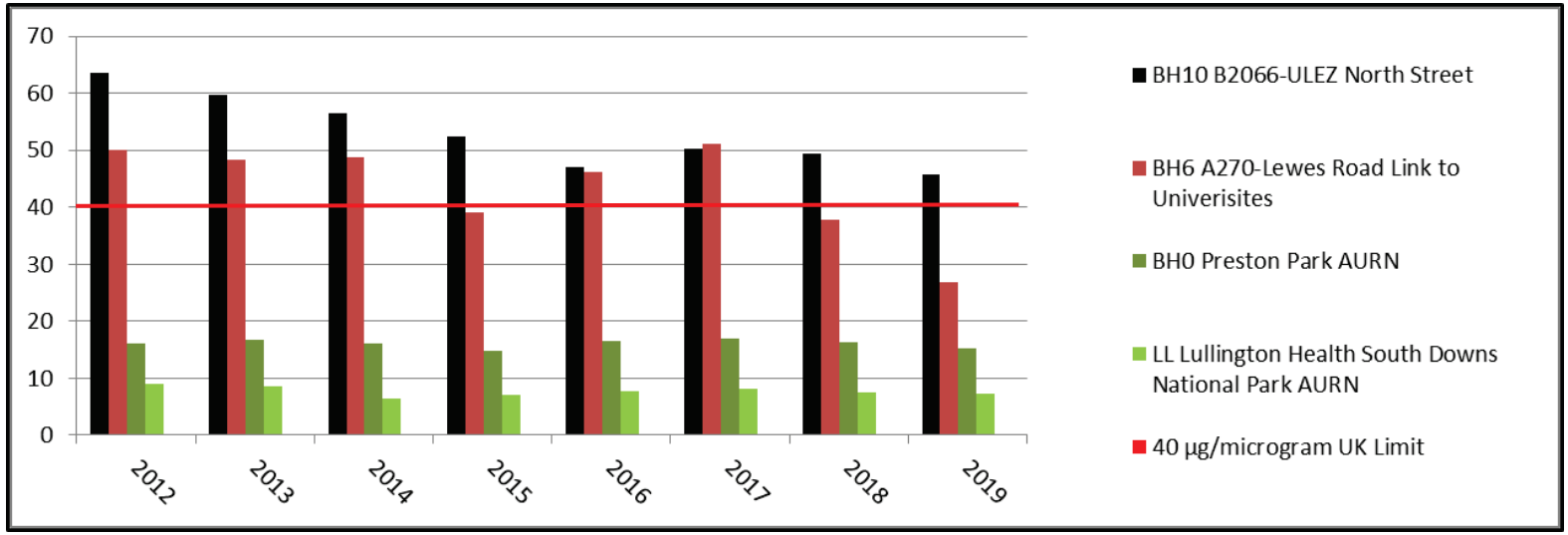
**Table A.13 –Six Annual Mean $NO_2$ Monitoring Results Corridor A259-A293 Portslade and A2023 Hove**

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) [1] | Valid Data Capture 2019 (%) [2] | $NO_2$ Annual Mean Concentration ($\mu g/m^3$) [3] [4] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| W16-09 | 526248 | 104857 | Roadside | Diffusion Tube | 100 | 100 | **40.1** | 37.8 | **40.5** | **38.4** | 33.5 |
| W17-09 | 525931 | 104961 | Roadside | Diffusion Tube | 100 | 100 | **41.5** | **42.4** | **44.4** | **42** | 39.2 |
| W18-10 | 525970 | 105230 | Urban Background | Diffusion Tube | 100 | 100 | 21 | 19.8 | 22.3 | 20.2 | 18.4 |
| W19-09 | 525658 | 105695 | Roadside | Diffusion Tube | 92 | 92 | 39.7 | **40.2** | 38.1 | **41.7** | **39.9** |
| W21-10 | 528389 | 105930 | Roadside | Diffusion Tube | 92 | 92 | 37.2 | **40.1** | 39.4 | 36.6 | 34.6 |

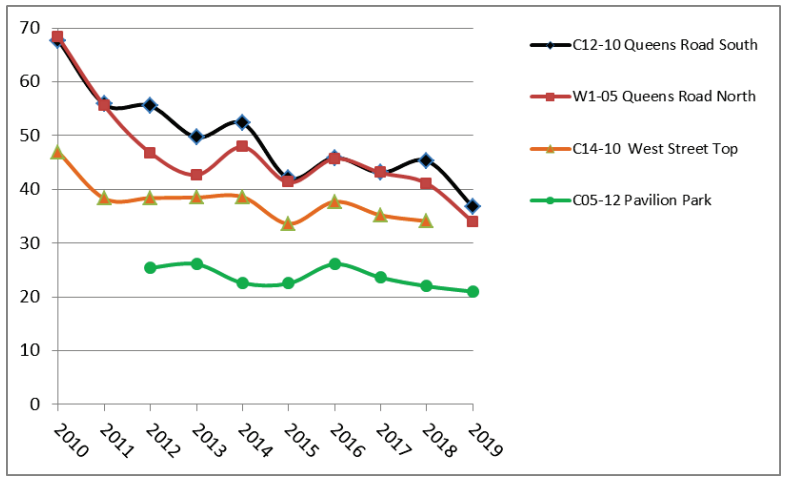
## Table A.14 –Seven Annual Mean $NO_2$ Monitoring Results Corridor B2123 Rottingdean-Woodingdean and A259 Rottingdean

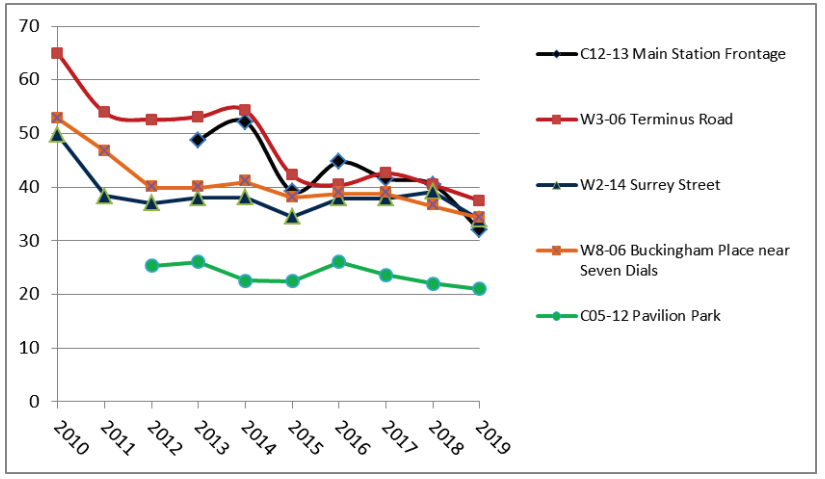
| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $NO_2$ Annual Mean Concentration ($\mu g/m^3$) (3) (4) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| E22-09 | 536970 | 102280 | Roadside | Diffusion Tube | 100 | 100 | 31.6 | 39.1 | **41.4** | 36.2 | 32.7 |
| E23-10 | 536966 | 102273 | Kerbside | Diffusion Tube | 100 | 100 | 37.7 | 38.4 | 35.3 | 37.2 | 35.2 |
| E25-18 | 537014 | 102238 | Roadside | Diffusion Tube | 92 | 92 | - | | | 35.5 | 31.7 |
| E27-18 | 535634 | 105890 | Roadside | Diffusion Tube | 100 | 100 | - | | | 23.6 | 23.1 |
| E29-18 | 536966 | 102273 | Kerbside | Diffusion Tube | **58** | **58** | - | | | 39.2 | 35.7 |

## Figure A.1 One – Trends in Annual Mean $NO_2$ Concentrations Automatic Analysers

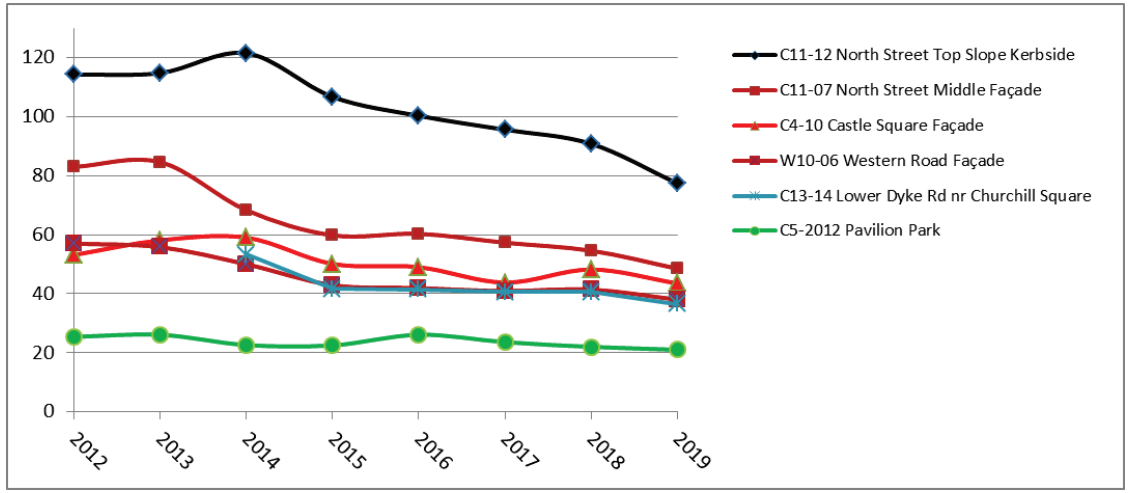



## Figure A.2 Two - Diffusion Tubes – Trends in Annual Mean A2010 Queens Road Terminus Road Seven Dials

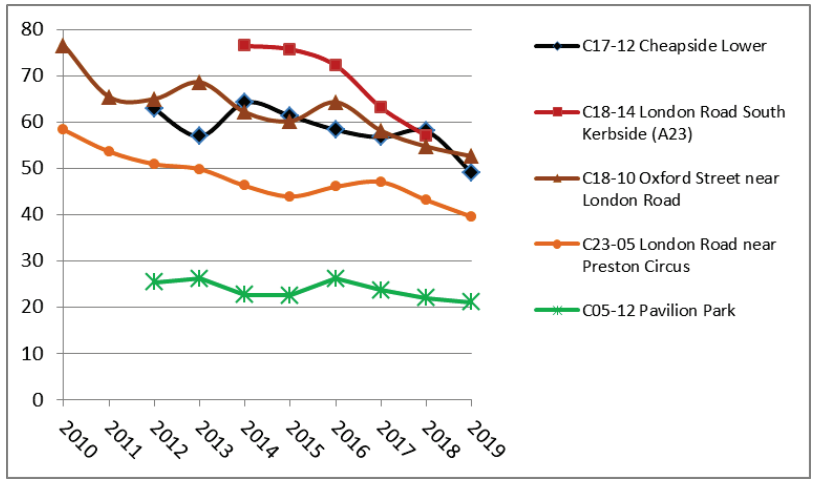


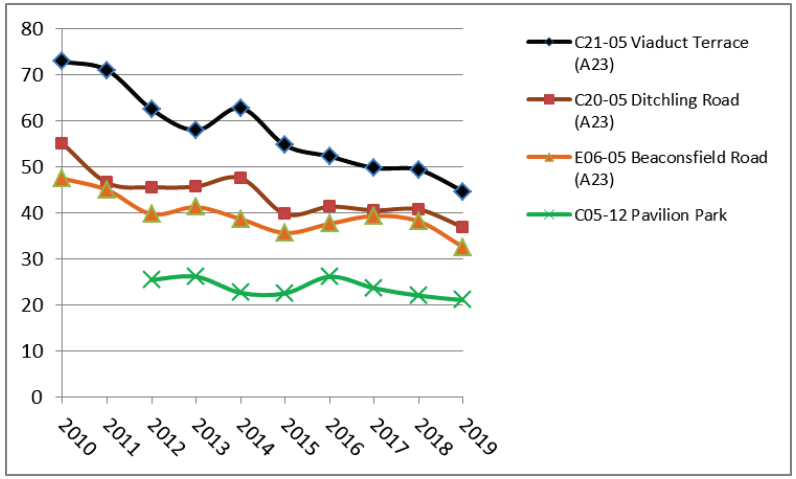



## Figure A.3 Three Trends in Annual Mean $NO_2$ Concentrations B2066 ULEZ




## Figure A.4 Four Trends in Annual Mean $NO_2$ Concentrations A23 London Road Valley Gardens



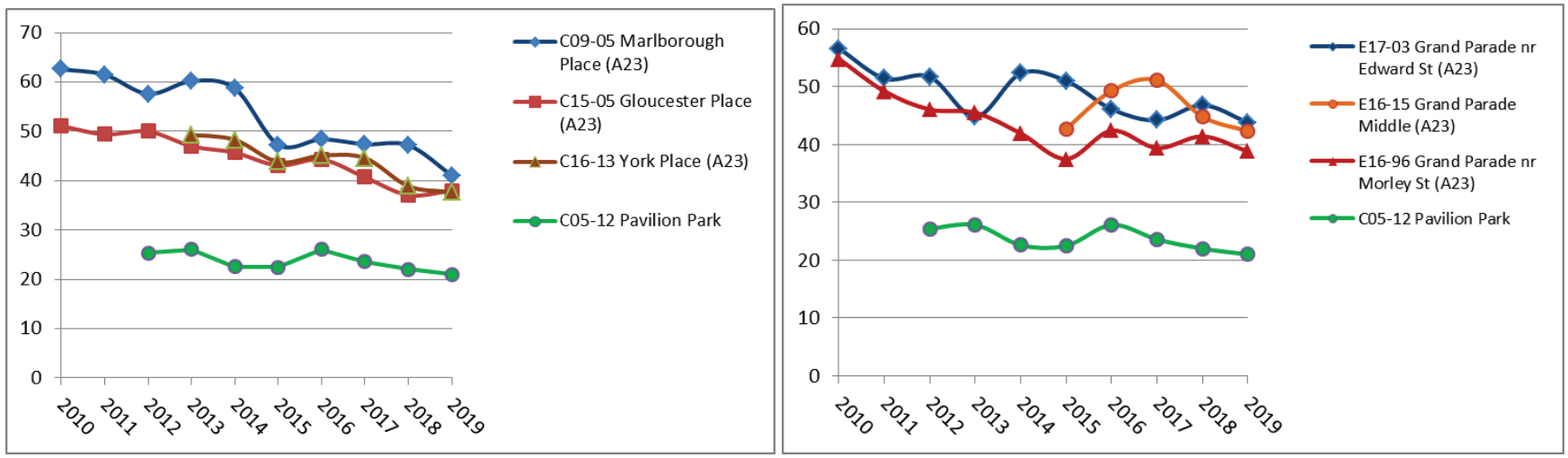
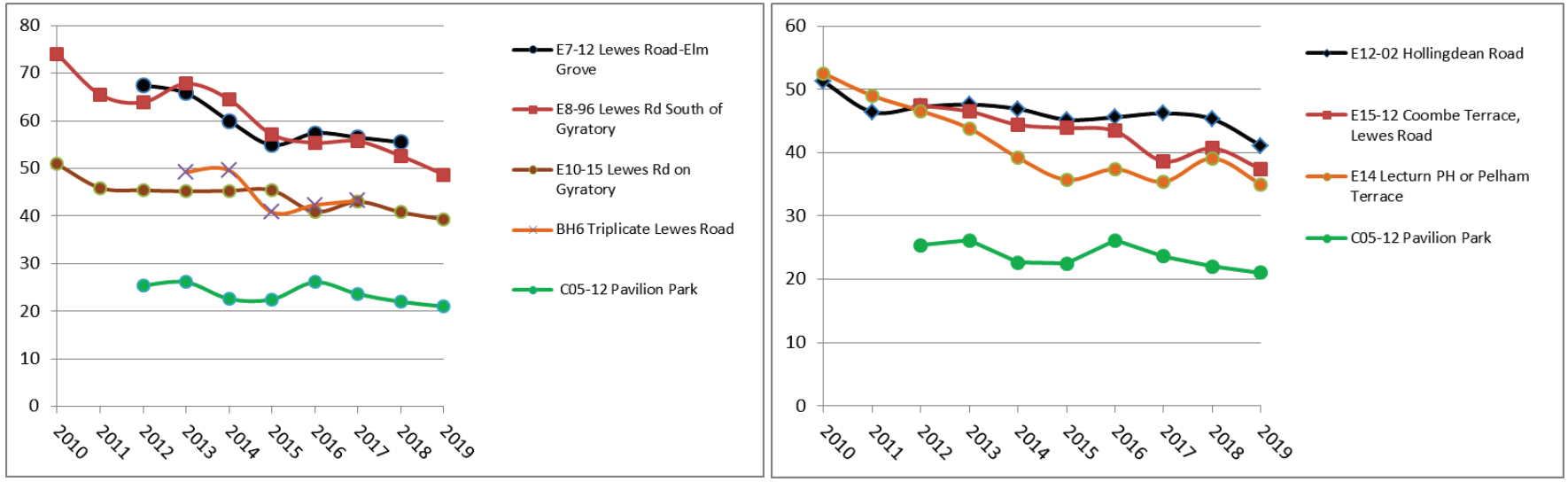
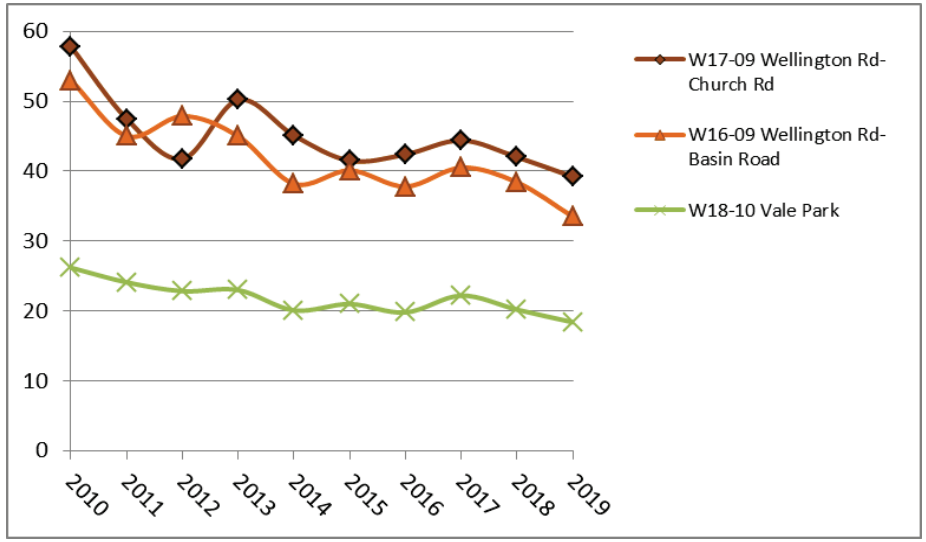
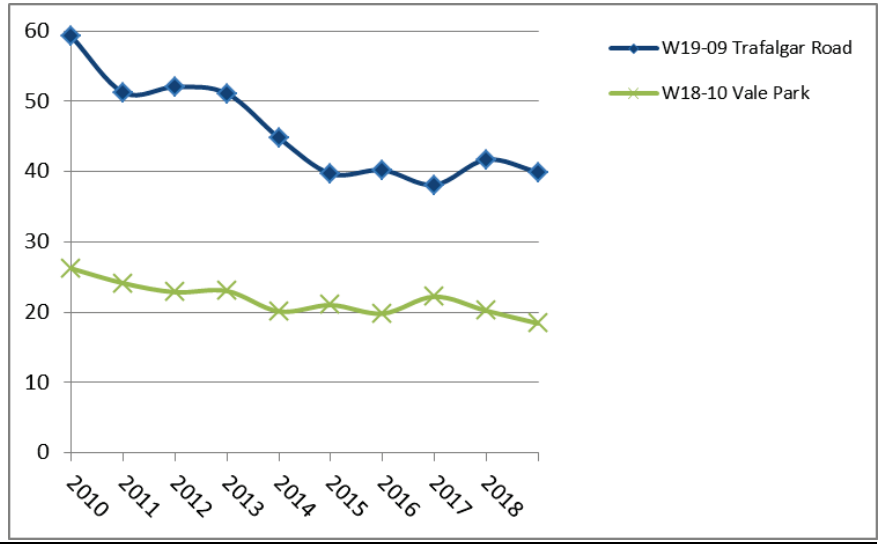


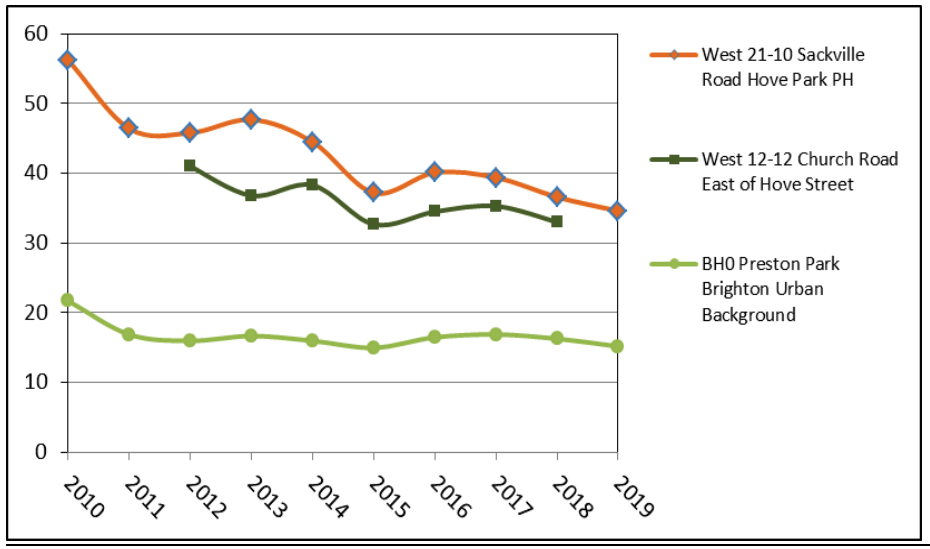

**Figure A.5 Five– Trends in Annual Mean $NO_2$ Concentrations A270 New England Road and Lewes Road**

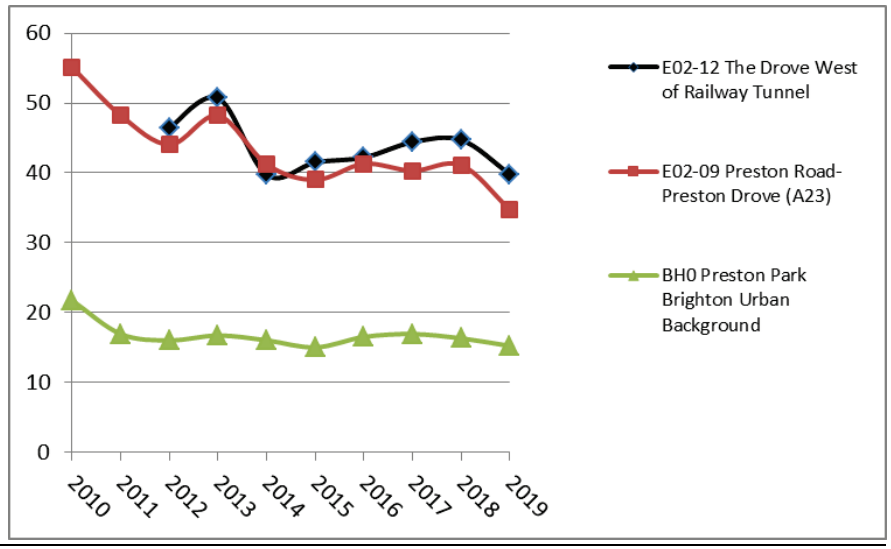


## Figure A.6 Six Trends in Annual Mean A259-A293 Portslade and A2023 Hove and The Drove (A23)

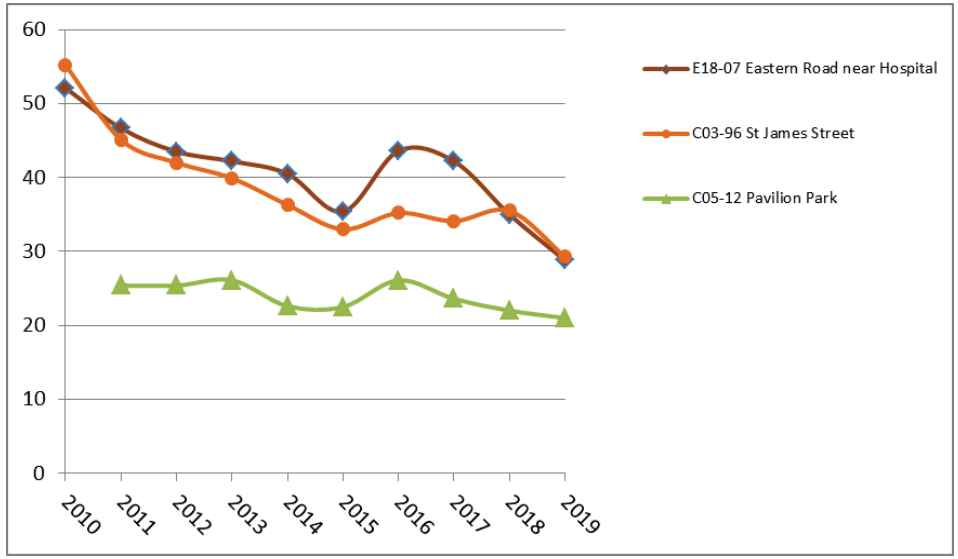


## Figure A.7 Seven -Trends in Annual Mean East- Brighton Kemp Town and B2123-A259 Rottingdean



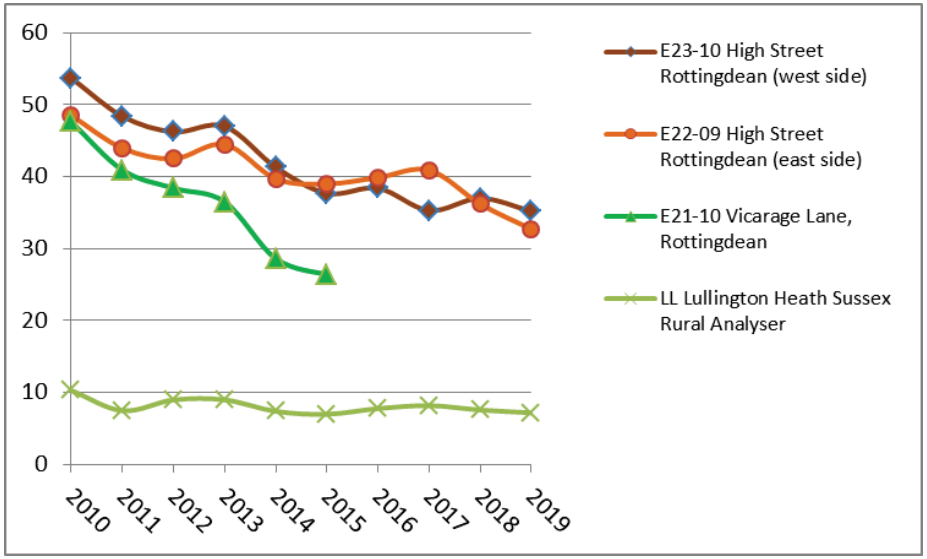



Table A.15 – 1-Hour Mean $NO_2$ Monitoring Results

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $NO_2$ 1-Hour Means > 200µg/m$^3$ (3) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| BH6 | 532082 | 105694 | Roadside | Automatic | 97.5 | 97.5 | 1 | 0 | **69** | 16 | 0 |
| BH10 | 530995 | 104271 | Roadside | Automatic | 99.5 | 99.5 | 13 | 0 | 0 | 3 | 0 |

**Notes:**

Exceedances of the $NO_2$ 1-hour mean objective (200µg/m$^3$ not to be exceeded more than 18 times/year) are shown in **bold.**

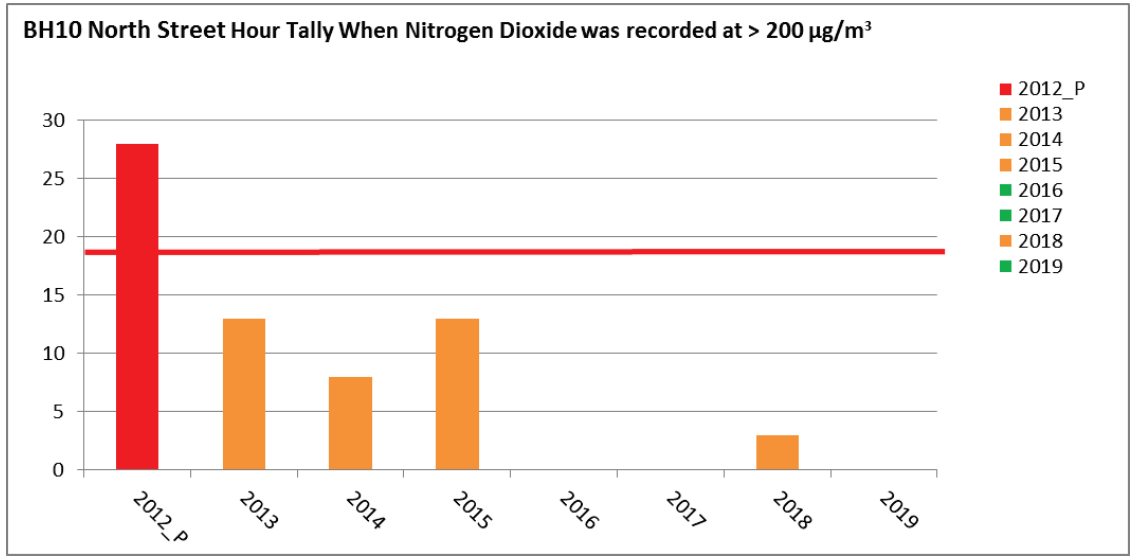
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

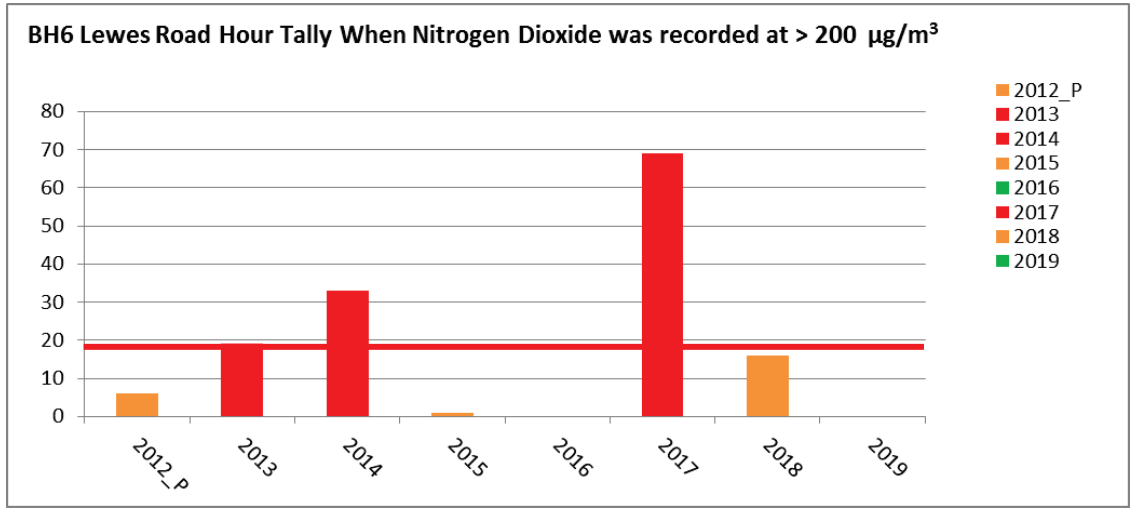
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 99.8$^{th}$ percentile of 1-hour means is provided in brackets.

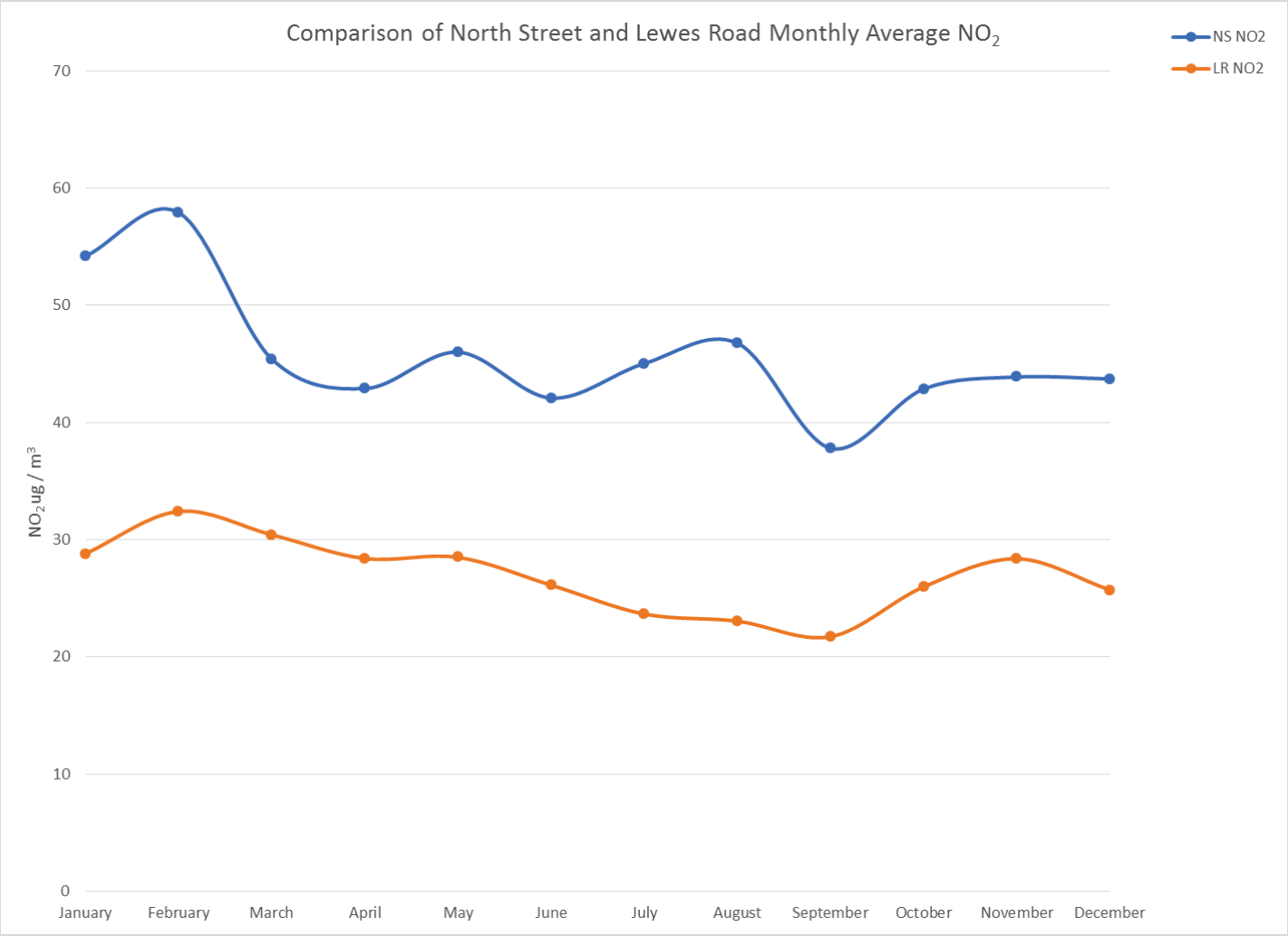
(4) Recording of the hourly exceedance for background sites is constantly zero and is not included in the reporting table

## Figure A.8 – Trends in Number of $NO_2$ 1-Hour Means > 200µg/m$^3$



## Figure A.9 Two Trends in 2019 Monthly $NO_2$ at Automatic Analysers



## Table A.5 – Annual Mean $PM_{2.5}$ Monitoring Results

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $PM_{2.5}$ Annual Mean Concentration (µg/m$^3$) (3) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| BH6 | 532082 | 105694 | Roadside | 99.5 | 99.5 | 6.8 | 7.2 | 6.4 | 5.8 | 5.7 |
| BH10 | 530995 | 104271 | Roadside | 99.3 | 99.3 | 13 | 11 | 10.6 | 10.3 | 9.8 |
| BH0 AURN | 530526 | 106218 | Urban Background | 100 | 40.5 | 9.3 | 9 | 8.9 | 8.9 | N/A |

**BH0 for 2019 was not suitable for annualisation in 2019 and is not reported. Previous years are included for reference.**

**Notes:**

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Data from Preston Park (BH0 AURN) was insufficient for 2019. Until May-2019 the site used the daily partisol method. It is not advisable to make direct comparisons and conclusions with BH6 & BH10 that use the TEOM method for monitoring particles. Defra have installed the BAM particulate monitoring method at site BH0 to monitor $PM_{2.5}$, this starting 2020.

## Table A6 One - 24-Hour Mean $PM_{2.5}$ Monitoring Results Days > WHO

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) | Valid Data Capture 2019 (%)) | $PM_{2.5}$ 24-Hour Means > WHO 25µg/m$^3$ (1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| BH6 | 532082 | 105694 | Roadside | 99.5 | 99.5 | 21 | 0 | 2 | 0 | 0 |
| BH10 | 530995 | 104271 | Roadside | 99.3 | 99.3 | 26 | 4 | 3 | 0 | 2 |

**Notes:**

(1) Tally of days in the calendar year more than the World Health Organisation Guideline (WHO)[23]

## Table A6 Two - 24-Hour Mean $PM_{2.5}$ Monitoring Results Days > Moderate

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) | Valid Data Capture 2019 (%)) | $PM_{2.5}$ 24-Hour Means Moderate > 36µg/m$^3$ (1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| BH6 | 532082 | 105694 | Roadside | 99.5 | 99.5 | 10 | 0 | 0 | 0 | 0 |
| BH10 | 530995 | 104271 | Roadside | 99.3 | 99.3 | 13 | 3 | 1 | 0 | 0 |

**Notes:**

(1) Tally of days in the calendar year more than the Moderate Level Set out in the UK Air Quality Index[22]

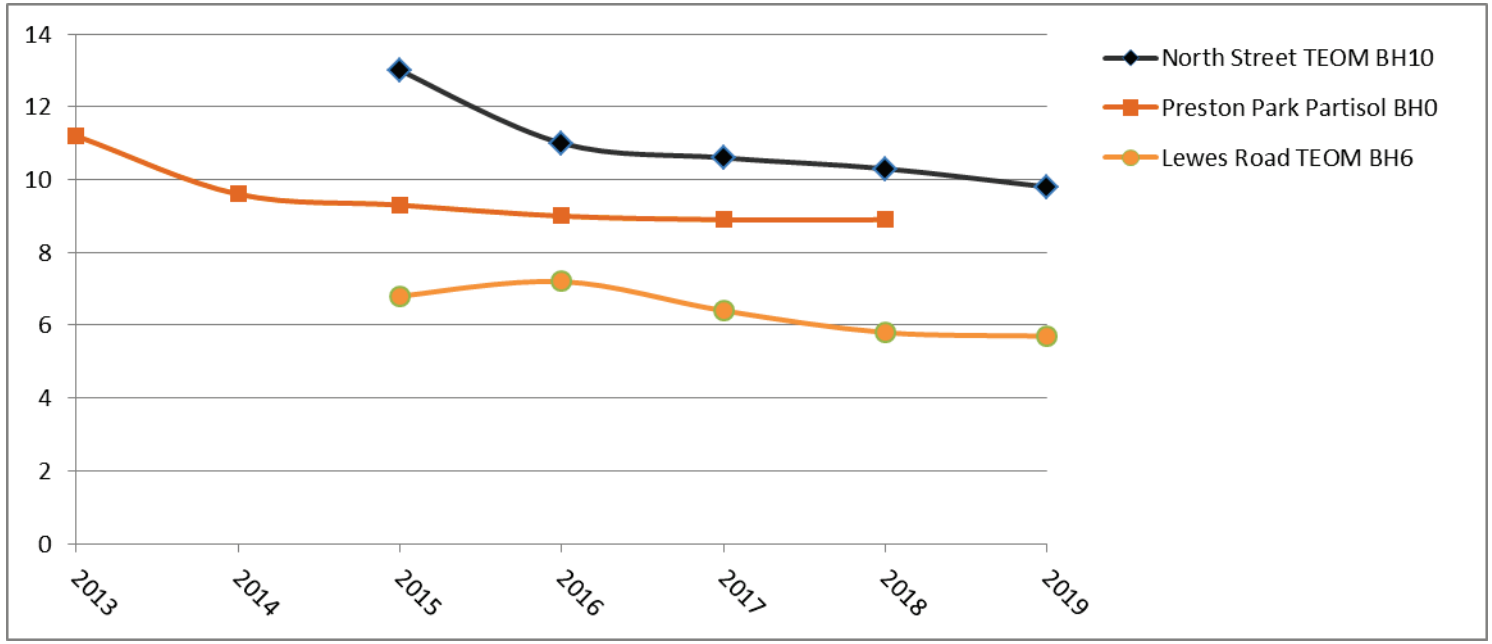
## Table A6 Three - 24-Hour Mean $PM_{2.5}$ Monitoring Results Days > High

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) | Valid Data Capture 2019 (%)) | $PM_{2.5}$ 24-Hour Means High > 54µg/m$^3$ (1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| BH6 | 532082 | 105694 | Roadside | 99.5 | 99.5 | 3 | 0 | 0 | 0 | 0 |
| BH10 | 530995 | 104271 | Roadside | 99.3 | 99.3 | 8 | 3 | 0 | 0 | 0 |

**Notes:**

(1) Tally of days in the calendar year more than the High Level Set out in the UK Air Quality Index[22]

## Figure A.10 – Trends in Annual Mean $PM_{2.5}$ Concentrations



# Appendix B: Full Monthly Diffusion Tube Results for 2019

## Table B.1One - $NO_2$ Monthly Diffusion Tube Results – 2019 Corridor A2010 Queens Road Terminus Road Seven Dials

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | $NO_2$ Mean Concentrations (µg/m$^3$) | | | | | | | | | | | | Annual Mean | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Raw Data | Bias Adjusted (0.92) and Annualised (1) | Distance Corrected to Nearest Exposure (2) |
| C12-10 | 530900 | 104451 | **45.4** | **52.9** | 35.1 | **46.5** | 25.8 | **41.5** | **50** | 37.8 | 27.6 | 37.5 | | 39.4 | 40.0 | 36.8 | 36.8 |
| C12-13 | 531014 | 104874 | 39.1 | **42.4** | 31 | **41.5** | **42.5** | 36.6 | 35.9 | 30.6 | 25.8 | 30.8 | 31 | 29.6 | 34.7 | 32.0 | 32.0 |
| C28-10 | 531032 | 104843 | **42.1** | **61.2** | **44.6** | 35.3 | **43.3** | 36.4 | **42.6** | **43.7** | 37 | 33.7 | 33 | 38.6 | 41.0 | 37.7 | 37.7 |
| W01-05 | 530969 | 104785 | **46** | **43.9** | 38.4 | 36.9 | 38.8 | 35.6 | 38 | 32.3 | 30.6 | 32.9 | 33.4 | | 37.0 | 34.0 | 34.0 |
| W02-14 | 530963 | 104837 | 36.1 | **43.5** | 37.1 | **44.8** | 38.5 | 38.4 | 39.5 | 32.2 | 33.5 | 33.6 | 35.2 | 31.4 | 37.0 | 34.0 | 34.0 |
| W03-06 | 530963 | 104994 | 38.7 | **48.7** | **44.8** | **41.3** | **40.9** | 36.9 | **49.6** | **40.6** | 37.9 | 32.4 | **42.5** | 34.5 | 40.7 | 37.5 | 37.5 |
| W08-06 | 530586 | 105104 | 29.8 | **50.8** | **42.6** | 32.9 | 32.4 | 33.4 | 38.7 | 36.8 | 31.5 | 33.8 | **41.8** | **41.7** | 37.2 | 34.2 | 34.2 |

☒ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column**

**Notes are the same for all B1 Sub-Tables :**

Exceedances of the $NO_2$ annual mean objective of 40µg/m$^3$ are shown in **bold**.

$NO_2$ annual means exceeding 60µg/$m^3$, indicating a potential exceedance of the $NO_2$ 1-hour mean objective are shown in **bold and underlined.**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

(3) Exposure periods may vary compared to Defra change over schedules

## Table B.2Two - $NO_2$ Monthly Diffusion Tube Results – 2019 Corridor B2066 Ultralow Emission Zone

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | $NO_2$ Mean Concentrations (µg/$m^3$) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | | |
| | | | | | | | | | | | | | | | Raw Data | Bias Adjusted (0.92) and Annualised (1) | Distance Corrected to Nearest Exposure (2) |
| C04-10 | 531228 | 104088 | **53** | **51** | **43.1** | **44.2** | **50.8** | **47.2** | **58.8** | **49.4** | **42.2** | **46.8** | **38.8** | **41.8** | 47.3 | **43.5** | **43.5** |
| C10-12 | 530995 | 104271 | **49.3** | **54.3** | **43.8** | **49** | **46.1** | **46.6** | **49** | **43.6** | 39.1 | **41** | **40.1** | 37 | 44.9 | **41.3** | **41.3** |
| C11-07 | 530947 | 104284 | **62.1** | **59.6** | **53.5** | **53.1** | **56.9** | **54.7** | **61.1** | **56.4** | 38.6 | **48.3** | **42.9** | **45.8** | 52.8 | **48.5** | **48.5** |
| C11-12 | 530890 | 104302 | **75.9** | **102.2** | **87.3** | **83.4** | **100.5** | **87.1** | **109** | | **62.8** | **70.6** | **70** | **77.2** | 84.2 | **77.4** | **77.4** |
| C13-14 | 530770 | 104363 | **48.8** | **50.6** | 35.9 | 37.5 | 36.3 | **41.9** | **47.3** | 36.3 | 29.5 | 37.4 | 37.1 | 38.8 | 39.8 | 36.6 | 36.6 |
| W10-06 | 530302 | 104415 | | **51.4** | **44.5** | 36.4 | **44.6** | 37.8 | **46.2** | **43.6** | **40** | 35.3 | 38.3 | 35.8 | 41.3 | 38.0 | 38.0 |

## Table B.3 Three - $NO_2$ Monthly Diffusion Tube Results – 2019 Corridor A23 London Road Valley Gardens and Adjoining

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | $NO_2$ Mean Concentrations (µg/m$^3$) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | | |
| | | | | | | | | | | | | | | | Raw Data | Bias Adjusted (0.92) and Annualised (1) | Distance Corrected to Nearest Exposure (2) |
| C02-09 | 531361 | 104006 | 32.7 | 39.5 | 29.0 | 37.7 | 32.4 | 32.5 | 35.0 | 28.7 | 24.2 | 29.8 | 30.8 | 26.1 | 31.5 | 29.0 | 29.0 |
| C03-96 | 531439 | 104045 | **43.8** | **45.4** | 32.0 | 32.2 | 27.2 | 28.4 | 31.1 | 24.4 | 24.0 | 31.1 | 34.8 | 28.3 | 31.9 | 29.3 | 29.3 |
| C05-12 | 531230 | 104260 | 26.8 | 32 | 23.1 | 25 | 19.5 | 19.9 | 20.4 | 19.2 | 17.5 | | 25 | 22.8 | 22.8 | 21.0 | 21.0 |
| C09-05 | 531302 | 104392 | **49.1** | **56.4** | **46.4** | **42.1** | **53.4** | **44.8** | **54.4** | **45.1** | 32.8 | 33.8 | 38.6 | 38.7 | 44.6 | **41.1** | **41.1** |
| C15-05 | 531401 | 104669 | **45** | **55.2** | **43.2** | 35.3 | **45.5** | **43.2** | **40.8** | **42.9** | 37 | 33.6 | 35.1 | 39.3 | 41.3 | 38.0 | 38.0 |
| C16-13 | 531400 | 104844 | **46.8** | **58.2** | 38.4 | 37.8 | **44.2** | 38.4 | **40.3** | 39.5 | 39.9 | 34.7 | 39.5 | 33.6 | 40.9 | 37.7 | 37.7 |
| C17-12 | 531364 | 104982 | **59.5** | **73.9** | **54.9** | **47.6** | **56.2** | **56.8** | **50.7** | **53.1** | **41.4** | **46.2** | **44.8** | **54** | 53.3 | **49.0** | **49.0** |
| C18-10 | 531376 | 105012 | | **76.9** | **55.5** | **56.2** | **54.2** | **56.3** | **53.4** | **55.8** | **51.6** | **46.3** | **55.3** | **68** | 57.2 | **52.6** | **52.6** |
| C18-19 | 531369 | 105042 | **68.2** | **79** | **67.8** | | **78.1** | **68.7** | **76.8** | **71.7** | **62.9** | **48.7** | **59.4** | **57.1** | 67.1 | **61.8** | **61.8** |
| C19-09 | 531472 | 105161 | **48.9** | **53.1** | **39.6** | 35.5 | **43.9** | 37.4 | 37.1 | 35.8 | 33 | 33.4 | 38.5 | | 39.7 | 36.5 | 36.5 |
| C20-05 | 531496 | 105315 | **48.5** | **53.1** | 32.9 | **42.4** | **40.1** | 38.6 | 38.8 | 34.5 | 33 | 34.6 | **42.2** | 41 | 40.0 | 36.8 | 36.8 |
| C21-05 | 531451 | 105356 | **49.9** | **67.2** | 39.5 | **41.2** | **48.2** | **47.3** | **53.3** | **52.1** | **43** | 39.1 | **51.2** | **50** | 48.5 | **44.6** | **44.6** |
| C23-05 | 531189 | 105375 | **46.5** | **65.7** | **46.5** | 36.3 | **44.9** | **40.1** | 38.5 | **44.4** | 35.3 | 36.4 | 35.8 | **45.1** | 43.0 | **39.5** | **39.5** |
| E01-10 | 531101 | 105498 | **40.2** | 33.8 | 39.4 | **47.1** | **43.5** | **43.5** | 37.3 | 32.5 | 28.1 | 31.9 | 36 | 34.2 | 37.3 | 34.3 | 34.3 |
| E02-09 | 530233 | 106515 | **41.5** | **54.8** | **44.2** | 31.8 | 39.5 | 35.2 | 34.9 | 37.4 | 27.8 | 33.8 | 34.2 | 37.9 | 37.8 | 34.7 | 34.7 |
| E02-12 | 530063 | 106368 | **40.9** | **53.7** | **46.5** | **40.3** | **46** | **49.2** | **44.8** | **40.1** | 34.7 | **39.6** | **40.4** | **42.3** | 43.2 | **39.8** | **39.8** |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E06-05 | 531102 | 105615 | **41.8** | **41.8** | **40.4** | 29.3 | 33.8 | 33.1 | 35.6 | 36.4 | 27.9 | 29.9 | 36.4 | 37.1 | 35.3 | 32.5 | 32.5 |
| E16-15 | 531465 | 104629 | **47.2** | **51** | 38.1 | **46.4** | **45.1** | | **43.7** | **43.3** | **47.5** | **46.8** | **55.6** | **41.5** | 46.0 | **42.3** | **42.3** |
| E16-96 | 531426 | 104514 | **44.4** | **47.4** | 36.1 | **41.7** | **43.4** | 39.2 | **42.8** | **41.7** | **43.2** | **41.1** | | **43.2** | 42.2 | 38.8 | 38.8 |
| E17-03 | 531394 | 104338 | **51.7** | **51.9** | **40.7** | **57.6** | **48.1** | **50.4** | **43.8** | **48.3** | **43.3** | **42.3** | **48.4** | **45.1** | 47.6 | **43.8** | **43.8** |
| E18-07 | 532759 | 103810 | **42** | 33.2 | 31.6 | 30.5 | 28.1 | 27.7 | 31.7 | 34 | 27 | 28.2 | 29.7 | 31.8 | 31.3 | 28.8 | 28.8 |

## Table B.4Four - $NO_2$ Monthly Diffusion Tube Results – 2019 Corridor A270 New England Road and Lewes Road

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | $NO_2$ Mean Concentrations (µg/m$^3$) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | | |
| | | | | | | | | | | | | | | | Raw Data | Bias Adjusted (0.92) and Annualised (1) | Distance Corrected to Nearest Exposure (2) |
| C24-05 | 531101 | 105443 | **55.6** | **65.5** | **54.4** | **50.6** | **47.4** | **42.2** | 39.2 | **42.4** | **41.4** | **40.7** | **42.4** | **52.3** | 47.8 | **44.0** | **44.0** |
| C25-10 | 530985 | 105419 | **51.7** | **61** | **43.1** | **42.1** | **49.5** | **43.3** | **42** | **46.6** | **42.6** | **43.8** | **41.5** | **49.8** | 46.4 | **42.7** | **42.7** |
| W04-06 | 530808 | 105340 | **46.6** | **47.7** | **42** | **48.2** | **40.6** | 37.9 | **41.5** | **41.7** | **40.5** | **41.6** | 38.2 | **41.8** | 42.4 | 39.0 | 39.0 |
| W05-06 | 530778 | 105362 | **41.5** | **53.5** | **47.2** | 39.1 | 38.3 | 29.2 | **45.2** | **39.6** | | **40.4** | **40.9** | **40.5** | 41.4 | 38.1 | 38.1 |
| E07-19 | 531838 | 105349 | **62.2** | **72.1** | **79.6** | **60.8** | **70** | **64.6** | **50** | **54.7** | **49.9** | **75.2** | **63.8** | **53.6** | 63.0 | **58.0** | **58.0** |
| E08-96 | 532090 | 105752 | **53.4** | **66.6** | **64.1** | **46.7** | **55.5** | **57.9** | **52.9** | **45.1** | **42.4** | **49.3** | **52.6** | **49** | 53.0 | **48.7** | **48.7** |
| E10-15 | 532126 | 105838 | **41.7** | **56.1** | **50.1** | 37.8 | **42.9** | **40.4** | 37.4 | | 35.6 | | | | 42.8 | 38.0 | 38.0 |
| E12-02 | 532021 | 105946 | **47.2** | **57.3** | **53.4** | **44.4** | **47.3** | **46.8** | 38.4 | **42.9** | 33.6 | 38.4 | **45.8** | **40.2** | 44.6 | **41.1** | **41.1** |
| E14-19 | 532377 | 106314 | 33.2 | **51.8** | **43.9** | 38 | **41.9** | **42.9** | 37.8 | 33.5 | 28 | 31.8 | 37.1 | 36.7 | 38.1 | 35.0 | 35.0 |
| E15-12 | 532300 | 106159 | **40.1** | **48.2** | **44.8** | **43.4** | | **44.8** | 38.1 | 33.8 | 35.3 | 38.5 | **42.7** | 37.8 | 40.7 | 37.4 | 37.4 |

## Table B.5Five- $NO_2$ Monthly Diffusion Tube Results – 2019 Corridor A259-A293 Portslade and A2023 Hove

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | $NO_2$ Mean Concentrations (µg/m$^3$) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | | |
| | | | | | | | | | | | | | | | Raw Data | Bias Adjusted (0.92) and Annualised (1) | Distance Corrected to Nearest Exposure (2) |
| W16-09 | 526248 | 104857 | 33.1 | **49.3** | **40.5** | 28.6 | 34.5 | 37 | 34.9 | 34.8 | 30 | 31.7 | **40.4** | **42.1** | 36.4 | 33.5 | 33.5 |
| W17-09 | 525931 | 104961 | 37 | **47.1** | **48.5** | **48.5** | 36.4 | **43.7** | **45.1** | **42.9** | **43.7** | **40.1** | **42.5** | 36 | 42.6 | 39.2 | 39.2 |
| W18-10 | 525970 | 105230 | 21.9 | 30.4 | 21 | 17.3 | 15.8 | 15.4 | 16.8 | 15.7 | 13.4 | 20.1 | 31 | 21.1 | 20.0 | 18.4 | 18.4 |
| W19-09 | 525658 | 105695 | **44.6** | **55.2** | **50.2** | 38.9 | **42.8** | **41.8** | **44.7** | **41.9** | 39.2 | 37.8 | | 39.4 | 43.3 | **39.9** | **39.9** |
| W21-10 | 528389 | 105930 | 38.8 | **42.1** | **45.1** | 36 | 34.6 | 36.5 | | 37.5 | 32.9 | 33.6 | 36.6 | **40.3** | 37.6 | 34.6 | 34.6 |

## Table B.6 Six - $NO_2$ Monthly Diffusion Tube Results – 2019 Corridor B2123 Rottingdean-Woodingdean and A259 Rottingdean

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | $NO_2$ Mean Concentrations (µg/m$^3$) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | | |
| | | | | | | | | | | | | | | | Raw Data | Bias Adjusted (0.92) and Annualised (1) | Distance Corrected to Nearest Exposure (2) |
| E22-09 | 536970 | 102280 | **49.4** | **41.2** | 34.3 | 38.9 | 36.8 | 34.8 | 31.6 | 33.4 | 31.1 | 30.6 | 33.2 | 31.3 | 35.6 | 32.7 | 32.7 |
| E23-10 | 536966 | 102273 | **48.4** | **41** | 35.4 | **39.8** | **41.6** | **39.8** | **41.6** | 39.3 | 34.6 | 31.1 | 29.6 | 36.5 | 38.2 | 35.2 | 35.2 |
| E25-18 | 537014 | 102238 | 38.9 | 34.9 | | **45.5** | 37.1 | 36.4 | 30.4 | 31.1 | 31.3 | 29.9 | 32 | 31.4 | 34.4 | 31.7 | 31.7 |
| E27-18 | 535634 | 105890 | 31.3 | 27.1 | 23.7 | 28.1 | 23.5 | 22.4 | 21.1 | 22.7 | 21.5 | 24.9 | 30 | 24.6 | 25.1 | 23.1 | 23.1 |
| E29-18 | 536966 | 102273 | **51.1** | | | **42** | | | 39.4 | | 28.6 | 29.9 | 39.6 | 35.9 | 38.1 | 35.7 | 35.7 |

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

More details on traffic data and dispersion modelling of emissions will follow with proposed amendment of the AQMAs. The most recent model map of $NO_2$ citywide is presented in section D below.

The long term construction project of the Royal Sussex Hospital on Eastern Road in Brighton has likely passed its peak in HGV movements. A reduction in $NO_2$ has been recorded in the area.

The construction of Preston Barracks Major Development on the Lewes Road has closed lanes of the dual carriageway and appears to have stemmed the flow of traffic along the corridor. A reduction in $NO_2$ has been recorded in the area especially at the automatic analyser BH6 d to the south of traffic approaching or leaving the Vogue Gyratory.

For audit purposes submitted to Defra with this report:

- Quality control for automatic analysers and diffusion tubes for 2019 and also 2018 for completeness as this was not included in last years ASR.
- The 2019 Bureau Veritas Annualisation spreadsheet procedure used for 2/56 diffusion tubes. 54/56 tubes had either eleven or twelve periods reported.
- Bias correction questionnaire submission to National Physical Laboratory, the national average for Gradko 20% TEA is used to be consistent with previous years. This is important for the trend lines reported.

For 2019 no distance correction was required. Kerbside sites are set in locations with high footfall where the annual mean is > 60 $\mu g/m^3$ and the hourly mean is at risk of being exceeded. Kerbside in Rottingdean is where there is no pavement and cottages meet the kerb.

## QA/QC of Automatic Monitoring Stations BH6 & BH10

TRL carry out the QA/QC on behalf of Brighton & Hove Council for the monitoring stations BH6 and BH10, Lewes Road and North Street.

### Site operation

Routine instrument calibrations are conducted approximately once per fortnight, which involve zero and span checks, a written record of the gas analyser diagnostics and a general visual inspection of all equipment is undertaken. There is a written operating procedure and a calibration record sheet is completed at every site visit.

### Data retrieval and daily data checking

Data from the monitoring station is retrieved directly via a Siemens TC35i GSM modem at 8-hourly intervals. The data is then stored on Envista Arm software hosted at TRL. This was used to retrieve, check and archive data. TRL's internal QA/QC procedures require all data to be backed up on a secure server and all documentation associated with each site to be uniquely identified and securely stored to provide an audit trail. Daily data inspections are undertaken during office hours using the facilities of the Data Management System. Initial observations of the Management System indicate whether the site has been contacted during its nominated 'poll time' overnight. If this has not been successful a manual poll of the site may be required. If this is not successful further investigation of the communications integrity will be required to establish contact with the site modem and data logger. Three day plots of recorded data are viewed for the requested site, and these are inspected and assessed for continuity, validity, minimum and maximum values, date and time, power failures and general integrity. All anomalies are recorded on the Daily Check log, as required. Any anomalies or queries arising from daily inspection of data, or system operation, are brought to the attention of the Project Manager who will evaluate the situation, and initialise any necessary action. In the event that the PM is not available, contact will be made with the next available senior person within the monitoring team. Any issues identified with equipment operation will be referred to the client for attention within 24 hours (excluding weekends). On a weekly basis, data are examined using summary statistics and outlier analysis to establish data validity. If unusual data episodes are recorded, these would be routinely examined over longer data periods to establish their impact on trends but would also be cross referenced with data peaks and troughs recorded

at other national monitoring stations. In addition, integrity and validity of data logger clock times are checked, and any significant errors recorded in the Data Management System logbook. All site data recorded through the Data Management System is archived on TRL's Network. The data is backed up daily, and the TRL IT Department maintains these data within their long-term and secure archives. This secures all data in the event of any system failure.

### Data calibration and ratification

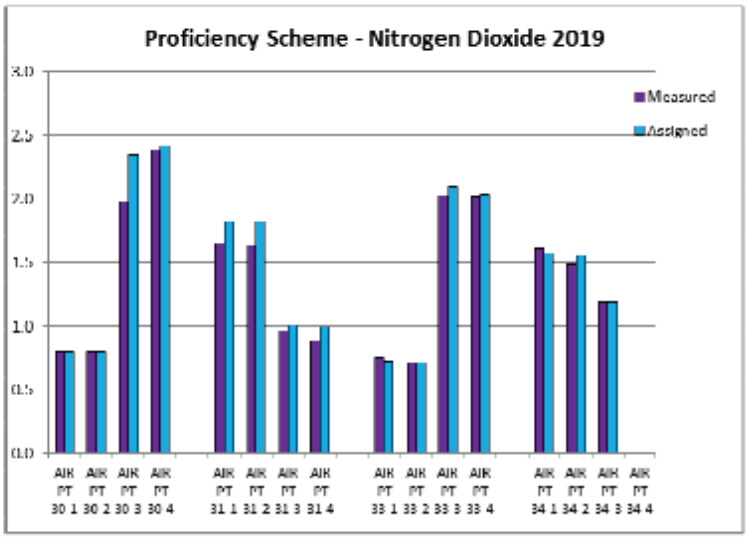
Data is ratified as per Automatic Urban Rural Network (AURN) recommended procedures. The calibration and ratification process for automatic gas analysers corrects the raw dataset for any drift in the zero baseline and the upper range of the instrument. This is done using Evista-based calibration and ratification which incorporates the zero and span check information from the calibration visits. The zero-reading recorded during the calibration visits is used to adjust any offset of the baseline of the data. The difference between the span value obtained between one calibration visit and the next visit is used to calculate a factor. This change is assumed to occur at the same rate over the period between calibrations and as such the factor is used as a linear data scaler. This effectively results in the start of the period having no factor applied and the end of the period being scaled with the full factor with a sliding scale of the factor in-between. After applying the calibration factors, it is essential to screen the data, by visual examination, to see if they contain any unusual measurements or outliers. Errors in the data may occur as a result of equipment failure, human error, power failures, interference or other disturbances. Data validation and ratification is an important step in the monitoring process. Ratification involves considerable knowledge of pollutant behaviour and dispersion, instrumentation characteristics, field experience and judgement. On completion of this data correction procedure, the data is converted to hourly means and provided to Brighton & Hove City Council at quarterly intervals and a calendar year annual report is prepared.

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 email:diffusion@gradko.com

## AIR PT Nitrogen Dioxide Proficiency Scheme Results 2019

Methods: GLM 7 – CARY 60 Spectrophotometer

| AIR PT Proficiency Scheme - Nitrogen Dioxide 2019 | | | | | |
|---|---|---|---|---|---|
| Date | Round | Assigned value | Procedure GLM 7 | | |
| | | | Measured concentration | z-Score | % Bias |
| Feb-19 | AIR PT 30-1 | 0.8 | 0.8 | 0 | 0.0% |
| Feb-19 | AIR PT 30-2 | 0.8 | 0.8 | 0 | 0.0% |
| Feb-19 | AIR PT 30-3 | 2.35 | 1.98 | -2.1 | -15.7% |
| Feb-19 | AIR PT 30-4 | 2.42 | 2.39 | -0.16 | -1.2% |
| | | | | | |
| May-19 | AIR PT 31-1 | 1.82 | 1.65 | -1.24 | -9.3% |
| May-19 | AIR PT 31-2 | 1.82 | 1.64 | -1.31 | -9.9% |
| May-19 | AIR PT 31-3 | 1.01 | 0.97 | -0.53 | -4.0% |
| May-19 | AIR PT 31-4 | 0.99 | 0.89 | -1.35 | -10.1% |
| | | | | | |
| Aug-19 | AIR PT 33-1 | 0.72 | 0.75 | 0.56 | 4.2% |
| Aug-19 | AIR PT 33-2 | 0.71 | 0.71 | 0 | 0.0% |
| Aug-19 | AIR PT 33-3 | 2.09 | 2.03 | -0.38 | -2.9% |
| Aug-19 | AIR PT 33-4 | 2.04 | 2.02 | -0.13 | -1.0% |
| | | | | | |
| Oct-19 | AIR PT 34-1 | 1.57 | 1.61 | 0.38 | 2.5% |
| Oct-19 | AIR PT 34-2 | 1.56 | 1.49 | -0.56 | -4.5% |
| Oct-19 | AIR PT 34-3 | 1.19 | 1.19 | 0 | 0.0% |
| Oct-19 | AIR PT 34-4 | Sample wasted not submitted | | | |

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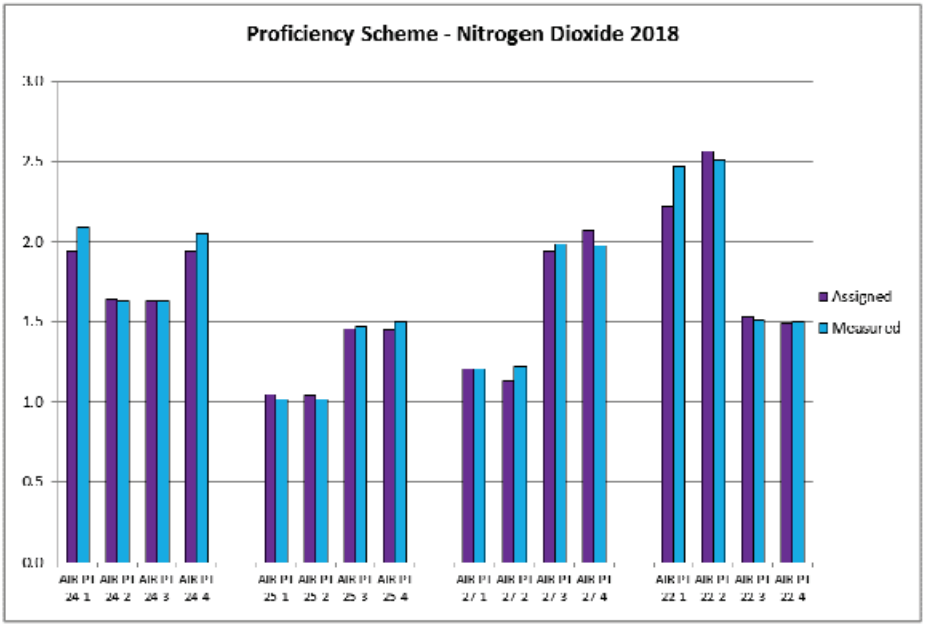
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 email:diffusion@gradko.com

## AIR PT Nitrogen Dioxide Proficiency Scheme Results 2018

Methods: GLM 7 – CARY 60 Spectrophotometer

| AIR PT Proficiency Scheme - Nitrogen Dioxide 2018 | | | | | |
|---|---|---|---|---|---|
| Date | Round | Assigned value | Procedure GLM 7 | | |
| | | | Measured concentration | z-Score | % Bias |
| Feb-18 | AIR PT 24-1 | 2.09 | 1.94 | -0.91 | -7.2% |
| Feb-18 | AIR PT 24-2 | 1.63 | 1.64 | 0.08 | 0.6% |
| Feb-18 | AIR PT 24-3 | 1.63 | 1.63 | 0 | 0.0% |
| Feb-18 | AIR PT 24-4 | 2.05 | 1.94 | -0.72 | -5.4% |
| May-18 | AIR PT 25-1 | 1.02 | 1.05 | 0.39 | 2.9% |
| May-18 | AIR PT 25-2 | 1.02 | 1.04 | 0.26 | 2.0% |
| May-18 | AIR PT 25-3 | 1.47 | 1.46 | -0.09 | -0.7% |
| May-18 | AIR PT 25-4 | 1.5 | 1.45 | -0.44 | -3.3% |
| Aug-18 | AIR PT 27-1 | 1.21 | 1.21 | 0.00 | 0.0% |
| Aug-18 | AIR PT 27-2 | 1.22 | 1.13 | -0.99 | -7.4% |
| Aug-18 | AIR PT 27-3 | 1.99 | 1.94 | -0.34 | -2.5% |
| Aug-18 | AIR PT 27-4 | 1.98 | 2.07 | 0.60 | 4.5% |
| Oct-18 | AIR PT 22-1 | 2.47 | 2.22 | -1.35 | -10.1% |
| Oct-18 | AIR PT 22-2 | 2.51 | 2.56 | 0.27 | 2.0% |
| Oct-18 | AIR PT 22-3 | 1.51 | 1.53 | 0.18 | 1.3% |
| Oct-18 | AIR PT 22-4 | 1.5 | 1.49 | -0.1 | -0.7% |

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**Annualisation** was carried out for diffusion tube samples BH E10-15 and BH E29-18 capturing different monthly periods of the 2019 calendar year.
In both cases the average adjustment factor from roadside analysers was used. Diffusion tube inputs to the annualisation tool were the same as those reported in the B1 series of tables:

## Diffusion Tube Calendar Inputs

Step 1. Select Annualisation Year

Reset Annualisation Tool

Enter data into the pink cells (if required)

| Annualisation year | 0 |
|---|---|
| Annualisation Year Start Date | 01/01/2019 |
| Annualisation Year End Date | 01/01/2020 |

| | Diffusion Tube Deployment Dates | | |
|---|---|---|---|
| Period/Month | Tube On | Tube Off | Comments |
| Jan | 01/01/2019 | 06/02/2019 | |
| Feb | 06/02/2019 | 01/03/2019 | *Diffusion tube exposure period shorter than the recommended 4 weeks (- 4 days)* |
| Mar | 01/03/2019 | 05/04/2019 | |
| Apr | 05/04/2019 | 07/05/2019 | |
| May | 07/05/2019 | 10/06/2019 | |
| Jun | 10/06/2019 | 04/07/2019 | |
| Jul | 04/07/2019 | 05/08/2019 | |
| Aug | | | *Should dates be entered here?* |
| Sep | 05/09/2019 | 02/10/2019 | |
| Oct | | | *Should dates be entered here?* |
| Nov | | | *Should dates be entered here?* |
| Dec | | | *Should dates be entered here?* |

### Adjustment for BH E10-15

| Diffusion Tube ID | Annualisation Factor BH6 Lewes Road | Annualisation Factor BH10 North Street | Annualisation Factor Site 3 Name | Annualisation Factor Site 4 Name | Average Annualisation Factor |
|---|---|---|---|---|---|
| DT 1 | 0.9519 | 0.9794 | | | 0.9657 |

## Diffusion Tube Calendar Inputs

Step 1. Select Annualisation Year

Reset Annualisation Tool

Enter data into the pink cells (if required)

| Annualisation year | 0 |
|---|---|
| Annualisation Year Start Date | 01/01/2019 |
| Annualisation Year End Date | 01/01/2020 |

| | Diffusion Tube Deployment Dates | | |
|---|---|---|---|
| Period/Month | Tube On | Tube Off | Comments |
| Jan | 01/01/2019 | 04/02/2019 | |
| Feb | | | *Should dates be entered here?* |
| Mar | | | *Should dates be entered here?* |
| Apr | 05/04/2019 | 05/05/2019 | |
| May | | | *Should dates be entered here?* |
| Jun | | | *Should dates be entered here?* |
| Jul | 04/07/2019 | 10/08/2019 | |
| Aug | | | *Should dates be entered here?* |
| Sep | 07/09/2019 | 06/10/2019 | |
| Oct | 06/10/2019 | 11/11/2019 | |
| Nov | 11/11/2019 | 11/12/2019 | |
| Dec | 11/12/2019 | 01/01/2020 | *Diffusion tube exposure period shorter than the recommended 4 weeks (- 4 days)* |

### Adjustment for BH E29-18

| Diffusion Tube ID | Annualisation Factor BH6 Lewes Road | Annualisation Factor BH10 North Stret | Annualisation Factor BH0 Preston Park | Annualisation Factor Site 4 Name | Average Annualisation Factor |
|---|---|---|---|---|---|
| E29-18 | 1.0111 | 1.0269 | | | 1.0190 |

**Diffusion Tube Collocation Data Questionnaire For Local Authorities**

**Please Read the "Notes" sheet and then fill in the white boxes of this questionnaire**
**Should you require assistance, email nick.martin@npl.co.uk or phone 020 8943 7088**

| | Date form filled in | Name of Local Authority | Your name | Phone number | Contact email |
|---|---|---|---|---|---|
| **Your Details** | 13/03/2019 | Brighton & Hove City Council | Samuel Rouse | 01273 292256 | samuel.rouse@brighton-hove.co.uk |

| | Distance from kerb (m) | Site type (e.g. roadside, background). Definitions of site types are given on the "Notes" sheet | Distance from diffusion tube(s) to continuous analyser inlet (m) (this should be less than 1m from the analyser inlet) | Location (site name or a brief description) | Grid Reference of Site (if available) |
|---|---|---|---|---|---|
| **Site Details** | 6 | Roadside (Façade) | 0.2 | 40 North Street B2066 Public Transport Corridor | 530995 104271 |

| | Prepared by | Analysed by | Example results sheet attached? (please attach a results sheet provided by the analysis laboratory) | Preparation method (e.g. 50% TEA in acetone; 50% TEA in water) | How are diffusion tubes deployed? (e.g. with a clip, spacer, shelter box, just tape) |
|---|---|---|---|---|---|
| **Diffusion Tube Details** | Gradko | Gradko | YES | 20% TEA | Clip on cage |

| | Analyser type | QA/QC (e.g. local or network) |
|---|---|---|
| **Continuous Analyser Details** | API NOx | local TRL |

**Data from the Automatic Analyser (Matching Individual Diffusion Tube Periods)**

| Period | Start Date (dd/mm/yy) | End Date (dd/mm/yy) | % Data Capture | Ratified / Provisional | NOx (if available) (ug/m$^3$) | Nitrogen Dioxide (ug/m$^3$) |
|---|---|---|---|---|---|---|
| 1 | 01/01/2019 | 06/02/2019 | 99.8 | Ratified | 147.5 | 52 |
| 2 | 06/02/2019 | 01/03/2019 | 100 | Ratified | 188.6 | 62.3 |
| 3 | 01/03/2019 | 03/04/2019 | 93.7 | Ratified | 117.4 | 45.4 |
| 4 | 03/04/2018 | 01/05/2019 | 99.9 | Ratified | 99.5 | 42.7 |
| 5 | 01/05/2019 | 10/06/2019 | 99.8 | Ratified | 113.9 | 45.4 |
| 6 | 10/06/2019 | 04/07/2019 | 98.3 | Ratified | 101.2 | 40.5 |
| 7 | 04/07/2019 | 01/08/2019 | 100 | Ratified | 116.2 | 46.3 |
| 8 | 01/08/2019 | 05/09/2018 | 79.3 | Ratified | 110.9 | 46.3 |
| 9 | 05/09/2019 | 02/10/2019 | 100 | Ratified | 93.6 | 37.1 |
| 10 | 02/10/2019 | 05/11/2019 | 72.5 | Ratified | 115.3 | 42.7 |
| 11 | 05/11/2019 | 05/12/2019 | 100 | Ratified | 133 | 47.3 |
| 12 | 05/12/2019 | 03/01/2020 | 100 | Ratified | 116.7 | 40.8 |
| 13 | | | | | 121.15 | 45.73333333 |

Please express NOx as $NO_2$ (e.g. ppb x 1.913) or alternatively note the approach / units here:

When you are identifying the automatic monitoring periods that match your diffusion tube exposure periods, please be as precise as possible. It is not, however, necessary to match start times to the exact hour that you put out your tubes.

**Individual Period (monthly) Mean Nitrogen Dioxide Data from the Diffusion Tubes (ug/m$^3$)**

| Period | | Tube 1 | Tube 2 (if available) | Tube 3 (if available) | Tube 4 (if available) |
|---|---|---|---|---|---|
| 1 | | 59.4 | 43.3 | 50.7 | |
| 2 | | 53.9 | 55.5 | 53.4 | |
| 3 | | 43.1 | 46.4 | 41.3 | |
| 4 | | 48.3 | 49.6 | 49 | |
| 5 | | 46.5 | 40.7 | 51.2 | |
| 6 | | 45.9 | 44.8 | 49.1 | |
| 7 | | 51.5 | 46.5 | 49 | |
| 8 | | 44.7 | 41.7 | 44.3 | |
| 9 | | 39.3 | 41.2 | 36.7 | |
| 10 | | 42 | 38.8 | 42.1 | |
| 11 | | 45 | 37.7 | 37.7 | |
| 12 | | 38.7 | 37.6 | 34.8 | |
| 13 | | | | | |

| | Are the concentrations stated in ug/m$^3$? | Did the diffusion tube supply or analysis method change during the monitoring period? When, from what, to what? | Were there any significant problems with the continuous analyser during the monitoring period? | Are there any other relevant issues with your data? |
|---|---|---|---|---|
| **Other Information** | Yes | NO | NO | NO |

**Notes**

Results of the co-located bias correction studies including the one submitted by Brighton & Hove City Council are online[25]. Bias correction factor (for the Gradko 20% TEA in water method) is applied to raw diffusion tube results each year. In 2019 the national average of thirty co-location studies: = 0.92. Brighton & Hove's North Street co-location study provides evidence that diffusion tubes and automatic analyser results show agreement very close to parity. For outer areas or less polluted sites diffusion tubes are more likely to give higher results compared to automatic analysers. For central settings the local bias factor can be applied as a worse case.

A consistent approach with the bias correction factor is required for graphing trends that span of at least five years. Seven full years is available since the North Street (Site BH10) co-location study started.

## Bias Correction History

| Source of Bias - Gradko 20% TEA/water | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|
| BH10 North Street Co-Location Study | 0.98 | 0.94 | N/A | 0.92 | 0.98 | 1.04 | 1.01 |
| UK Average (at the time of reporting) | 0.95 | 0.92 | 0.91 | 0.92 | 0.93 | 0.93 | 0.92 |
| Applied Factor Derived from Local Studies or National | 0.9(1) | 0.91(1) | 0.91 | 0.92 | 0.93 | 0.93 | 0.92 |

Notes

1) Orthogonal mean of Brighton & Hove Co-located studies provided by National Physical Laboratory