Brighton & Hove City Council

# 2018 Air Quality Annual Status Report (ASR)

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

June 2018

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| Local Authority Officer | Samuel Rouse |
| Department | Environmental Protection, Regulatory Services |
| Address | Bartholomew House, Bartholomew Square, Brighton BN1 1JP |
| Telephone | 01273 292256 |
| E-mail | samuel.rouse@brighton-hove.gov.uk |
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*Churchill Square and North Street part of Brighton & Hove's Ultralow Emission Zone for Buses*

# Executive Summary: Air Quality in Our Area

## Air Quality in Brighton & Hove City Council

Brighton & Hove City Council's is compliant with all pollutants listed in the national Air Quality Strategy (AQS) with the exception of nitrogen dioxide ($NO_2$). Improvement is also required to meet the World Health Organisation Guideline for Particulate Matter less than 2.5 microns ($PM_{2.5}$). The city first declared an Air Quality Management Area (AQMA) for $NO_2$ in 2004. The two existing AQMAs for $NO_2$ were declared in 2013 and include Brighton & Hove Centre connected with South West Portslade. Rottingdean Village is a separate area.

Parts of Brighton & Hove's coastal frontage and the South Downs National Park (within the Local Authority Area) have air quality that is amongst the cleanest in the South East of England. A number of parks or background sites in the city have consistently recorded low levels of airborne pollution namely; $NO_2$, microscopic particulate, Poly Aromatic Hydrocarbons (PAH), sulphur dioxide and carbon monoxide. In contrast at roadside places where diesel traffic stops and starts in confined spaces concentration of $NO_2$ continue to exceed the national limit. Throughout the year high levels of $NO_2$ are monitored at residences and workplaces and where pedestrian activity is frequent adjacent to A, B and C roads. Typically these busy transport corridors have high density of permanent dwellings with thousands of passing people; active cyclists and walkers. This is important when considering the dose and exposure to pollutants inhaled and lifelong impacts on overall health and lung condition.

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 lung and thoracic cancers and bronchitis. Air pollution especially affects the most vulnerable in society: children and older people, and those with heart and lung conditions. Airborne pollution can add to the health burden of smoking and is an extra risk to those with sedentary lifestyles. The local impact on health and wellbeing is summarised in our Joint Strategic Needs Assessment[1]. There is often a strong correlation with equalities

[1] Brighton & Hove City Council Joint Strategic Needs Assessment found at: http://www.bhconnected.org.uk/sites/bhconnected/files/6.4.9%20Air%20Quality%20JSNA%202016.pdf

issues because; areas with poor air quality are also often the less affluent areas[2,3]. That said parts of Central Brighton in the Air Quality Management Area (AQMA) have expensive property prices and very high rental rates. Affluent people live on polluted streets. Measures to improve air quality will benefit all of society.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[4].

The Environment, Transport and Sustainability Committee approved the Cities' latest Air Quality Action Plan (AQAP) in October 2015. This followed twelve week public consultation earlier that year. Further information can be found in the Brighton & Hove 2015 AQAP found online[5].

In the three years since considerable progress has been made with the AQAP. Delivery and updates are summarised in this Air Quality Annual Status Report (ASR). The Council is working closely with bus and taxi operators, the Low Carbon Vehicle Partnership (LCVP) and the Joint Air Quality Unit (JAQU) that is made up of government departments for the Environment and Transport. There is cross border discussion with adjacent local authorities. The City Council is active member of the Sussex Air Quality Partnership (SAQP). Environmental Protection at the Council has chosen to monitor Particulate Matter less than 2.5 microns ($PM_{2.5}$). The City Council is close to meeting both national exposure reduction objectives (2020) and World Health Organisation guidelines for this pollutant.

Defra (Department for the Environment Food and Rural Affairs) together with PHE (Public Health England) have published a briefing on air quality[6] (March 2017). The reports sets out examples of how local authorities can use the Public Health Outcomes Indicator to specify appropriate mitigation measures to reduce the impact of both short term and long term exposure of air pollution. .

## Priority Areas for Air Quality Improvement

A series of pictures below helps explain the situation in Brighton & Hove's two extant AQMAs. It is important to note that the national model predictions of air quality

[2] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[3] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[4] Defra. Abatement cost guidance for valuing changes in air quality, May 2013
[5] Brighton & Hove 2015 Air Quality Action Plan found at: http://www.brighton-hove.gov.uk/content/environment/air-quality-and-pollution/air-quality-management-city
[6] Air Quality: A Briefing for Directors of Public Health March 2017 A Local Government Publication Defra and Public Health England found at: http://www.adph.org.uk/2017/03/air-quality-a-briefing-for-directors-of-public-health/

preclude B and C roads which make up a significant proportion of the local AQMAs. Whilst some exceedances of the $NO_2$ standards are monitored on the approach to junctions, this is not exclusively the case. Higher $NO_2$ levels are recorded along transport corridors. In many parts of the AQMA this can be a hundred or more metres from the main junctions.


London Road and Lower Cheapside (above photograph) has some of the highest levels of nitrogen dioxide in Sussex. The area is characterised by emission contributions from mixed traffic; buses, trucks, taxis, vans and cars. The area has busy markets with high pedestrian footfall and continued exceedance of the hourly standard for $NO_2$. Low or no emission buses and taxis are an essential requirement for the area. If extended beyond buses London Road fits all the criteria for a Low Emission Area or a Clean Air Zone. $NO_2$ Monitoring suggests an improvement especially at kerbside.


The Brighton & Hove Bus Low Emission Zone (LEZ) includes North Street Churchill Square and Western Road, for much of its length the B2066 is only open to buses and taxis. The road link is one of the busiest highways in the UK for buses. Bus services between the City Centre the Universities of Brighton and Sussex operate day and night. Retail, residential, hotel, restaurant and entertainment uses surround the street that has very high pedestrian numbers. Buses on the uphill carriageway (towards this view point) dominate emissions of oxides of nitrogen within the street canyon. Bus counts have been monitored at one hundred an hour or more than three thousand daily. The corridor was designated as a Low Emission Zone January 2015. In 2017 Diffusion tube and automatic analysers (at six sites) continue to record exceeding levels of $NO_2$ close to North Street and Castle Square, Churchill Square and Western Road. Two monitors suggest continued exceedance of the hourly average. Monitoring suggests an improving trend (at a faster rate than elsewhere), with further reductions especially in the emissions from euro-V buses required. The $NO_2$ annual standard (> 40 µg/$m^3$) is exceeded on Western Road with all air quality standards likely to be met as far west as Brunswick Square.

Grand Parade A23 general traffic close to the residential façade. Levels are likely to continue to exceed the $NO_2$ annual mean for some years to come without intervention measures. Smoother traffic flow will help ease emissions associated with vehicle launch and engine idling. Plans to improve the Valley Gardens park area are scheduled start August 2018. A tree and shrub planting programme has been discussed with landscaping and Highways. It is advised that outdoor events use plugged in places instead of diesel generators.

New England Road (picture above) is an important east-west link under the London to Brighton railway. High frequency and duration of queuing cars and vans happen adjacent to the residential facade. A queue length of 400 metres west of Preston Circus is common. Engines idle in the eastbound queue whilst vehicles accelerate up the hill (westbound) passing by terraces houses one metre from the Old Shoreham Road Hill section. Whilst monitoring suggests recent $NO_2$ improvement concentrations of: 50µ/$m^3$ has been typical over the past decade. It is important that new developments do not add additional traffic to New England Road. Network management should explore alternative routings or consider a Clean Air Zone for cars and vans. Anti-idling "cut engine cut pollution" signs and information re the timing of red light phase change would suit this area.


The main station is an important transport interchange with pick up points for buses and taxis. There have been a number of recent complaints in the area relating to diesel fumes and engine idling. $NO_2$ levels of: 45µ/$m^3$ has been typical for Queens Road area over the past decade. An improvement to the flow of buses and taxis is required for Queens Road. Some have called for an extension of the "bus and taxi only zone" that exists for North Street and Churchill Square. Such a move would need a caveat that requires accelerated delivery of Ultra Low Emission buses and taxis. Thameslink Govia is considering proposals for station taxi pick up.

Bus and cycling use are well established on the Lewes Road between the universities and the City Centre. $NO_2$ hotspots continue adjacent to Lewes Road on approach roads to the main junctions; along Coombe Terrace, south of the Vogue Gyratory and are near to Elm Grove (pictured above). There are discussions regarding further emissions improvements for regular buses shuttling along the corridor day and night. It is advised that new development minimise impacts on $NO_2$ in this area aiming for neutral or beneficial change to the existing situation.

Hollingdean Road is a "C road link" that carries more than 16,000 vehicles a day and has high duration of queuing traffic with engine idling adjacent to housing. The road section does not have any scheduled bus services. $NO_2$ levels have been close to: 45µ/$m^3$ for a decade. Hollingdean Road has been part of the AQMA since 2004. The road link provides access to the Cities waste transfer and material recycling facility. It is important that Council and Veolia waste vehicles fleets set out how they will work towards Ultra-Low Emission Fleets.

Road traffic emissions are the reason for an exceedance of $NO_2$ standard opposite the Sussex Royal County Hospital. The ten years construction project at the hospital is likely to influence local emissions and roadside air quality along Eastern Road. The Construction Environment Management Plan conditions that Heavy Goods Vehicles will meet the more stringent Euro-VI emission standard.


The haulage route from Shoreham Port passes into Brighton & Hove City Council's area along Wellington Road and Trafalgar Road to Southern Cross in South Portslade. The Council's Environmental Protection team would like to have further talks with Harbours Authority regarding the schedules for Heavy Goods Vehicles (HGV) to meet the Euro-VI emissions standard.


Funding has been allocated for a feasibility study to look at traffic scheme to alleviate emission in the Rottingdean High Street bottleneck and AQMA. One suggestion is for an extension of existing keep clear zones to around twenty metres long. This would help avoid diesel traffic emission happening in the narrowest part of the street.

## Actions to Improve Air Quality

Brighton & Hove has one of the few UK bus Low Emissions Zones outside of London. Ultralow Emission Bus proposals target emission improvement for the highest mileage buses that frequently enter the central area. Local bus operators continue to invest in a cleaner bus fleet. Environmental Protection has managed a series of projects supported by the Department for Transport's (DfT's) Clean Bus Transport Fund (CBTF). Working with *Eminox,* seventy-three double decker exhaust retrofits have been completed. On average the retrofits reduce oxide of nitrogen (NOx) emissions by around 70%. Some of the fitted vehicles have NOx rates equivalent to the Euro-VI emission standard. At the same time a project working with *Green Urban Technologies* using DfT's Clean Vehicle Transport Fund (CVTF) has retrofitted taxi minibuses and cars with cleaner exhaust systems. It has been a challenge to access working vehicles to fit the Selective Catalytic Reduction (SCR).

The Big Lemon bus company is on track to deliver nine operating buses to electric operation. Lithium-ion *magtec* batteries are to be charged from the operators array of solar panels[7]. Use of electromotive charging points for cars and vans whilst still a small part of the total, has increased substantially since 2012. The recent growth can be appreciated by the statistic: The UK has 0.9% of the world's population (65 million out of >7 billion) and 5% of the world's electric vehicles (100,000 out of two million).

The rapid on street vehicle charger at Withdean (takes a few minutes) is one of the most used in the South East. The charging facility is operated by *charge your car network*[8]. New development are proposing a higher percentage of parking spaces with wiring ready for future electromotive; cars, vans, taxis, scooters and electrically assisted bicycles.

After bidding to DfT's access fund for sustainable travel, Brighton & Hove has won £1.45 million to unlock growth with active travel initiatives[9]. The cities bike share scheme goes live summer 2017. The service will be available in and around the main Air Quality Management Area (AQMA).

[7] Big Lemon Electric found at: https://thebiglemon.com/
[8] Withdean Stadium Electric Charging Point found at: https://www.zap-map.com/pts/neqhzd1/
[9] Access Fund for Sustainable found at: Travel https://www.brighton-hove.gov.uk/content/parking-and-travel/travel-transport-and-road-safety/access-fund-sustainable-travel-brighton

## Conclusions and Priorities

Exceedances of $NO_2$ continue at roadside near to general traffic, buses and taxis. In 2017 general background levels in NO2 increased slightly compared to the previous year. That said where intervention measures to reduce $NO_2$ were focused on concentrations continue to improve. Good progress has been made since high $NO_2$ levels were recorded in 2010 and 2013. Recent Air Quality Improvement Projects Taken Forward:

- Progress an Ultralow Emission Bus Zone that requires the a minimum euro-VI emission standard
- Continue to promote active and sustainable travel, including the Access Fund projects financed from 2017-2020
- Reach agreement with JAQU regarding allocation of remaining Clean Bus Transport Funds to reduce NOX emissions from euro-V buses
- Director set an interdepartmental air quality programme board
- Choice of electromotive charging points for car parks and for off road parking including Office of Low Emission funded project
- Project for Rottingdean High Street to alleviate emissions in the most confined space
- Green Plan for Portslade
- Air Quality Action plan seeks options for energy storage on developments and for transport avoiding fixed plant combustion with oxide of nitrogen emissions to air in the urban area
- Talks with the Harbours Authority to discuss their schedule to procure a higher percentage of Euro-VI trucks for port haulage
- Sussex Local Authorities anti-idling campaign including educational and awareness project working with volunteers and schools focused on the Lewes Road Corridor
- Explore options for grid balancing and hydrogen storage as a policy for City Development Areas (DA) and local transport fleets

- Gap Analysis of NICE (National Institute for Health and Care Excellence) and COMEAP (Committee on the Medical Effects of Air Pollutants) guidance on outdoor air pollution and health
- Brighton & Hove Environmental Protection, Health, Transport has provided joint comments to Defra's consultation on improving nitrogen dioxide in our town and cities. This includes participation at workshops in London, feedback on national technical reports including proposals for Clean Air Zones (CAZ) a related report has been delivered to Brighton & Hove's Environment Transport & Sustainability Committee

## Local engagement and how to get involved

Brighton and Hove is compact and high density; many local journeys are less than 5km. The healthiest option for short journeys is active travel; walking, jogging, roller skating and cycling including electrically assisted bicycles. Supported by Transport and Public Health, The City Council's Access Fund for Sustainable Travel is funded until 2020 by the Department for Transport, it will be promoting the health benefits of active travel.

These projects aim to ensure that sustainable transport is the preferred way to ensure that residents, visitors, employees and students are able to access the seafront area for employment and leisure.

The 'Brighton Bike Share' project has been an enormous success in its first year. This is a Local Growth Funded initiative. The Access fund project will help to promote and encourage the expansion of the scheme over the timescale of the fund.

Our measures, which will be delivered up to March 2020, are based on programmes successfully delivered over the last ten years. There is an emphasis on programmes to boost the number of people cycling and walking, and also a stronger focus on improving access to jobs, skills, education and training. Projects will be delivered under the following themes: Access to Work; Personalised Travel Planning; Access to Education; Encouraging Cycling; and Road Safety.

Sussex wide project will involve local communities; engage volunteers, schools and businesses. During 2017 the City Council received numerous complaints for engine idling. Modern cars stay hot for twenty-five minutes after being switched off. Engine idling draws in extra air that cools engine and exhaust systems producing higher emissions. Idling for more than a few minutes contributes to pollution in one place.

The best travel choices for urban air quality are to avoid older diesel cars for short journeys. Economic driving achieves lower fuel consumption and avoids harmful emission from the tailpipe. Smooth drive styles reduce particulate release due to tire wear and harder braking releases fine metals to the urban environment. Local car share and car club options are available[10]. Smart ticket multi-mode trips information can be found: via *Journey Planner*[11]. The universities and hospital trusts (with campus in or adjacent to the AQMA) are important partners in action to promote healthy low emission travel options. No emission vehicles can complement active travel for a cleaner healthier city more conducive to business investment and leisure.

[10] Local Lift Share Options found at: https://liftshare.com/uk/journeys/from/brighton
[11] Journey Planner found at: http://www.brighton-hove.gov.uk/journeyplanner/

**Endorsement from the acting Director of Public Health, Brighton & Hove City Council**

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 impact 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 especially; Environmental Health, Transport, Planning and Public Health work together effectively to deliver improvements where they are needed. As Acting Director of Public Health I endorse this Annual Status Report which sets out the position in Brighton & Hove and which will support an ongoing work programme to address air quality issues.

Acting Director of Public Health
Peter Wilkinson

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# 1 Local Air Quality Management

This report provides an overview of air quality in Brighton & Hove City Council during 2017 compared with archive records. 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 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 probable 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 any 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 risk of an exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within twelve 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 can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online[12]. Alternatively, see Appendix D: Map(s) of Monitoring Locations , which provides for a view of air quality monitoring locations in relation to the AQMA(s).

[12] Brighton & Hove AQMA found online at: https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=35

## Table 2.1 – Declared Air Quality Management Areas

| AQMA Name | Date of Declaration | Pollutants and Air Quality Objectives | City / Town | One Line Description | Is air quality in the AQMA influenced by roads controlled by Highways England? | Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure) | | Action Plan (inc. date of publication) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | At Declaration | Now | |
| AQMA Brighton Hove and Portslade | Aug-13 | $NO_2$ Annual Mean | Brighton Hove & South Portslade | >240 hectares includes a few thousand roadside dwellings | NO | 83 µg/$m^3$ (highest level monitored at façade) | 58.1 µg/$m^3$ | Brighton & Hove City Council 2015 Air Quality Action Plan Annual Status Report Progress Updates |
| AQMA Brighton Hove and Portslade | Aug-13 | $NO_2$ 1 Hour Mean | Brighton Hove & South Portslade | North Street and London Road | NO | 114 µg/$m^3$ (measured with diffusion tube, high pedestrian footfall on pavement and likely exceedance of hourly average) | 77.9 µg/$m^3$ | Brighton & Hove City Council 2015 Air Quality Action Plan Annual Status Report Progress Updates |
| AQMA Rottingdean | Aug-13 | $NO_2$ Annual Mean | Rottingdean | Less than one hectare Rottingdean High Street including junction with A259 and Vicarage Lane about fifty dwellings | NO | 46 µg/$m^3$ | 41.4 µg/$m^3$ | Brighton & Hove City Council 2015 Air Quality Action Plan with Annual Status Report Progress Updates |

☒ **Brighton & Hove City Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

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

Defra's appraisal of the 2015-ASR concluded that maps of monitoring locations should be included. Detailed maps with annotated 2017 results are presented in Appendix D of this report. Defra's appraisal of the 2017 ASR requested an update to the city councils pollution source apportionment. New automatic traffic counters have been ordered specifically for the AQMA to help provide improved evidence for the emissions inventory, dispersion model and source apportionment. The modelling update will be submitted as an addendum to this report.

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

The original position and the consultation behind it can be found in the 2015 AQAP. The AQAP is not set in stone following consultation and committee approval and is an evolving document. For example bus technology for low emission is a fast moving topic with changes happening at a rapid rate. Key completed measures are:

- Exhaust retrofit of 73 double decker buses now all in operation
- Conditioning of euro-VI heavy good vehicles on the Royal Sussex County Hospital rebuild
- Field enforcement response to engine idling and diesel fumes

Brighton & Hove City Council is exploring the following measures to be considered over the course of the next reporting year:

- Continue to promote active and sustainable travel, including the Access Fund projects financed from 2017-2020
- Reach agreement with JAQU regarding final allocation of remaining Clean Bus Transport Funds to work towards much lower vehicle bus NOx
- Seek funds for accelerated rollout of Ultra-Low Emissions Vehicles (ULEV) that include electric and hybrid options and opportunities for taxi licencing
- Joint Project with University of Sussex, Brussels and Barcelona on rapid electric vehicle charging infrastructure

- Work with Highways regarding proposed changes for traffic flow in Rottingdean High Street following funding allocation
- Air Quality Action Plan hierarchy for energy on developments avoiding fixed plant combustion with preference for renewable without emissions to air
- Explore options for grid balancing and hydrogen storage with merits considered for City Development Areas (DA) and local transport fleets
- Continue talks with the Harbours Authority to discuss their schedule to procure Euro-VI emission vehicles
- Sussex Air Quality Partnership project across a number of Local Authorities for an anti-idling campaign including an educational and awareness project working with local schools and businesses
- There are no plans to revoke the existing AQMAs during the next year. The action plan summary table (included in this Annual Status Report) provide updates on progress since the 2015 AQAP
- Brighton & Hove participates in the Local Government Advisory Board on Air Quality hosted at Department for Environment
- Brighton Bus Ultralow Emission Zone requires accelerated uptake of euro-VI compliant buses
- Reach agreement with JAQU related to revised allocation of remaining Clean Bus Transport Funds to work towards much lower vehicle emission of NOx
- Seek assistance for accelerated rollout of Ultra-Low Emissions Vehicles that include electric and hybrid options

The principal challenges and barriers to implementation that Brighton & Hove City Council's anticipates are:

1. Lack of funds to retrofit euro-V buses
2. Annual changes in central and local government funding streams and grant and bid allocations makes financial and strategic planning a challenge. Particularly with the uncertainty in relation to the impact of BREXIT.

3. Working in a field where technology is new and innovative and sometimes needs testing to assess viability and at the same time delivering in accordance with procurement and financial regulations and standing orders.

Progress on the following measures has been slower than expected due to:

1. Adaptation of vehicles to test and fit new technology such as exhaust retrofits relies on commercial businesses withdrawing vehicles from service
2. Working with new and innovative technology does bring with it uncertainty around implementation timetables and challenges when scaling up and down to different vehicle and fleet sizes

Whilst the measures stated in Table 2.2 will help to contribute towards compliance, Brighton & Hove City Council anticipates that further additional measures including continued behavioural changes will be required in subsequent years to achieve compliance and enable the revocation of the City Centre and Portslade AQMA and the Rottingdean AQMA.

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

| Measure No. | Measure | EU Category | EU Classification | Organisations involved and Funding Source | Planning Phase | Implementation Phase | 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 | Unitary Authority Highways liaising with several bus operators & Traffic Regulation Condition (TRC) | 2017/18 | 2017-2024 | NOx emission reduction on very high mileage vehicles plying trade through the AQMA | Compliance with Euro-V Emissions Standard through the LEZ | NO2 reduced from 63 (2012) to 48 µg/m3 | Requires exhaust fit grants to accelerate compliance as soon as possible | Bus Operators given time to comply with Euro-VI. |
| 2 | Exhaust Fit of Diesel Buses | Promoting Low Emission Transport | Low Emission Zone (LEZ) | EP and DfT Clean Bus Transport Fund Brighton & Hove Bus Company | 2013 | 2014-2016 | NOx emission reduction on very high mileage 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 | Operators ceased on Brighton Services do not qualify for the retrofit grant |
| 3 | Procurement of Euro-VI buses with micro-engines and regenerative braking | Promoting Low Emission Transport | Company Vehicle Procurement - Prioritising uptake of low emission vehicles | Brighton & Hove Bus Company | 2015 | 2015-2018 | Hybrid Electrical Vehicle | Replacing Older Vehicles | Complete | Phase I & II implemented Phase III due 2018 | N/A |
| 4 | Bus Procurement Next Steps for High Capacity Double Decks and Artics | Promoting Low Emission Transport | Company Vehicle Procurement - Prioritising uptake of low emission vehicles | Brighton & Hove Bus Company Big Lemon Bus Company | 2017/18 | 2018/19 | Discussions with Manufacturers | 99% NOx reduction compared with Euro-V | Ongoing | 2020 | Market Availability of high capacity no emission vehicles |
| 5 | Exhaust Fit of Taxi Minibus and Saloons | Promoting Low Emission Transport | Taxi emission incentives | EP and DfT Clean Vehicle Transport Fund Citycabs and Radiocabs Low Carbon Vehicle Partnership | 2014 | 2016/17 | 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 |

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| 6 | Taxi Licencing to work towards lower emission vehicles | Promoting Low Emission Transport | Taxi Licensing conditions | EP Taxi Licence Forum Seeking Joint Venture Across the Sussex Air Group | 2017 | 2018 | 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 | EP and Taxi Licence Forum | 2014 | 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 que duration in the AQMA | Traffic Management | UTC, Congestion management, traffic reduction | EP, Traffic Control | 2017 | 2018 | 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 |
| 9 | Rapid Vehicle Charging SE Network | Promoting Low Emission Transport | Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | Sussex Air Group and Office of Low Emission Vehicles | 2015 | 2015 | 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 | At new Developments on Street and at fuel stations | 2017 | ongoing | 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 | EP to Liaise with Highways | 2015 | ongoing | Improve traffic flow, reduce queuing and idling, reduce emission enclosure, increase distance between exhaust and | To be monitored | Advice on Valley Gardens Scheme | Phase I 2018 | Other considerations of Highways Schemes |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | residential façade | | | | |
| 12 | Assess Environmental Capacity of Key Transport Corridors Through the AQMA | Traffic Management | Public transport improvements-interchanges stations and services | EP Advice to Highways and Bus Company | 2015 | ongoing | Advise on emission standard & traffic limit 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 | 2019 | 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 | EP and Planning Policy, Development Control | 2016 | Ongoing | 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 sources | EP and Planning Policy, Development Control | 2015 | Ongoing | 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 |
| 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 | EP and Planning Policy, Development Control | 2015 | Ongoing | 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 | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | EP and Planning Policy, Development Control | 2007 | Ongoing | Best Practice | Developments that are beneficial for emissions and air quality compared with | Development of urban sites that have a lower pollution footprint than the previous land use: light industrial, petrol | Ongoing | Traffic contribution on some new developments |

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| | local air quality and Public exposure especially around the AQMA | | | | | | | previous land use | station, car park | | |
| 17 | Any domestic fuel burning to use smokeless and seasoned fuels with Defra exempt stoves and appliances | Public Information | Via the Internet | EP and AQ Action Plan, Defra grant | 2012 | 2013 | 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 | EP | 2012 | 2013 | Web Information response to complaints | Appropriate waste disposal for City Centre | Improved Awareness | Constant | Lack of awareness of the AQMA and health sensitivities |
| 19 | Development of Planning Policy to Support Ultralow Emission Vehicles, signs & lines, foliage and planting | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | EP Sussex AQ Partnership. Progress with Planning Policy | 2015 | 2018 | Update to planning policy | Potential to reduce and mitigate emissions | Discussion with Planning | Constant | NPPF requires developer contributions in support of air quality action plans |
| 20 | Lessons learned from events, road closures and traffic re-routing | Traffic Management | UTC, Congestion management, traffic reduction | EP and Traffic Control | Ongoing | Ongoing | Track days in the year when AQMA road links are closed. Could increase as City Centre is used for event space. | 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 and air quality. |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | Review of Higher Emission Standard for the LEZ. | Promoting Low Emission Transport | Low Emission Zone (LEZ) | EP and Highways Report to Committee | 2017 | 2018 | 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 Construction | Freight and Delivery Management | Freight Consolidation Centre | Planning CEMP | 2015 | 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 | EP and Harbours Authority grants considered | 2016 | Ongoing | 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 | EP Liaising with Traffic Control Transport Schemes and Road Safety | 2015 | 2018 | 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 | 2017 | Ongoing | 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 Consolidation Centres "last mile services" to avoid heavy freight movements in the AQMA | Freight and Delivery Management | Freight Consolidation Centre | LTP4 | 2015 | Unknown | 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 | 2015 | | 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 and sensitive residential | Promoting Travel Alternatives | Other | Hackney Carriage and EP | 2015 | Ongoing | 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 Management | Delivery and Service plans | Highways | 2015 | Done | Visiting Tourist Coaches held on Madeira Drive | Avoidance of emission in AQMA engine off when waiting | Effective holding area fewer complaints | Done | |
| 30 | Alter position of traffic emissions in Rottingdean High Street | Transport Planning and Infrastructure | Other | Highways, EP and Local Parish Council | 2017 | 2018 | 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 | EP and Planning Policy, Development Control | 2007 | Ongoing | 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 | EP and Planning Policy, Development Control | 2015 | 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 | Intensive active travel campaign & | Transport and Health Joint Working Group | 2017 | 2017 | Increase active travel to work and | More healthy workers | Funding Secured | 2017 | Officer Allocated |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alternatives | infrastructure | | | | education | | | | |
| 34 | Bike Share | Transport Planning and Infrastructure | Public cycle hire scheme | Transport | 2017 | 2017 | Increase in cycling | Uptake to be monitored | Scheme Starting Summer 2017 | 2017 | Sponsor agreement took time |
| 35 | Educational Anti-Idling Campaign | Traffic Management | Anti-idling enforcement | EP, Enforcement Officers, Sussex Air Group, Cool World Consulting | 2017 | 2018 | Volunteer and 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 | Highways Planning, EP and Lang O'Rourke | 2016 | 2017-2026 | 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.

For this reason in recent years Brighton & Hove City Council has chosen to monitor $PM_{2.5}$. To complement the AURN monitoring station in Preston Park the Council monitors for $PM_{2.5}$ at two roadside sites BH6 on Lewes Road and BH10 on North Street.

Sussex Air alert mostly refers to regional fine particulate and ozone air pollution episodes. Via multi-media those that sign up are sent air alerts informing them of a period of higher air pollution. Using Defra project funds the Council previously produced a public facing pamphlet burning solid fuels safely and legally. Many of the measures set out in the Council AQAP for $NO_2$ will also help particulate levels that are close to meeting WHO guidelines across the city including at roadside. That said there is no safe level and any improvement will help improve public health outcomes.

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

## 3.1 Summary of Monitoring Undertaken

In 2017 the City Council continued to monitor in the same background and roadside sites as in 2015/16. There were minor additions to the set of nitrogen dioxide diffusion tubes. For example two sample sites on Boundary Road, Portslade tested the possibility of an AQMA revocation in that area. Improvement in long term $NO_2$ concentrations across all of Hove and Portslade will be required if the AQMA is to be revoked across a wider area. Remaining hotspots in the western part of Brighton & Hove City Council include the north end of Sackville Road, Wellington Road and Trafalgar Road, Preston Road and The Drove.

### 3.1.1 Automatic Monitoring Sites

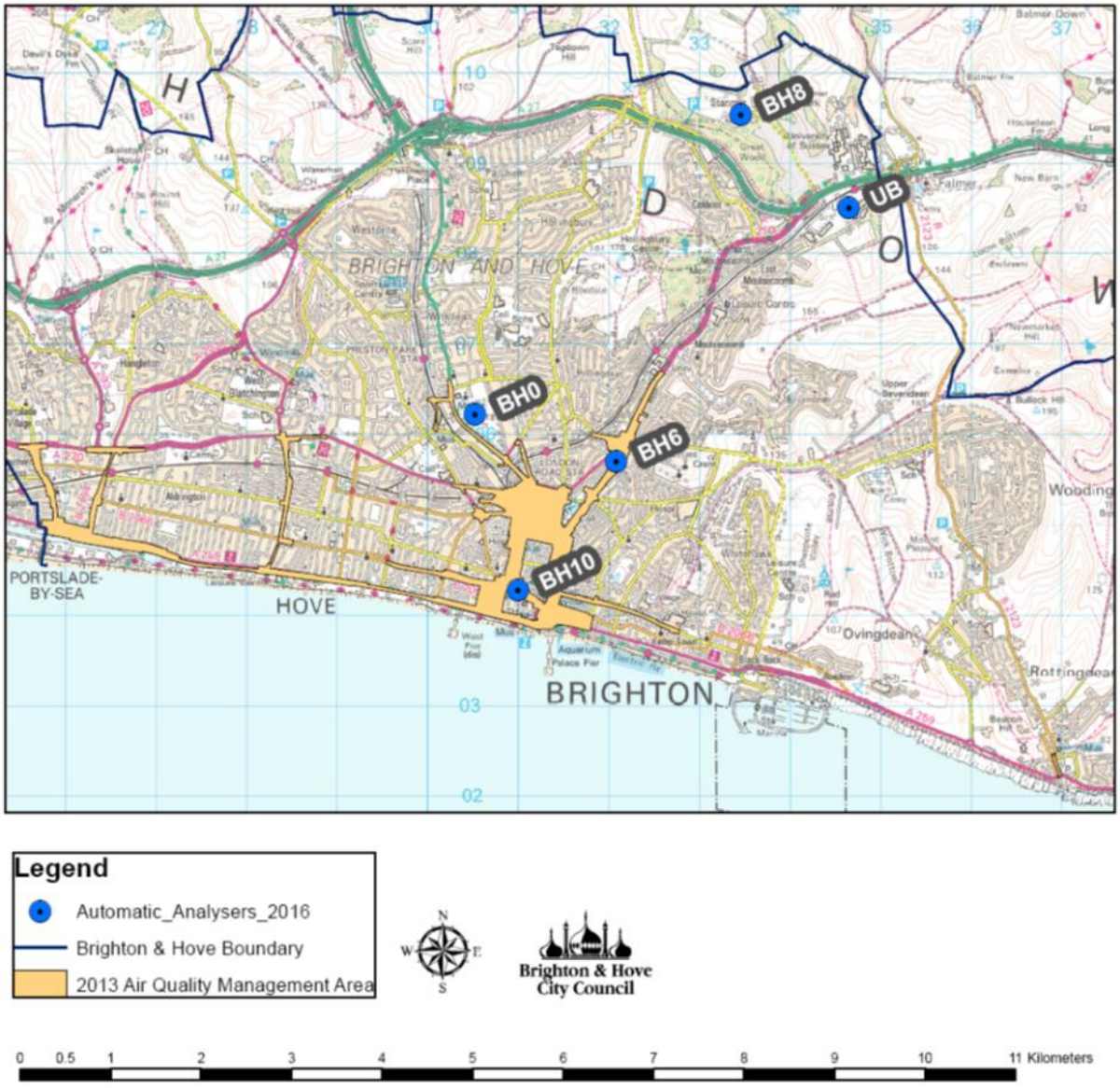
This section sets out what monitoring has taken place and how it compares with objectives.

Brighton & Hove City Council undertook automatic monitoring at two sites during 2017. Table A.1 in Appendix A shows the details of the sites. National monitoring results for the AURN (Automatic Urban Rural Network) are available on line[13] and include the local background monitor located in Person Park, Brighton. The University of Brighton has a background air monitor on its campus.

Maps of archive monitoring sites are shown in past LAQM reports. Figure 1 below shows the location of automatic air monitoring sites that were active in 2016/17 within Brighton & Hove City Council area.

[13] Preston Park AURN results found at: https://uk-air.defra.gov.uk/networks/network-info?view=aurn

**Figure 1 2017 Active Automatic Analysers Brighton & Hove**



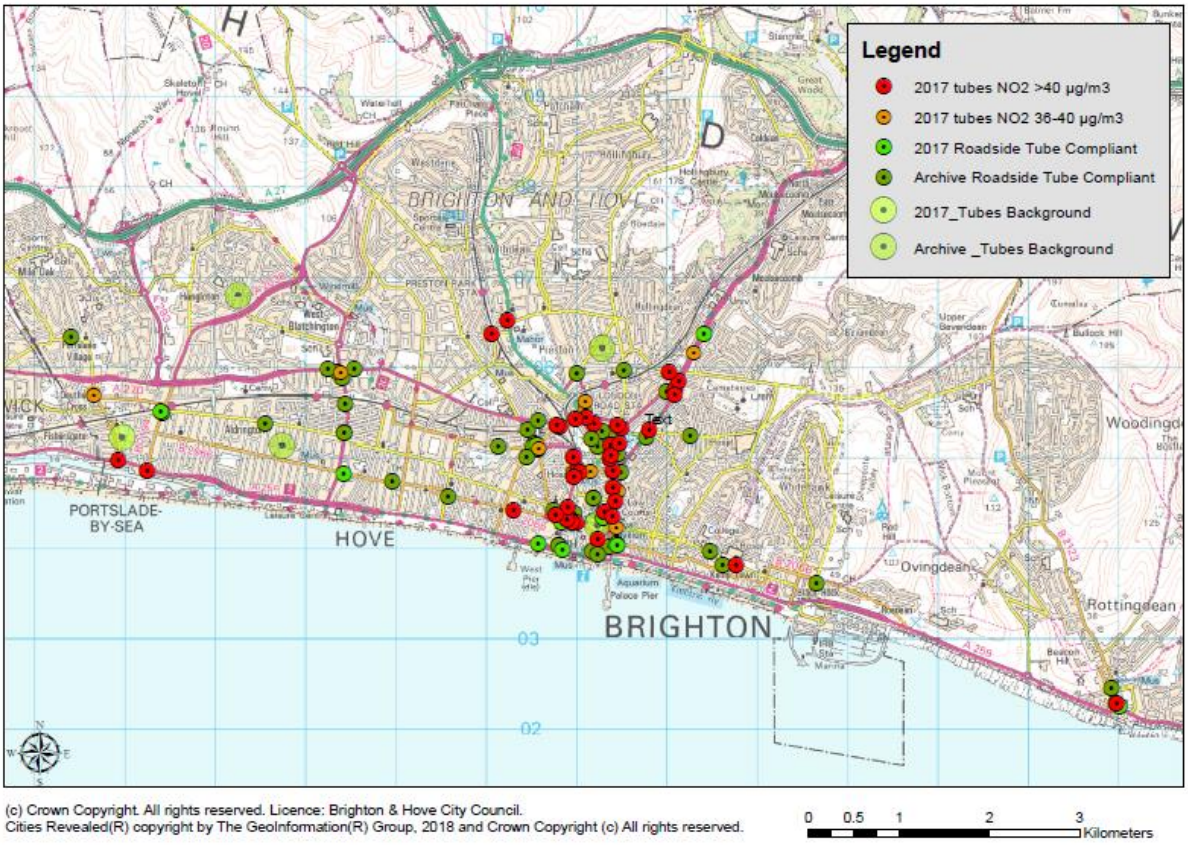

Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

### 3.1.2 Non-Automatic Monitoring Sites

Brighton & Hove City Council undertook non- automatic (passive) monitoring of $NO_2$ at sixty-two sites during 2017 including two triplicate sites co-located with automatic analysers BH6 and BH10. Table A.2 in Appendix A shows the details of each area. More detailed maps for each sub area are presented in Appendix D.

An overview of $NO_2$ diffusion tubes within Brighton & Hove City Council area is mapped in Figure 2.

**Figure 2 - 2017 and Archive Nitrogen Dioxide Diffusion Tubes Brighton & Hove**




Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied are included in Appendix C.

## 3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, "annualisation" and distance correction. Further details on adjustments are provided in Appendix C.

### 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/$m^3$. In 2017 $NO_2$ was monitored at three automatic sites; two at roadside and the AURN site located in a large suburban park. All sites include regular filter changes, maintenance checks and calibrations in accordance with LAQM (Technical Guidance 2016) TG16.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B. Results are reported for sixty-six tubes at sixty-two sites. All tubes have been adjusted so representative of exposure in accordance with LAQM TG16.

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 200 µg/m$^3$, not to be exceeded more than 18 times per year. Recent and archive automatic analysers sites for $NO_2$ labelled with most recent results are presented below.

**Figure 3 NO2 Automatic Analysers 2017 and Archive Brighton & Hove**

**Figure 4 NO2 Automatic Analysers City Centre**


Exceedance of the annual mean greater than 60µg/m$^3$, indicates that an exceedance of the 1-hour mean standard continues for two areas of the city that is: North Street and London Road. The autmatic analyser on Lewes Road recorded hourly exceedances during the 2017 calendar year.

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

Archive monitorng of $PM_{10}$ is set out in past LAQM reports. In recent years the highest annual average for $PM_{10}$ was 27 µg/m$^3$. As no recent exceedances of $PM_{10}$ were recorded the City Council has chosend to targeted resource at monitoring $PM_{2.5}$ instead. The pollutant is especially important to health and guides the Public Health Outcomes Framwork.

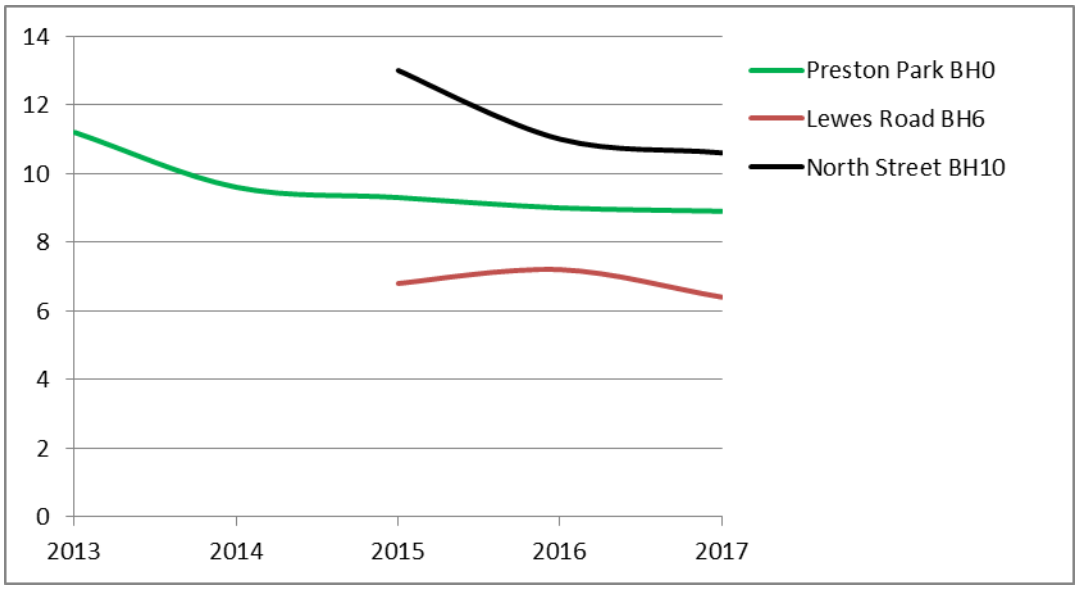
### 3.2.3 Particulate Matter ($PM_{2.5}$)

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

Levels recorded at the Preston Park AURN site show an improvement over the past five years and are close to complaince with WHO guidelines. Levels on North Street are higher than suburban background and other roadside locations as shown in Figure 5.

## Figure 5 2017 Particulate Matter ($PM_{2.5}$) monitoring Brighton & Hove


## Figure 6 Particulate Matter ($PM_{2.5}$) Trends Brighton & Hove



### 3.2.4 Sulphur Dioxide ($SO_2$)

Brighton and Hove does not have an AQMA for $SO_2$. Council archives and more recent university monitors show concentrations are not recorded close to any of the standards for $SO_2$ set out in the national air quality strategy.

Table A.6 in Appendix A compares the ratified continuous monitored $SO_2$ concentrations for year 2017 with the air quality objectives for $SO_2$. The monitoring data has been ratified by *Environment Technology Ltd.*

# Appendix A: Monitoring Results

## Table A.1 – Details of Automatic Monitoring Sites Archive and Continuous

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | 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 | $NO_2$, $PM_{2.5}$ | YES | API Chemiluminescent, TEOM | 1 | 1.5 | 3 |
| BH10 | North Street near Ship Street | Roadside | 530995 | 104271 | $NO_2$, $PM_{2.5}$ | YES | API Chemiluminescent | 0 | 6 | 3.5 |
| BH0 | Preston Park AURN | Suburban Background | 530526 | 106218 | $NO_2$, $PM_{2.5}$, $O_3$ | NO | API Chemiluminescent, Partisol | N/A | 200 | 5 |
| BH8 | Stanmer | Rural | 533457 | 109526 | $O_3$ | NO | API Chemiluminescent | N/A | >200 | 3.5 |
| LH | Lullington Health AURN | Rural in Wealden | 553800 | 101600 | $NO_2$, $O_3$, $PM_{10}$, $SO_2$ | NO | API Chemiluminescent | N/A | N/A | 3 |
| UB | University of Brighton | Suburban Background | 534653 | 108503 | $NO_2$, $PM_1$,$PM_{2.5}$, $PM_{10}$, $SO_2$, nitrous acid, formaldehyde | NO | Differential Optical Absorption Spectroscopy | N/A | 200 | 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.

## Table A.2 – Details of Non-Automatic Monitoring Sites

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| C03 | St James Street | Roadside | 531439 | 104045 | NO2 | YES | 0 | 3.8 | NO | 2.7 |
| C3-2015 | St James Street Lamp | Kerbside | 531448 | 104034 | NO2 | YES | 2.5 | 3 | NO | 2.8 |
| C04 | Lower North Street-Castle Square | Roadside | 531228 | 104088 | NO2 | YES | 0 | 5.7 | NO | 2.7 |
| C05-2012 | Pavilion Gardens Background BG | Urban Background | 531230 | 104260 | NO2 | NO | >100 | 102 | NO | 2.8 |
| C08 | Brighton Pavilion Lower | Roadside | 531292 | 104321 | NO2 | YES | 0 | 18.2 | NO | 2.4 |
| C09 | Marlborough Place | Roadside | 531302 | 104392 | NO2 | YES | 0 | 4.3 | NO | 3.2 |
| C10-2012 | North Street BH10 Triplicate | Roadside | 530995 | 104271 | NO2 | YES | 0 | 6.1 | YES | 2.5 |
| C11 | North Street Central | Roadside | 530947 | 104284 | NO2 | YES | 0 | 6.5 | NO | 3 |
| C11-2012 | North Street Clock Tower | Kerbside | 530890 | 104302 | NO2 | YES | 0 | 2.7 | NO | 2.5 |
| C12 | Queens Street north of Clock | Roadside | 530900 | 104451 | NO2 | YES | 0 | 4.2 | NO | 3 |
| C12-2013 | Main Station Taxi Rank | Roadside | 531014 | 104302 | NO2 | YES | 0 | 2.8 | NO | 2.5 |
| C13-2014 | Lower Dyke Road-Churchill Square | Roadside | 530770 | 104363 | NO2 | YES | 0 | 3.3 | NO | 3.1 |
| C14 | West Street south of Clock | Roadside | 530833 | 104276 | NO2 | YES | 0 | 4.8 | NO | 2.8 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tower | | | | | | | | | |
| C15 | Gloucester Place re-instated 2014 | Roadside | 531401 | 104669 | NO2 | YES | 0 | 8.4 | NO | 3 |
| C16 | York Place | Roadside | 531400 | 104844 | NO2 | YES | 0 | 4.9 | NO | 2.8 |
| C17-2012 | Cheapside nr Pelham Street | Roadside | 531364 | 104982 | NO2 | YES | 0 | 3.4 | NO | 2.4 |
| C18-2014 | London Road near Oxford | Kerbside | 531376 | 105012 | NO2 | YES | 0 | 3 | NO | 2.8 |
| C18 | Oxford Street-London Road | Roadside | 531376 | 105012 | NO2 | YES | 0 | 3.3 | NO | 2.5 |
| C19 | Oxford Street-Ditchling Road | Roadside | 531472 | 105161 | NO2 | YES | 0 | 3.4 | NO | 2.6 |
| C20 | Ditchling Road-Viaduct Terrace | Roadside | 531496 | 105315 | NO2 | YES | 0 | 4.7 | NO | 2.2 |
| C21 | Viaduct Terrace | Roadside | 531451 | 105356 | NO2 | YES | 0 | 3.6 | NO | 3.1 |
| C23 | London Road-Preston Circus | Roadside | 531189 | 105375 | NO2 | YES | 0 | 5.4 | NO | 3 |
| C24 | New England Road-Preston Circus | Roadside | 531101 | 105443 | NO2 | YES | 0 | 3.6 | NO | 3 |
| C25 | New England Road-Argyle Road | Roadside | 530985 | 105419 | NO2 | YES | 0 | 3.5 | NO | 2.7 |
| C27 | Trafalgar Street | Roadside | 531151 | 104850 | NO2 | YES | 0 | 2.8 | NO | 2.5 |
| C28 | Frederick Place | Roadside | 531032 | 104843 | NO2 | YES | 0 | 2.8 | NO | 2.4 |
| C29 | Kingsway Facade | Roadside | 530848 | 103970 | NO2 | YES | 0 | 4.2 | NO | 2 |
| E01 | Preston Road-Preston Circus | Roadside | 531090 | 105510 | NO2 | YES | 0 | 4.5 | NO | 2.8 |
| E02 | Preston Road-Preston Drove | Roadside | 530233 | 106515 | NO2 | YES | 0 | 4 | NO | 2.7 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| E02-2012 | The Drove | Roadside | 530006 | 106368 | NO2 | YES | 0 | 2.6 | NO | 2.5 |
| E06 | Beaconsfield Road-Preston Circus | Roadside | 531102 | 105615 | NO2 | YES | 0 | 4 | NO | 2.6 |
| E07-2012 | Lewes Road Elm Grove Junction | Roadside | 531805 | 105303 | NO2 | YES | 0 | 2.9 | NO | 2.8 |
| E08 | Lewes Road-Inverness Road | Roadside | 532090 | 105752 | NO2 | YES | 0 | 4.4 | NO | 2.6 |
| E10 | Vogue Gyratory Island | Roadside | 532126 | 105838 | NO2 | YES | 0 | 3 | NO | 2.7 |
| E12 | Hollingdean Road | Roadside | 532021 | 105946 | NO2 | YES | 0 | 4.9 | NO | 2.7 |
| E14 | Lewes Road Lectern Pub | Roadside | 532409 | 106370 | NO2 | YES | 0 | 3.4 | NO | 2.9 |
| E15-2012 | Lewes Road Coombe Terrace | Roadside | 532300 | 106159 | NO2 | YES | 0 | 3.7 | NO | 2.6 |
| E16 | Grand Parade Middle | Roadside | 531396 | 104344 | NO2 | YES | 0 | 4.4 | NO | 2.6 |
| E16-2015 | 37 Grand Parade Middle West Façade | Roadside | 531429 | 104514 | NO2 | YES | 0 | 5 | NO | 3.2 |
| E17 | Grand Parade University Building | Roadside | 531402 | 104365 | NO2 | YES | 0 | 3.2 | NO | 2.8 |
| E17-2015 | 174 Edward Street North Facing Façade | Roadside | 531440 | 104225 | NO2 | YES | 0 | 2.9 | NO | 2.7 |
| E18 | Eastern Road opposite Hospital | Roadside | 532759 | 103810 | NO2 | YES | 0 | 3.5 | NO | 2.9 |
| E22 | High Street Rottingdean East Side | Roadside | 536968 | 102274 | NO2 | YES | 0 | 3.1 | NO | 2.6 |
| E23 | High Street | Roadside | 536966 | 102273 | NO2 | YES | 0 | 2.6 | NO | 2.6 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rottingdean West Side | | | | | | | | | |
| E24 | Marine Drive, Rottingdean | Roadside | 537003 | 102237 | NO2 | YES | 0 | 2.5 | NO | 2.8 |
| BH6 Triplicate | South of Vogue Gyratory | Kerbside | 532082 | 105694 | NO2 | YES | 3 | 1.5 | YES | 2.5 |
| W01 | Queens Road | Roadside | 530969 | 104785 | NO2 | YES | 0 | 4.5 | NO | 2.8 |
| W02 | Surrey Street | Roadside | 530963 | 104837 | NO2 | YES | 0 | 5.3 | NO | 2.6 |
| W03 | Terminus Road Hill | Roadside | 530963 | 104994 | NO2 | YES | 0 | 3.5 | NO | 3 |
| W04 | Chatham Place-New England Road | Roadside | 530809 | 105362 | NO2 | YES | 0 | 3.4 | NO | 3 |
| W05 | Old Shoreham Road- Hill | Roadside | 530776 | 105400 | NO2 | YES | 0 | 3.6 | NO | 3.2 |
| W07-2014 | Dyke Road-Seven Dials | Kerbside | 530554 | 105142 | NO2 | YES | 2 | 3 | NO | 3 |
| W08 | Buckingham Place-Seven Dials | Roadside | 530586 | 105104 | NO2 | YES | 0 | 8.4 | NO | 3.5 |
| W10 | Western Road | Roadside | 530302 | 104415 | NO2 | YES | 0 | 4.5 | NO | 3.2 |
| W12-12 | Church Road Hove | Roadside | 528423 | 104809 | NO2 | YES | 0 | 4 | NO | 2.7 |
| W15-16 | Boundary Road Shops | Roadside | 526404 | 105500 | NO2 | YES | 0 | 4.5 | NO | 3 |
| W16 | Wellington Road-Basin Road | Roadside | 526248 | 104857 | NO2 | YES | 0 | 3.4 | NO | 2.7 |
| W17 | Wellington Road-Church Road | Roadside | 525931 | 104961 | NO2 | YES | 0 | 3 | NO | 2.7 |
| W18 | Vale Park, Portslade BG | Urban Background | 525970 | 105230 | NO2 | NO | ~50 | 97 | NO | 2.8 |
| W19 | Trafalgar Road, | Roadside | 525657 | 105696 | NO2 | YES | 0 | 3.9 | NO | 2.8 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Portslade facade | | | | | | | | | |
| W21 | Sackville Road-Old Shoreham Rd | Roadside | 528406 | 105874 | NO2 | YES | 0 | 3.4 | NO | 2.8 |
| W22 | Kingsway the Grand Hotel | Roadside | 530578 | 104046 | NO2 | YES | 5 | 3 | NO | 2.8 |

**Notes:**

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

(2) N/A if not applicable.

## Table A.3 – Annual Mean $NO_2$ Monitoring Results

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2017 (%) (2) or periods (months) | $NO_2$ Annual Mean Concentration (µg/m$^3$) (3) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2013 | 2014 | 2015 | 2016 | 2017 |
| BH6 | Roadside | Automatic | N/A | 89.8 | **48.4** | **48.7** | 39 | **46.2** | **51.1** |
| BH10 | Roadside | Automatic | N/A | 99.3 | **59.7** | **56.4** | **52.5** | **47.1** | **50.3** |
| BH0 | Park Background | Automatic | N/A | >95 | 16.7 | 16 | 14.8 | 16.5 | 16.9 |
| LL1 | Rural | Automatic | N/A | >95 | 8.5 | 6.4 | 7 | 7.8 | 8.2 |
| C03 | Roadside | Diffusion Tubes (DT) | N/A | 10 | 39.9 | 36.3 | 33 | 35.3 | 34.1 |
| C3-2015 | Kerbside | DT Continued | N/A | 5 | | | 37.3 | **40.2** | **40.5** |
| C04 | Roadside | | N/A | 11 | **58.1** | **59** | **50.1** | **49** | **43.8** |
| C05-2012 | Urban Background | | N/A | 11 | 26.1 | 22.6 | 22.5 | 26.1 | 23.6 |
| C08 | Roadside | | N/A | 5 | 34.6 | 32.7 | 29.4 | 32.4 | 32.7 |
| C09 | Roadside | | N/A | 11 | **60.2** | **58.7** | **47.3** | **48.4** | **47.4** |
| C10-2012 | Roadside | | N/A | 11 | **65.5** | **53.6** | **52.5** | **48.3** | **45.2** |
| C11 | Roadside | | N/A | 11 | **84.6** | **68.3** | **59.8** | **60.3** | **57.3** |
| C11-2012 | Kerbside | | N/A | 9 | **114.8** | **121.5** | **91.9** | **100.3** | **77.9** |
| C12 | Roadside | | N/A | 9 | **49.7** | **52.3** | **42.1** | **45.9** | **43.1** |
| C12-2013 | Roadside | | N/A | 9 | **48.8** | **52.5** | 39.2 | **44.7** | **43.1** |
| C13-2014 | Roadside | | N/A | 11 | | **53.2** | **41.7** | **41.5** | **41.6** |
| C14 | Roadside | | N/A | 11 | | 35.3 | 33.6 | 37.7 | **40.6** |
| C15 | Roadside | | N/A | 7 | | **45.7** | **43.1** | **44.3** | 35.2 |
| C16 | Roadside | | N/A | 11 | **49.3** | **48.3** | **43.8** | **45.1** | **44.6** |
| C17-2012 | Roadside | | N/A | 11 | **56.9** | **64.2** | **61.3** | **55.4** | **44.5** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C18-2014 | Kerbside | | N/A | 11 | | 76.4 | 75.7 | 72.2 | 63.1 |
| C18 | Roadside | | N/A | 11 | 68.6 | 62.1 | 60.2 | 64.3 | 58.1 |
| C19 | Roadside | | N/A | 10 | 54.6 | 49.2 | 43.2 | 43.8 | 44.9 |
| C20 | Roadside | | N/A | 9 | 45.7 | 47.5 | 39.7 | 41.3 | 40.5 |
| C21 | Roadside | | N/A | 11 | 57.9 | 62.7 | 54.6 | 52.2 | 49.7 |
| C23 | Roadside | | N/A | 11 | 49.8 | 46.2 | 43.9 | 46 | 47.0 |
| C24 | Roadside | | N/A | 11 | | | | 52.4 | 54.8 |
| C25 | Roadside | | N/A | 11 | 53.2 | 52.9 | 45.3 | 50.2 | 47.8 |
| C27 | Roadside | | N/A | 10 | 38.7 | 39.8 | 37.6 | 39.5 | 39.8 |
| C28 | Roadside | | N/A | 10 | 51.6 | 44.6 | 44.6 | 43.1 | 46.0 |
| C29 | Roadside | | N/A | 5 | | 30.8 | 30.4 | 35 | 32.5 |
| E01 | Roadside | | N/A | 9 | 42.8 | 37.6 | 33.8 | 37.8 | 39.9 |
| E02 | Roadside | DT Continued | N/A | 10 | 48.2 | 41.2 | 39 | 41.3 | 40.3 |
| E02-2012 | Roadside | | N/A | 11 | 50.7 | 39.7 | 41.5 | 42.2 | 44.4 |
| E06 | Roadside | | N/A | 10 | 41.2 | 38.6 | 35.6 | 37.6 | 39.3 |
| E07-2012 | Roadside | | N/A | 8 | 65.8 | 60 | 54.9 | 57.4 | 48.0 |
| E08 | Roadside | | N/A | 10 | | | 57.1 | 55.4 | 55.7 |
| E10 | Roadside | | N/A | 10 | | | 45.4 | 40.9 | 43.0 |
| E12 | Roadside | | N/A | 10 | 47.6 | 46.9 | 45.2 | 45.6 | 46.2 |
| E14 | Roadside | | N/A | 10 | 43.8 | 39.2 | 35.7 | 37.4 | 37.2 |
| E15-2012 | Roadside | | N/A | 10 | 46.5 | 44.4 | 39.7 | 43.7 | 38.6 |
| E16 | Roadside | | N/A | 10 | 45.5 | 41.9 | 37.5 | 42.4 | 39.4 |
| E16-2015 | Roadside | | N/A | 9 | | | 42.7 | 49.3 | 51.1 |
| E17 | Roadside | | N/A | 11 | 44.8 | 52.3 | 51 | 46.1 | 44.2 |
| E17-2015 | Roadside | | N/A | 9 | | | 36.5 | 37.8 | 37.0 |
| E18 | Roadside | | N/A | 11 | 42.2 | 40.5 | 35.4 | 43.6 | 42.2 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| E22 | Roadside | | N/A | 10 | **44.5** | 39.7 | 31.6 | 39.1 | **41.4** |
| E23 | Roadside | | N/A | 11 | **47** | **41.3** | 37.7 | 38.4 | 35.3 |
| E24 | Roadside | | 80 | 12 | | | | 32.4 | 30.4 |
| BH6 Triplicate | Kerbside | | N/A | 7 | **48.1** | **49.6** | **40.6** | **42.3** | **43.2** |
| W01 | Roadside | | N/A | 11 | **42.7** | **47.9** | **41.3** | **45.7** | **43.1** |
| W02 | Roadside | | N/A | 10 | | 38.1 | 34.5 | 37.9 | 37.9 |
| W03 | Roadside | | N/A | 11 | **53.1** | **54.3** | **42.2** | **40.4** | **42.6** |
| W04 | Roadside | | N/A | 11 | **48.2** | **46.6** | 38.4 | **42** | **41.0** |
| W05 | Roadside | | N/A | 11 | **55.3** | **50.6** | **46.3** | **47.2** | **44.9** |
| W07-2014 | Kerbside | | N/A | 10 | | **40.4** | 34.3 | 38.2 | 38.2 |
| W08 | Roadside | | N/A | 10 | 39.9 | **41** | 38 | 38.8 | 37.3 |
| W10 | Roadside | | N/A | 11 | **55.8** | **50** | **42.9** | **41.9** | **40.9** |
| W12-2012 | Roadside | | N/A | 11 | 36.8 | 38.3 | 32.7 | 34.5 | 35.3 |
| W15-2016 | Roadside | | 100 | 11 | | | | 35.5 | 28.5 |
| W16 | Roadside | | N/A | 11 | **45** | 38.2 | **40.1** | 37.8 | **40.5** |
| W17 | Roadside | | N/A | 10 | **50.2** | **45.1** | **41.5** | **42.4** | **44.4** |
| W18 | Urban Background | | N/A | 10 | 23 | 20.1 | 21 | 19.8 | 22.3 |
| W19 | Roadside | | N/A | 11 | **51.1** | **44.8** | 39.7 | **40.2** | 38.1 |
| W21 | Roadside | | N/A | 11 | **47.7** | **44.5** | 37.2 | **40.1** | 39.4 |
| W22 | Roadside | | N/A | 5 | | **43.7** | 37.8 | 37.2 | 37.0 |

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

☒ **Annualisation has been conducted where data capture is <75% or where the tube does not represent one half of the year**

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

☒ **An increase or decrease may relate to variable data capture and sample exposure between years**

**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.**

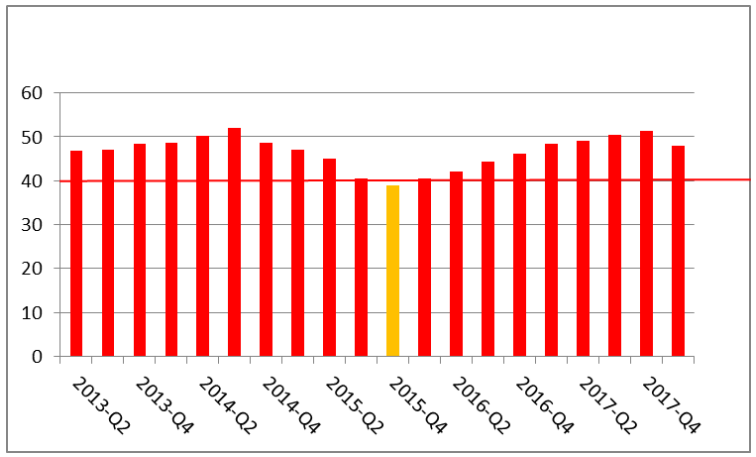
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(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%).

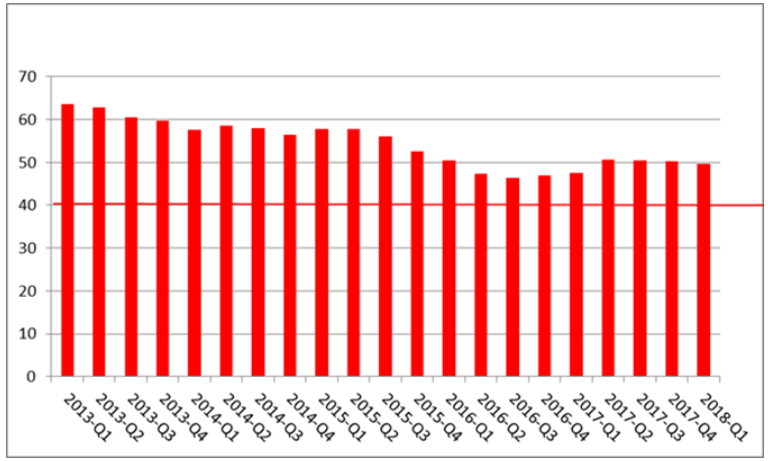
(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

**Figure A.1 – Trends in Annual Mean $NO_2$ Concentrations**

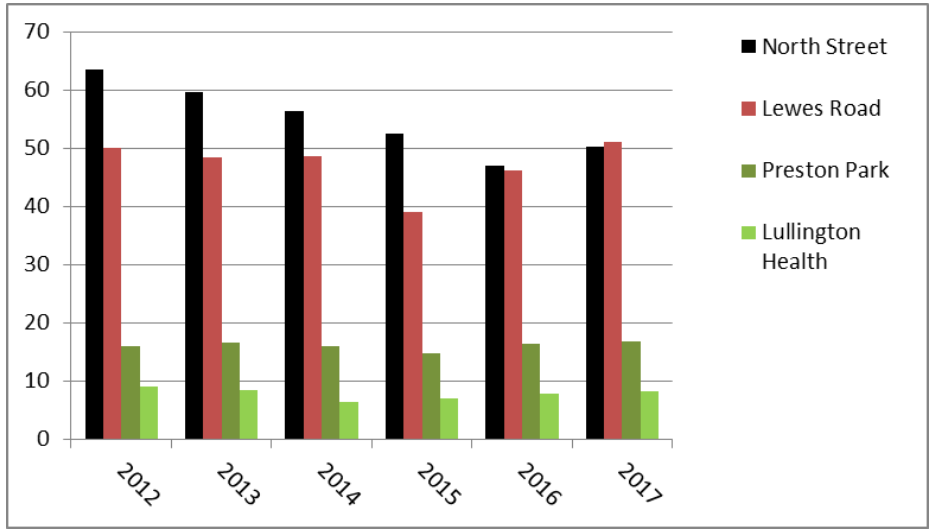
## BH6 Lewes Road Automatic Analyser - Quarterly Twelve Month Rolling Mean µg/m$^3$ (2017 Data Capture 89.3%)



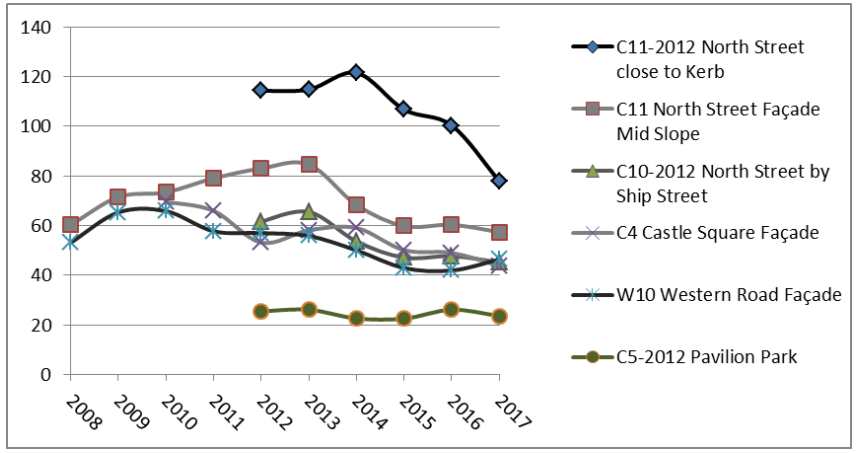

## BH10 North Street Automatic Analyser - Quarterly Twelve Month Rolling Mean µg/m$^3$ (2017 Data Capture 99.3%)



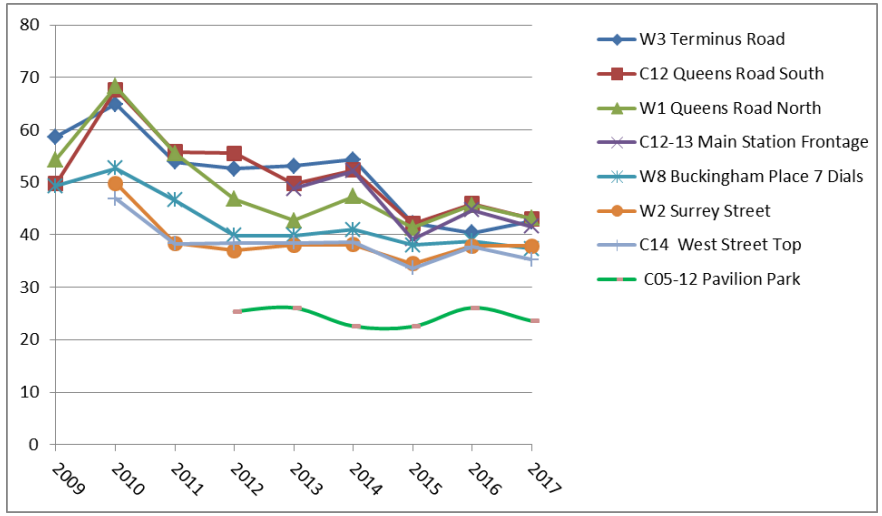
## Nitrogen Dioxide Automatic Analyser Trend Annual Averages (2012-2017)



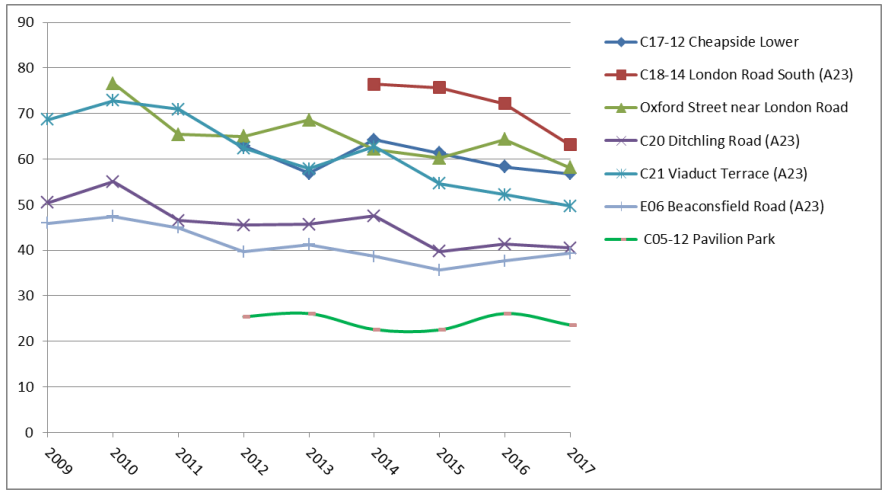

## 1 Diffusion Tube Nitrogen Dioxide Low Emission Zone North Street and Western Road (Monitors Adjacent to Roads B2066)



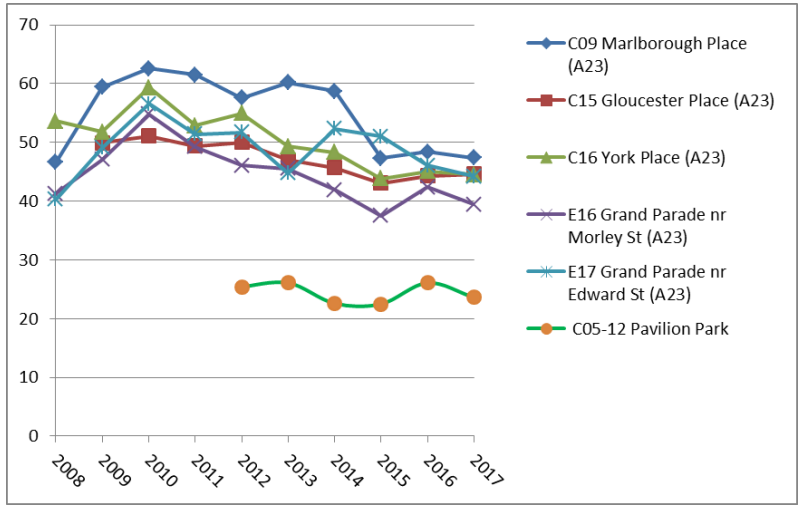
## 2 Gateway to the Sea Queens Road Station and Seven Dials (A2010)



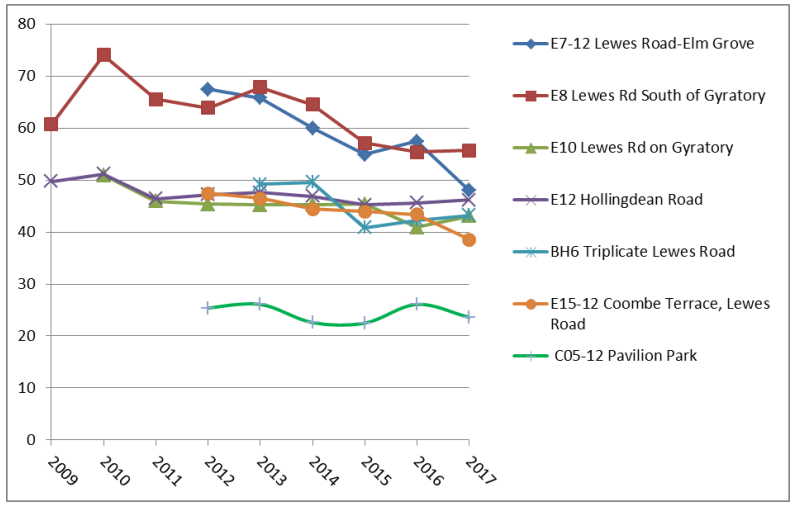

## 3 Preston Circus Area (A23)



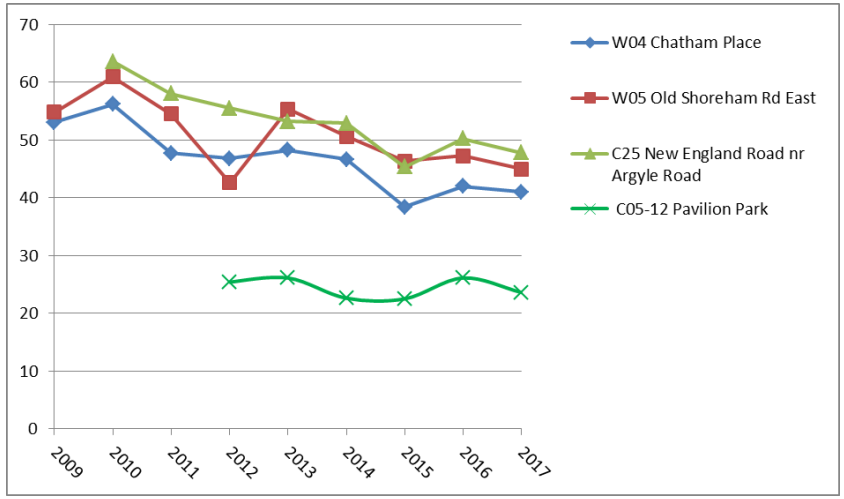
## 4 Valley Gardens (A23)



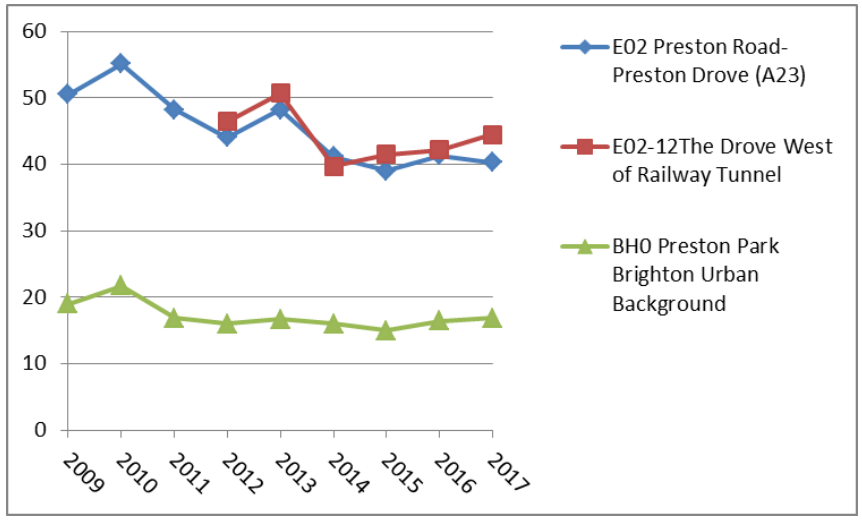

## 5 Lewes Road Area (A270 with Hollingdean Road)



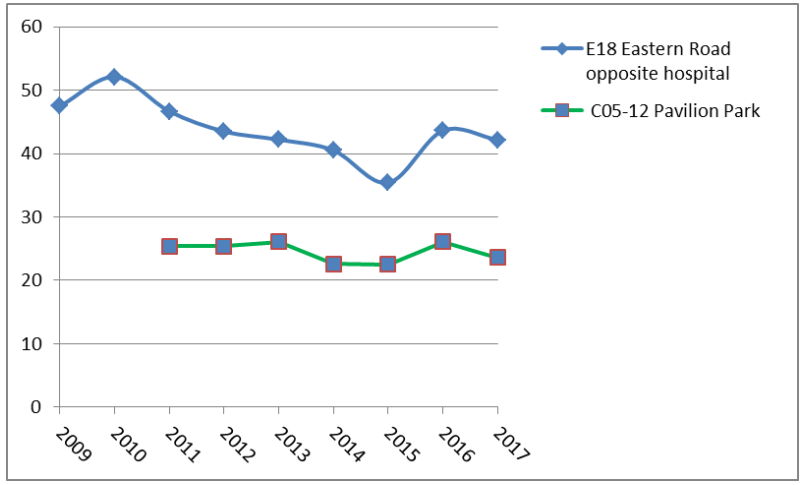
## 6 New England Road Area (A270)



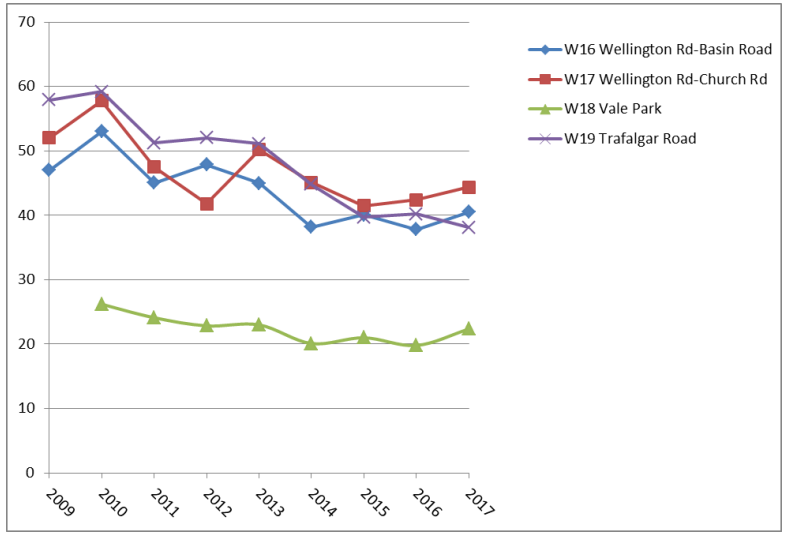

## 7 Preston Drove and Preston Road Area



## 8 Royal Sussex County Hospital Eastern Road




## 8 Portslade (A259 & B2193)



## 9 Rottingdean (A259 & B2123)

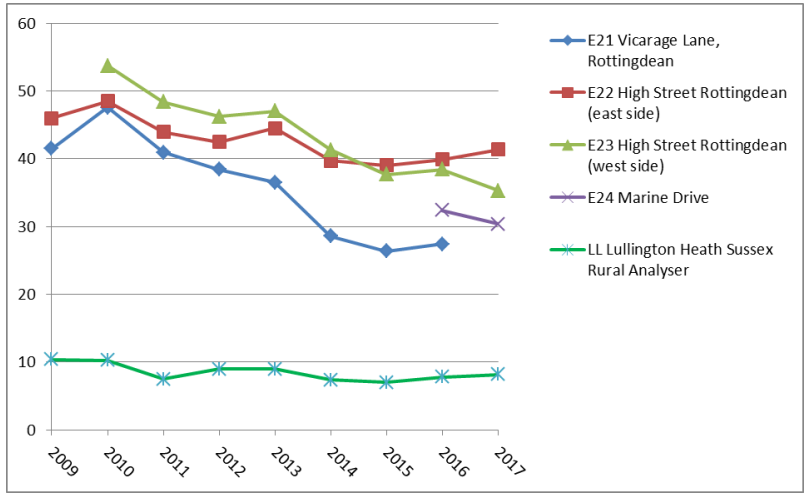


Table A.4 – 1-Hour Mean $NO_2$ Monitoring Results

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) [1] | Valid Data Capture 2017 (%) [2] | $NO_2$ 1-Hour Means > 200µg/m$^3$ [3] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2013 | 2014 | 2015 | 2016 | 2017 |
| BH6 Lewes Road | Roadside | Automatic | N/A | 89.8 | **19** | **33** | **1** | **0** | **69** |
| BH10 North Street | Roadside | Automatic | N/A | 99.3 | **13** | **8** | **13** | **0** | **0** |

**Notes:**

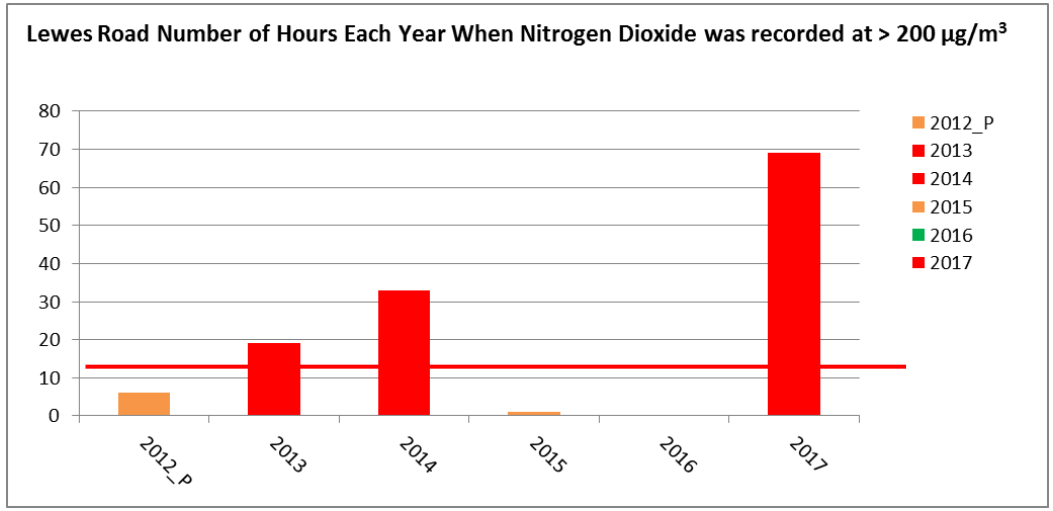
Exceedances of the $NO_2$ 1-hour mean objective (200µg/m$^3$ not to be exceeded more than 18 times/year) are shown in **bold.**

(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.

## Figure A.2 – Trends in Number of $NO_2$ 1-Hour Means > 200µg/m$^3$



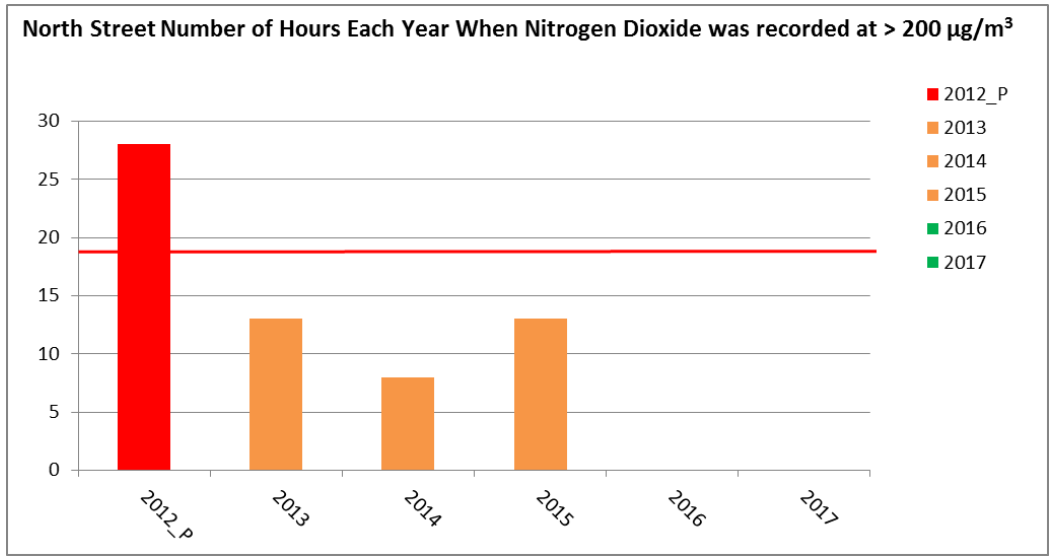



Table A.5 – $PM_{2.5}$ Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2017 (%) (2) | $PM_{2.5}$ Annual Mean Concentration (µg/m$^3$) (3) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2013 | 2014 | 2015 | 2016 | 2017 |
| BH6 | Roadside | N/A | 97.3 | | | 6.8 | 7.2 | 6.4 |
| BH10 | Roadside | N/A | 93.9 | | | 13 | 11 | 10.6 |
| BH0 AURN | Suburban Park | N/A | 87 | 11.2 | 9.6 | 9.3 | 9 | 8.9 |

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

**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) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

## Table A.6 – $SO_2$ Monitoring Results

| Site ID | Site Type | Valid Data Capture for monitoring Period (%) [1] | Valid Data Capture 2017 (%) [2] | Number of Exceedances 2017 (percentile in bracket) [3] | | |
|---|---|---|---|---|---|---|
| | | | | 15-minute Objective (266 µg/m$^3$) | 1-hour Objective (350 µg/m$^3$) | 24-hour Objective (125 µg/m$^3$) |
| UB | Suburban | ? | ? | 0 | 0 | 0 |

**Notes:**

Exceedances of the $SO_2$ objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

(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 relevant percentiles are provided in brackets.

# Appendix B: Full Monthly Diffusion Tube Results for 2017

## Table B.1 – $NO_2$ Monthly Diffusion Tube Results - 2017

| Site ID | $NO_2$ Mean Concentrations (µg/m$^3$) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | | |
| | | | | | | | | | | | | | Raw Data | Bias Adjusted (factor) and Annualised (1) | Distance Corrected to Nearest Exposure (2) B is Background |
| C03 | **43.1** | **40.6** | 38.1 | **43.1** | 35.4 | | 36.6 | | 34.5 | 34.8 | **43.8** | 38.7 | 38.9 | 34.1 | |
| C03-2015 | **46.7** | **51.2** | **45.5** | 38.9 | **45.7** | **44.8** | | | | | | | **45.5** | **40.5** | **33.7** |
| C04 | **55.8** | **59.8** | **55.2** | **48.6** | **62.0** | **65.1** | **37.7** | | **35.5** | **39.9** | **51.4** | **30.5** | **49.2** | **43.8** | |
| C05-2012 | 32.7 | 29.3 | 28.9 | 23.5 | 25.2 | 25.9 | 17.9 | | 21.7 | 25.7 | 32.1 | 28.9 | 26.5 | 23.6 | B |
| C08 | **41.2** | 37.9 | 36.1 | 32.0 | 36.7 | | | | | | | | 36.8 | 32.7 | |
| C09 | **58.7** | **54.3** | **50.9** | **54.8** | | **63.3** | **44.3** | **45.5** | **48.7** | **55.9** | **57.7** | **51.6** | **53.2** | **47.4** | |
| C10-2012 T1 | **53.1** | **37.9** | **58.8** | **54.2** | **56.9** | **65.0** | **48.4** | | 29.2 | **39.0** | **49.2** | **50.0** | **49.2** | **43.8** | |
| C10-2012 T2 | **58.6** | **56.7** | **62.1** | **48.7** | **57.5** | **65.1** | **50.1** | | 28.5 | 35.1 | **50.3** | **49.3** | **51.1** | **45.5** | |
| C10-2012 T3 | **58.6** | **57.0** | **57.3** | **48.9** | **64.4** | | **48.9** | | 29.4 | | **54.3** | **50.1** | **46.3** | **46.3** | |
| C11 | **70.1** | **72.8** | **74.7** | **59.2** | **62.9** | **81.0** | **65.3** | | 34.7 | **44.2** | **84.0** | **66.7** | **57.3** | **57.4** | |
| C11-2012 | **96.7** | **72.8** | | **68.3** | **109.7** | | **110.1** | | **46.7** | **61.9** | **119.0** | **100.5** | **87.3** | **77.9** | |
| C12 | **45.4** | **53.6** | **62.0** | **50.7** | **56.0** | | | | **44.9** | **44.5** | **40.9** | **40.8** | **48.7** | **43.1** | |
| C12-2013 | **52.1** | **54.6** | **42.3** | **41.8** | **48.2** | **50.1** | | | **46.0** | **44.5** | | **42.0** | **46.8** | **41.6** | |
| C13-2014 | **51.6** | **49.2** | **48.1** | **42.5** | **46.9** | **51.5** | **39.0** | | **35.5** | **41.6** | **48.1** | **47.6** | **45.6** | **40.6** | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C14 | 44.7 | 39.4 | 36.3 | 40.1 | 35.2 | 35.7 | 27.9 | | 47.8 | 37.4 | 48.3 | 43.1 | 39.6 | 35.2 | |
| C15 | 46.3 | 53.4 | 57.2 | 46.8 | | 55.5 | 45.3 | 46.7 | | | | | 50.2 | 44.6 | |
| C16 | 49.5 | 57.0 | 64.0 | 51.1 | | 54.2 | 43.8 | 37.9 | 40.9 | 48.8 | 56.8 | 46.1 | 50.0 | 44.5 | |
| C17-2012 | 90.1 | 73.3 | 75.0 | 52.2 | | 63.6 | 49.5 | 60.5 | 56.6 | 59.5 | 61.1 | | 64.1 | 56.7 | |
| C18-2014 | 67.9 | 92.9 | 90.6 | 83.5 | | 63.7 | 67.3 | 52.6 | 42.3 | 67.6 | 97.7 | 53.7 | 70.9 | 63.1 | |
| C18 | 82.0 | 66.2 | 79.4 | 81.3 | | 32.6 | 48.5 | 59.8 | 50.8 | 67.0 | 81.7 | 69.2 | 65.3 | 58.1 | |
| C19 | 55.0 | 51.1 | 54.1 | 45.8 | | 62.2 | | 41.3 | 41.9 | 49.4 | 54.0 | 49.3 | 50.4 | 44.9 | |
| C20 | 56.2 | 42.5 | 55.7 | 44.6 | | | | 39.0 | 40.7 | 48.2 | 51.4 | 41.8 | 46.7 | 40.5 | |
| C21 | 60.9 | 60.6 | 65.8 | 50.6 | | 65.8 | 51.1 | 48.7 | 53.5 | 58.7 | 48.4 | 50.2 | 55.8 | 49.7 | |
| C23 | 55.5 | 57.6 | 59.3 | 48.0 | | 65.8 | 42.0 | 50.3 | 45.5 | 57.1 | 54.4 | 45.0 | 52.8 | 47.0 | |
| C24 | 70.9 | 65.9 | 71.5 | 52.9 | | 52.3 | 45.3 | 53.7 | 51.6 | 59.4 | 83.7 | 70.1 | 54.8 | 54.8 | |
| C25 | 59.6 | 62.2 | 54.1 | 48.7 | | 50.2 | 44.0 | 39.1 | 56.0 | 62.9 | 61.4 | 52.2 | 47.8 | 47.8 | |
| C27 | 49.0 | 46.7 | 52.0 | 29.9 | | | 35.8 | 49.5 | 40.1 | 48.3 | 53.5 | 40.8 | 44.5 | 39.8 | |
| C28 | 51.7 | 62.3 | 64.8 | 35.8 | | 47.5 | 44.1 | | 50.4 | 54.6 | 58.4 | 47.2 | 51.7 | 46.0 | |
| C29 | 42.7 | 36.5 | 37.4 | 34.6 | 33.1 | | | | | 34.8 | | | 36.5 | 32.5 | |
| E01 | | | | 43.8 | 55.0 | 39.5 | 33.0 | 40.8 | 41.5 | 53.7 | 49.3 | 43.4 | 43.4 | 39.9 | |
| E02 | | | | 41.6 | 37.2 | 47.5 | 39.6 | 43.8 | 46.0 | 43.2 | 45.4 | 53.9 | 44.2 | 40.3 | |
| E02-2012 | | | | 43.6 | 55.2 | 59.3 | 38.8 | 49.1 | 49.2 | 48.1 | 47.8 | 48.4 | 48.8 | 44.4 | |
| E06 | . | 41.7 | . | 37.7 | 37.2 | 39.4 | 38.8 | 41.5 | 48.0 | 49.2 | 48.3 | 48.3 | 43.0 | 39.3 | |
| E07-2012 | | | 61.4 | 25.4 | | 58.2 | 49.7 | 51.8 | | | 55.7 | 69.0 | 54.0 | 48.0 | |
| E08 | | 56.1 | 62.3 | 56.5 | 57.5 | 58.5 | 53.4 | 71.0 | | | 77.8 | 67.6 | 62.3 | 55.7 | |
| E10 | | 56.1 | 45.8 | 45.4 | 50.9 | 38.0 | 39.8 | 54.4 | | | 54.6 | 47.4 | 48.0 | 43.0 | |
| E12 | | 58.0 | 55.0 | 46.4 | 53.0 | 58.0 | 40.4 | 46.8 | | | 52.7 | 54.4 | 51.6 | 46.2 | |
| E14 | | 47.0 | 42.2 | 37.1 | 53.2 | 42.7 | 36.0 | 28.0 | | | 45.5 | 42.3 | 41.6 | 37.2 | |
| E15-2012 | | 49.9 | 46.4 | 45.1 | 56.9 | 41.5 | 37.7 | 40.0 | | | 43.0 | 49.4 | 43.0 | 38.6 | |
| E16 | | 42.8 | 51.4 | 46.3 | 50.2 | 42.3 | 38.6 | 38.9 | 44.7 | 44.6 | | 39.0 | 43.9 | 39.4 | |
| E16-2015 | | 55.4 | 56.2 | 50.7 | 51.1 | 91.5 | | | 53.4 | 55.2 | 49.6 | 52.0 | 57.2 | 51.1 | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E17 | | **49.1** | **58.2** | **47.3** | **56.3** | **56.9** | | **43.4** | **51.9** | **49.3** | **46.3** | **42.4** | **50.1** | **44.2** | |
| E17-2015 | | **41.3** | **43.1** | **41.1** | | | 36.2 | **46.3** | 46.4 | | **46.3** | 36.6 | **37.5** | 37.0 | |
| E18 | **46.8** | **49.0** | **53.0** | **43.5** | **51.1** | 37.7 | 38.5 | **45.2** | **50.4** | **53.6** | **50.9** | **48.8** | **47.4** | **42.2** | |
| E21 | **52.9** | **48.2** | 50.9 | **41.8** | **46.7** | 35.5 | 44.6 | **21.9** | **37.4** | **40.0** | **51.0** | **87.3** | **46.5** | 41.4 | |
| E22 | 39.5 | 42.1 | 40.6 | **42.6** | **43.6** | **36.3** | 31.9 | **24.8** | 49.7 | **41.5** | **41.2** | **41.9** | **39.6** | 35.3 | |
| E23 | 39.7 | 36.6 | 35.3 | 40.1 | **36.9** | 33.1 | 25.1 | 25.6 | 33.7 | 34.5 | **38.9** | 30.2 | 34.1 | 30.4 | |
| E24 | **57.7** | **50.6** | **53.7** | **43.2** | **54.4** | **44.9** | **42.4** | | | | | | **49.6** | **44.1** | |
| BH6 T1 | **61.2** | **53.7** | **50.5** | **25.5** | **59.5** | **40.8** | **42.0** | | | | | | **47.6** | **42.4** | |
| BH6 T2 | **58.5** | **48.3** | **51.1** | **44.4** | **56.2** | 39.0 | **42.3** | | | | | | **48.5** | **42.8** | |
| BH6 T3 | **59.1** | **50.9** | **51.7** | **37.7** | **56.7** | **41.6** | **42.2** | | | | | | **48.6** | **43.2** | |
| W01 | **51.0** | **49.6** | **47.9** | **49.5** | **52.4** | **56.3** | **42.3** | | **46.4** | **47.7** | **45.8** | **44.2** | **48.5** | **43.1** | |
| W02 | **51.4** | 40.1 | **56.9** | 41.6 | | 38.2 | | **42.8** | 36.9 | **43.0** | **42.8** | **33.4** | **42.7** | 37.9 | |
| W03 | **56.8** | **48.8** | **48.0** | **46.6** | | **43.2** | **39.0** | **44.9** | **49.8** | **52.6** | **52.3** | **44.0** | **47.8** | **42.6** | |
| W04 | **52.8** | **47.5** | **47.9** | **47.0** | | **39.0** | **31.9** | **41.0** | **45.4** | **51.7** | **59.1** | **43.5** | **46.1** | **41.0** | |
| W05 | **63.6** | **43.3** | **53.3** | **45.9** | | **46.5** | **40.1** | **50.3** | **52.7** | **56.7** | **57.2** | **45.6** | **50.5** | **44.9** | |
| W07-2014 | **45.3** | **45.4** | **43.6** | 36.3 | | | 34.1 | **41.8** | **46.6** | **46.5** | **47.9** | **40.5** | **42.8** | 38.2 | 33.2 |
| W08 | **59.6** | **52.2** | **49.8** | 38.5 | | **41.9** | 33.6 | | **48.4** | **47.8** | **50.0** | **39.8** | **46.1** | 37.3 | |
| W10 | 30.1 | **45.3** | **47.9** | **44.4** | | **47.3** | **41.2** | **46.3** | **51.7** | **54.1** | **50.5** | **46.4** | **45.9** | **40.9** | |
| W12-12 | **53.3** | **40.9** | 39.8 | 38.1 | | 36.3 | 35.7 | 32.4 | 36.9 | **42.6** | **42.0** | 38.7 | 39.7 | 35.3 | |
| W15-16 | 38.9 | 21.5 | 32.2 | 34.1 | | 30.0 | 35.2 | 40.9 | 31.1 | 34.4 | **44.5** | 34.4 | 34.3 | 28.5 | |
| W16 | **61.3** | **49.5** | 30.4 | **40.1** | | **48.9** | 28.8 | **44.0** | **43.1** | **47.2** | **58.6** | **64.8** | **45.5** | 40.5 | |
| W17 | 54.5 | **53.1** | **45.6** | **51.5** | | **45.2** | | | **44.4** | **49.4** | **55.7** | **49.3** | **49.8** | **44.4** | |
| W18 | 21.6 | 27.5 | 25.3 | 20.1 | | 18.2 | 36.2 | | 21.8 | 24.1 | 31.8 | 24.4 | 25.1 | 22.3 | B |
| W19 | **34.5** | **45.8** | **50.3** | **49.6** | | **47.4** | 23.1 | 28.1 | **24.8** | **54.7** | **63.1** | **50.0** | **42.8** | **38.1** | |
| W21 | **33.3** | **51.2** | **45.7** | **41.2** | | **43.5** | 35.7 | **44.4** | **46.3** | **47.9** | **55.5** | **41.9** | **44.2** | **39.4** | |
| W22 | 29.6 | **43.2** | **47.3** | **46.3** | | | | | | | | | **41.6** | 37.0 | 32.1 |

☒ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

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

(2) Distance corrected to nearest relevant public exposure.

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

## Discussion

Construction activity has advanced on the Royal Sussex County Hospital. At the same time Circus Street development is taking shape. Construction activities are likely to influence traffic emissions in the vicinity of Eastern Road a C-road carrying approximately 17,000 vehicles a day. Monitoring in the area is within the existing AQMA and shows a small increase in 2017-$NO_2$ compared with 2015 (this appears to be more localised than the small regional increase monitored across a number of local authorities). The construction activity scheduled until 2026 it is not expected to require declaration of a new AQMA – but could delay revocation of the existing area. Construction, commuting and working vehicles influence roadside air quality along the Lewes Road corridor.

Further improvement in $NO_2$ is required across a large area of Portslade and Hove. It is more likely than Brighton City Centre that this part of the AQMA could be revoked by 2020.

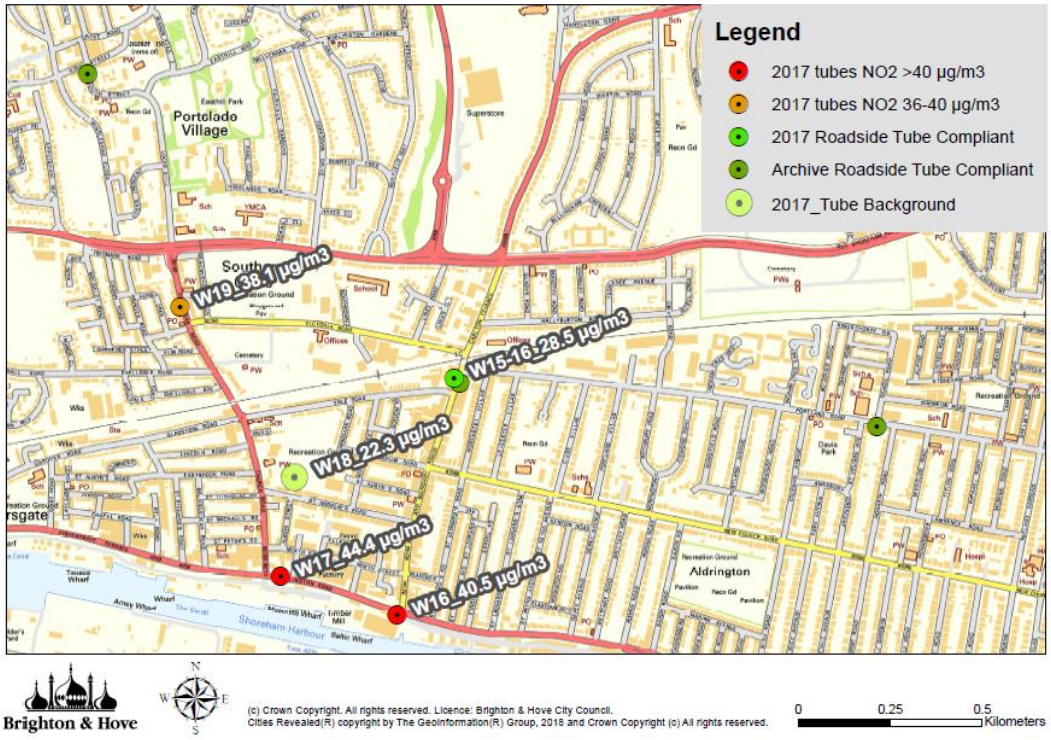
All tubes have been corrected using National Physical Laboratories (NPL) calculation utilising Brighton & Hove City Council's diffusion tube triplicate co-location with the automatic analyser at site BH10 on North Street. For 2017 the correction factor used was 0.89 which compares to 0.92 for the previous year. The vast majority Diffusion Tubes are on the façade of the building line. Triangular Distance from the road carriageway to the monitor is one to eight metres. Within the AQMA Brighton & Hove has high population density and residential dwellings that are less than eight metres of roads. Where monitors are not at a relevant location for public exposure these have been corrected for distance in accordance with the LAQM Technical Guidance (TG 2017).

Moving forward an update to the dispersion model and source apportionment is required to determine the contribution to roadside pollution from various emission sources. New Automatic traffic counters target; North Street, London Road, Lewes Road, Queens Road, Hollingdean Road.

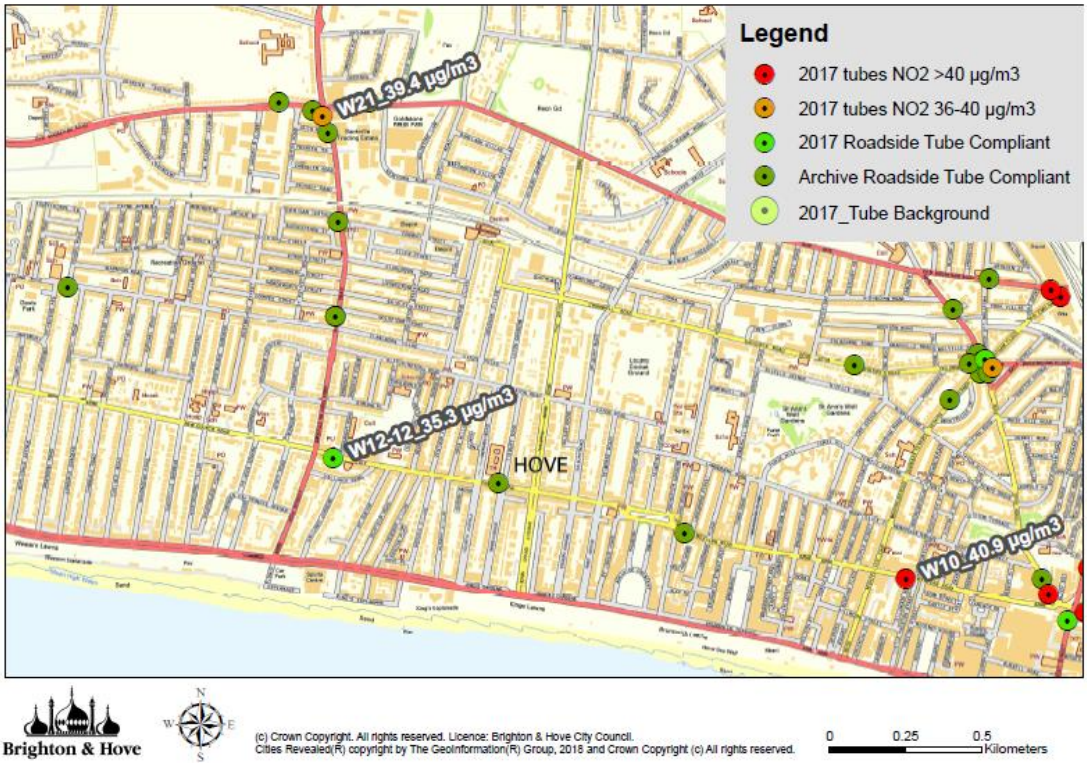
# Appendix D: Map(s) of Monitoring Locations

Area maps of 2017 $NO_2$ diffusion tubes and annotated results

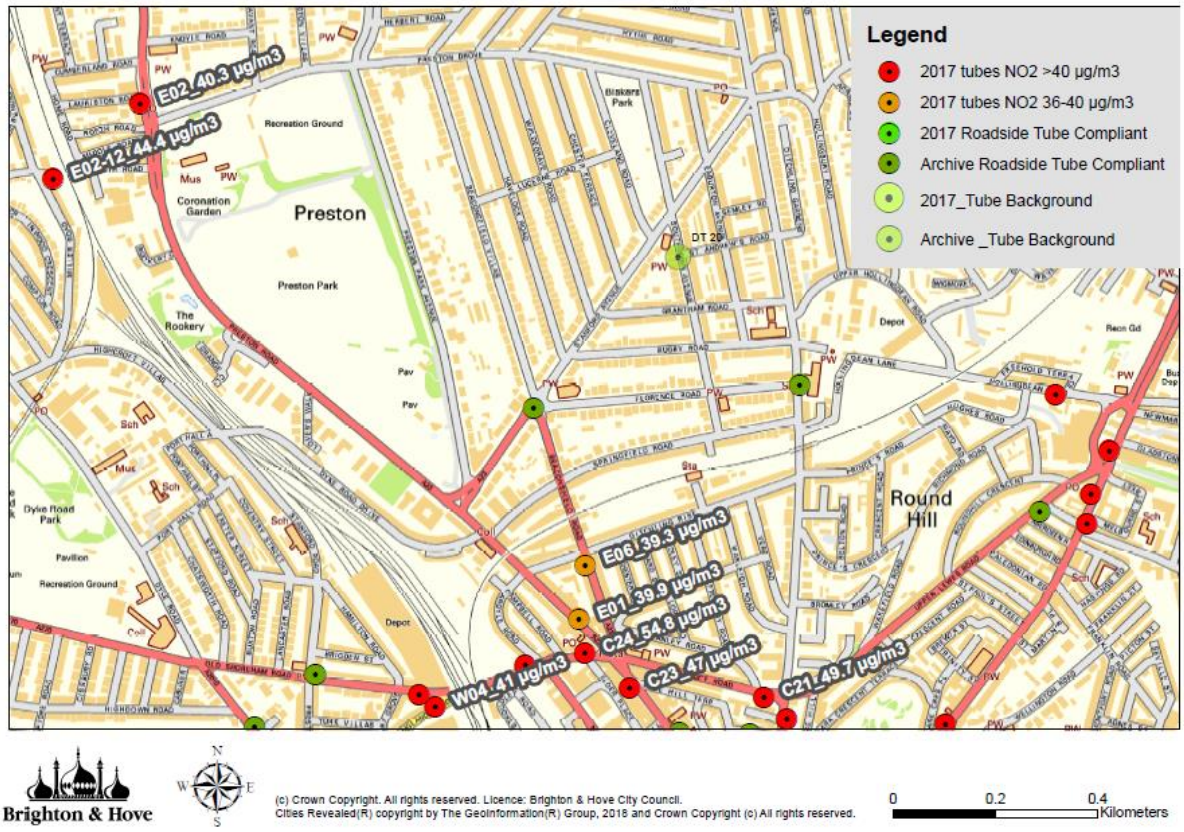
## Figure 7 2017 $NO_2$ Diffusion Tubes Portslade and Hove



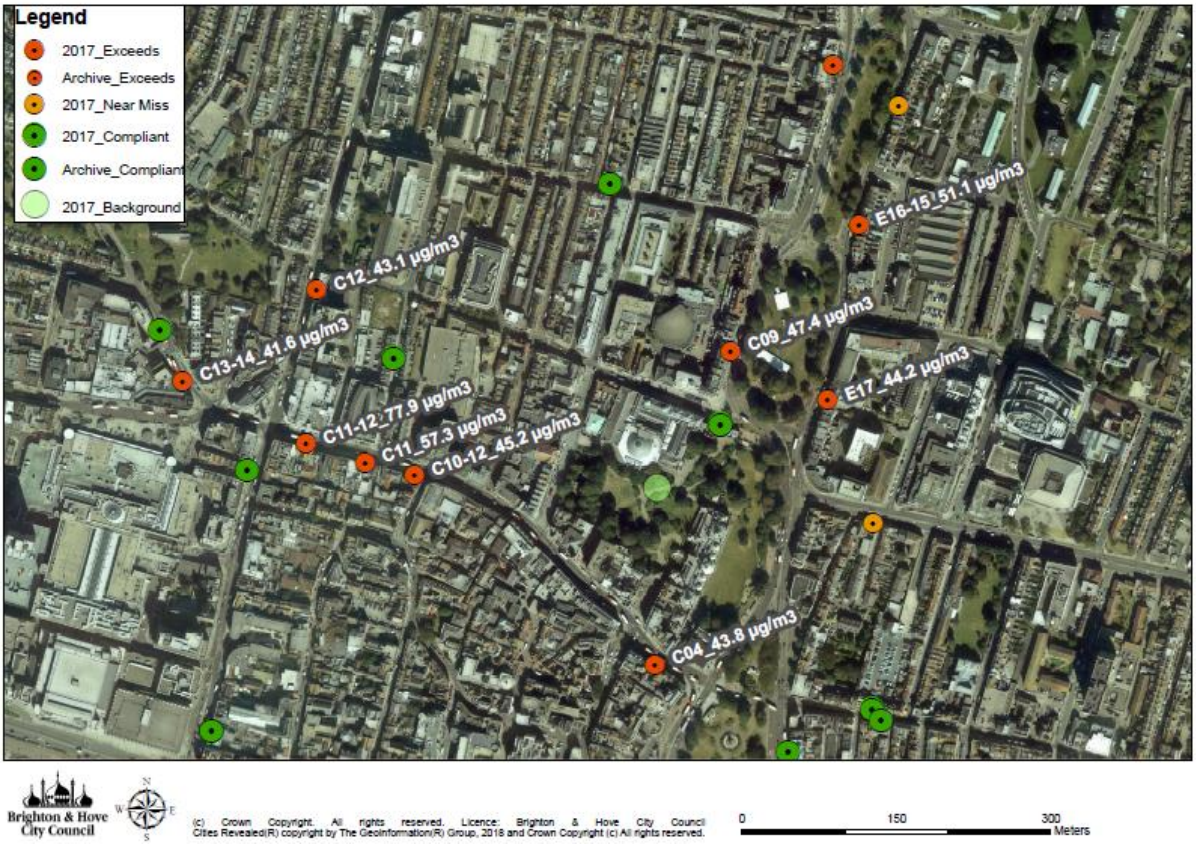

## Figure 8 2017 $NO_2$ Diffusion Tubes Hove



## Figure 9 2017 $NO_2$ Diffusion Tubes Preston Park and Preston Drove

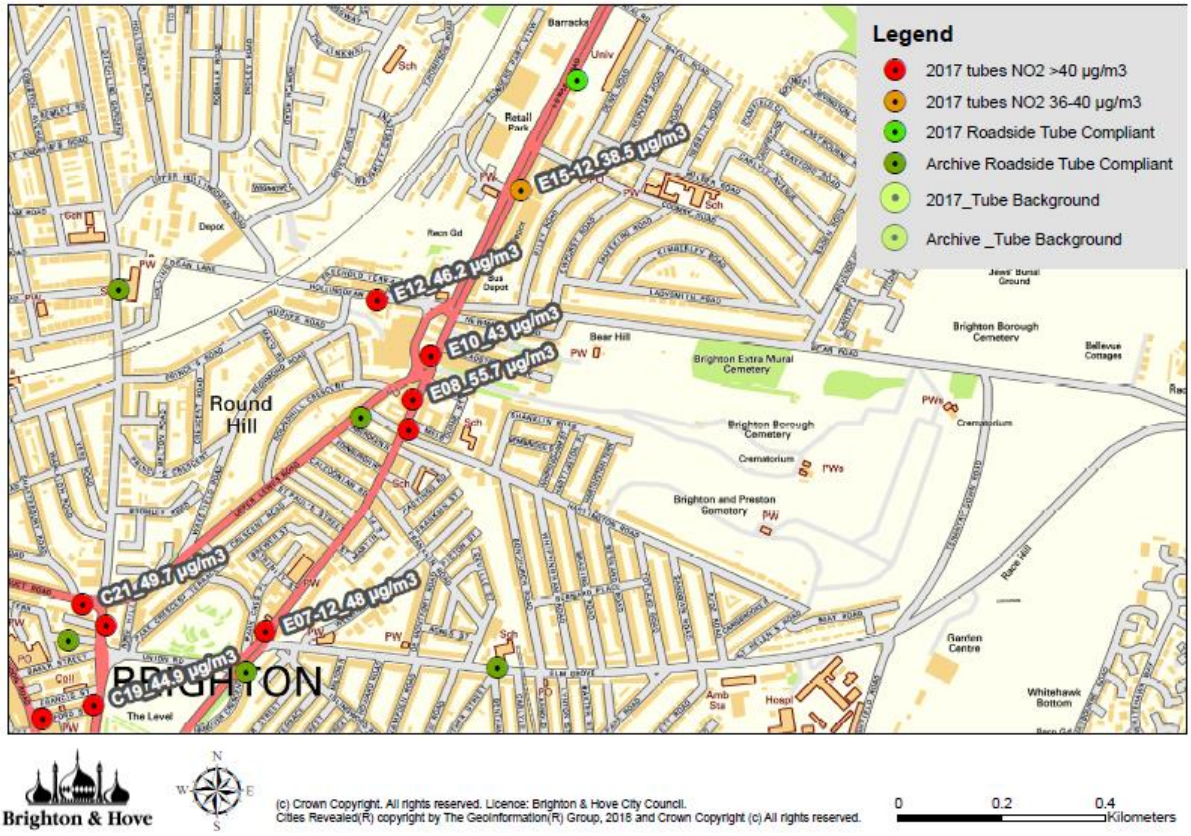



## Figure 10 2017 $NO_2$ Diffusion Tubes Central Low Emission Zone



## Figure 11 2017 $NO_2$ Diffusion Tubes Main Station and London Road Area


## Figure 12 2017 $NO_2$ Diffusion Tubes Lewes Road Area



## Figure 13 2017 $NO_2$ Diffusion Tubes Rottingdean


## Figure 14 2016 $NO_2$ Diffusion Tubes Sussex Royal County Hospital Area

Appendix E: Summary of Air Quality Objectives in England

## Table E.1 – Air Quality Objectives in England

| Pollutant | Air Quality Objective[14] | |
|---|---|---|
| | Concentration | Measured as |
| Nitrogen Dioxide ($NO_2$) | 200 µg/$m^3$ not to be exceeded more than 18 times a year | 1-hour mean |
| | 40 µg/$m^3$ | Annual mean |
| Particulate Matter ($PM_{10}$) | 50 µg/$m^3$, not to be exceeded more than 35 times a year | 24-hour mean |
| | 40 µg/$m^3$ | Annual mean |
| Sulphur Dioxide ($SO_2$) | 350 µg/$m^3$, not to be exceeded more than 24 times a year | 1-hour mean |
| | 125 µg/$m^3$, not to be exceeded more than 3 times a year | 24-hour mean |
| | 266 µg/$m^3$, not to be exceeded more than 35 times a year | 15-minute mean |

[14] The units are in microgrammes of pollutant per cubic metre of air (µg/$m^3$).

# Glossary of Terms

| Abbreviation | Description |
|---|---|
| ADMS | Atmospheric Dispersion Model System |
| AQMA | Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants objectives or legally binding standards. |
| AQAP | Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values' |
| AQS | Air Quality Strategy |
| ASR | Annual Status Report for Air Quality |
| AURN | Automatic Urban and Rural Network (UK air quality monitoring network) |
| AQS | Air Quality Strategy |
| BAM | Beta Attenuation Monitor (particulate monitoring method) |
| BH6 | Brighton & Hove Automatic Air Analysers on Lewes Road |
| BH10 | Brighton & Hove Automatic Air Analysers on North Street |
| BREEAM | Building Research Establishment Environment Assessment Methodology |
| BHCC | Brighton and Hove City Council (unitary authority) |
| BQPA | Bus Quality Partnership Agreements |
| C01 | Diffusion Tubes Monitor in **C**entral Brighton second number after "C" donates if the monitor started during a recent year for example C18-14 (Central Monitor started 2014). |
| CAZ | Clean Air Zone |
| CBTF | Clean Bus Transport Fund (DfT) |
| CEMP | Construction Environment Management Plan |

| | |
|---|---|
| CIL | Community Infrastructure Levy |
| COMEAP | Committee on the Medical Effects of Air Pollutants |
| CVTF | Clean Vehicle Transport Fund (DfT) |
| Defra | Department for Environment, Food and Rural Affairs |
| DMRB | Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England |
| DPF | Diesel Particulate Filter |
| E1 | Diffusion Tubes Monitor in **East** Brighton second number after "E" donates if the monitor started during a recent year for example E16-15 (East Monitor started 2015). |
| EU | European Union |
| FDMS | Filter Dynamics Measurement System |
| GIS | Geographical Information Systems |
| HGV | Heavy Goods Vehicles |
| JSNA | Joint Strategic Needs Assessment |
| KERS | Kinetic Energy Recovery System |
| LAQM | Local Air Quality Management |
| LDV | Light Duty Vehicles |
| LDF | Local Development Framework |
| LEP | Local Enterprise Partnership |
| LEZ | Low Emission Zone |
| LSTF | Local Sustainable Transport Fund |
| LTP4 | Local Transport Plan 4 |
| LCVP | Low Carbon Vehicle Partnership |
| NICE | The National Institute for Health Care Excellence |

| | |
|---|---|
| $NO_2$ | Nitrogen Dioxide |
| $NO_x$ | Nitrogen Oxides |
| NPL | National Physical Laboratory |
| NPPF | National Planning Policy Framework |
| $O_3$ | Ozone near ground level |
| OLEV | Office of Low Emission Vehicles |
| $PM_{10}$ | Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less |
| $PM_{2.5}$ | Airborne particulate matter with an aerodynamic diameter of 2.5µm or less |
| PAH | Poly Aromatic Hydrocarbons |
| PHE | Public Health England |
| QA/QC | Quality Assurance and Quality Control (referring to air monitoring data) |
| S106 | Developer Funding under Town and Country Planning Act 1990 |
| SAQP | Sussex Air Quality Partnership |
| SCRT | Selective Catalytic Reduction Technology (fitted to vehicle exhausts) |
| $SO_2$ | Sulphur Dioxide |
| TEA | Triethanolamine in water (laboratory method for $NO_x$ diffusion tubes) |
| TEOM | Tapered Element Oscillating Microbalance (particulate monitoring method) |
| TRO | Traffic Regulation Order |
| $\mu g/m^3$ | Concentration in micrograms per cubic meter |
| W01 | Diffusion Tubes Monitor in **W**est Brighton & Hove second number after "W" donates if the monitor started during a recent year for example C07-14 (West Monitor started 2014). |

# References

**Defra References**

Environmental equity, air quality, socioeconomic status and respiratory health, 2010

Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

Defra abatement cost guidance for valuing changes in air quality, May 2013

Air Quality: A Briefing for Directors of Public Health March 2017 A Local Government Publication Defra and Public Health England found at: http://www.adph.org.uk/2017/03/air-quality-a-briefing-for-directors-of-public-health/

**Brighton & Hove References**

Brighton & Hove City Council Joint Strategic Needs Assessment found at: http://www.bhconnected.org.uk/sites/bhconnected/files/6.4.9%20Air%20Quality%20JSNA%202017.pdf

Brighton & Hove 2015 Air Quality Action Plan found at: http://www.brighton-hove.gov.uk/content/environment/air-quality-and-pollution/air-quality-management-city

Big Lemon Electric Buses found at: https://thebiglemon.com/

Withdean Stadium Electric Charging Point found at: https://www.zap-map.com/pts/neqhzd1/

Access Fund for Sustainable Transport found at: https://www.brighton-hove.gov.uk/content/parking-and-travel/travel-transport-and-road-safety/access-fund-sustainable-travel-brighton

Local Lift Share Options found at: https://liftshare.com/uk/journeys/from/brighton

Journey Planner found at: http://www.brighton-hove.gov.uk/journeyplanner/

Brighton & Hove AQMA found online at: https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=35

Preston Park AURN results found at: https://uk-air.defra.gov.uk/networks/network-info?view=aurn

*Further references can be found in previous Local Air Quality Management Reports including the 2015 Air Quality Action Plan online link given above.*