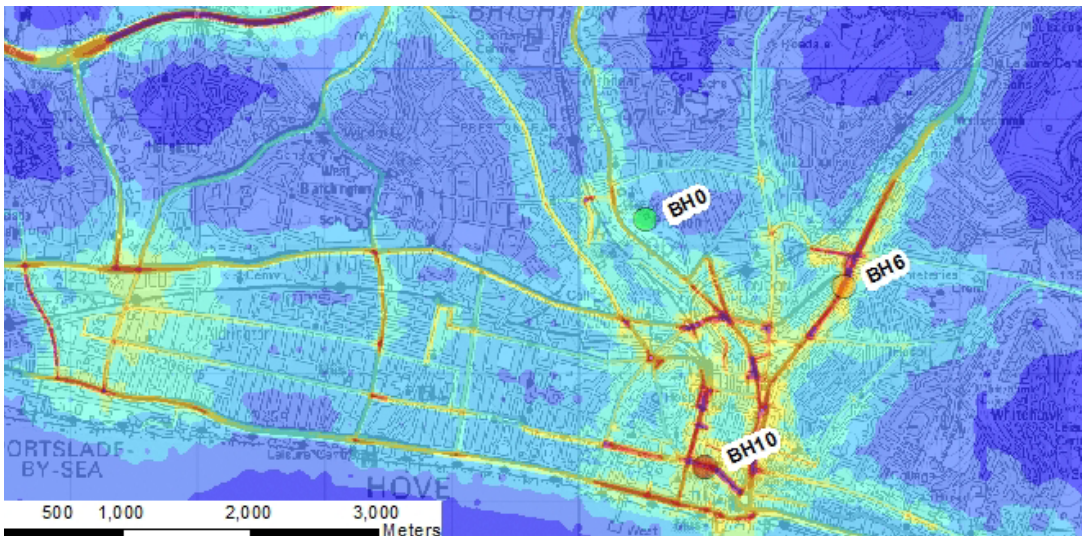
Brighton & Hove City Council

2019 Air Quality Annual Status Report (ASR)

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

June 2019



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Executive Summary: Air Quality in Our Area

Air Quality in Brighton & Hove

Air pollution is the largest environmental risk we face today and is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and some cancers and particularly affects the most vulnerable in society: children and older people, and those with pre-existing heart and lung conditions. Lung tissue growth and lifelong lung capacity can be influenced by pollution dose in the formative years[1]. Pollution dose can be an extra burden to those with sedentary lifestyles.

The local impact on health and wellbeing is summarised in our Joint Strategic Needs Assessment[2]. It is a critical public health issue, bringing forward 175 deaths locally and 36,000 nationally based on two pollutants; nitrogen dioxide and airborne particulate that are smaller than 2.5 microns ($PM_{2.5}$).

There is also a strong correlation with equalities issues, as poor air quality often occurs in less affluent areas[3,4]. In Central Brighton where the cost of living is high, certain streets continue to have high levels of nitrogen dioxide throughout the year. To varying degrees the inhalation of airborne pollution influences the health and wellbeing of everyone.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[5]. In order to meet World Health Organisation (WHO) Guidelines Brighton & Hove requires further improvements in Particulate Matter ($PM_{2.5}$). The Air Quality Strategy (AQS) for England[6] sets out standards for the protection of human health.

In Brighton & Hove road traffic emissions dominate local emissions of nitrogen dioxide. Tiny particles can travel long distances and some industrial sources are far from home.

[1] Long Term Exposure to Traffic Related Air Pollution on Lung Function in Children
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5446841/
[2] 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
[3] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[4] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[5] Defra's abatement cost guidance for valuing changes in air quality, May 2013
[6] The Air Quality Strategy for England
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf

For the last full year (2018) Brighton & Hove City Council's is compliant with all pollutants listed in the AQS with the exception of nitrogen dioxide (NO_2). The city first declared an Air Quality Management Area (AQMA) for NO_2 in 2004. This included Preston Circus, the Vogue Gyratory and London Road through Valley Gardens to the Pavilion. The two existing AQMAs for NO_2 were declared in 2013 and include Brighton & Hove Centre connected with Sackville Road and South Portslade. Rottingdean Village has its own AQMA. The upgraded Ultralow Emission Zone for Buses includes North Street, Castle Square, Churchill Square and Western Road.

A number of parks or background sites in the city have consistently recorded low levels of airborne pollution, while 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. In contrast, where diesel traffic stops and starts in confined spaces, concentration of NO_2 continues to exceed the legally binding limit. This is a highly populated area where thousands of people live and work. Years spent in a location is an important factor when considering the dose and exposure to pollutants inhaled and lifelong impacts on overall health; lung and circulatory conditions in particular. Long term pollution levels in the city are improving, but further declines are essential for a healthier city.

The Air Quality Council's remit has transferred from Environmental Health to Transport. Brighton and Hove City Council is a unitary authority. The urban area has differing transport demands and population density compared with surrounding East and West Sussex (County Councils). For twenty years the council has been an active member of the Sussex Air Quality Partnership. In 2018 the City Council's newly formed Air Quality Programme Board was set up to oversee air quality projects and services. The Board includes; Transport Planning, Public Health, Taxi Licencing, Planning Policy and Fleet Management. Air Quality is a material consideration of the planning process and for City Plan Part II.

Actions to Improve Air Quality

The council continues to invest in sustainable active travel, which provides people with a greater number of transport options for journeys around the city and especially short ones. Health and wellbeing is a key objective of the council's Local Transport Plan which has seen continued investment in this area. Brighton and Hove is one of the UK's least car dependent cities and overall one third of the city's residents do not

own a car; in the central AQMA this rises to two thirds. Nearly twice as many people walk to work compared with the rest of the UK.

Bus patronage continues to increase and is the highest in the UK outside of London. This connects people from around the city enabling quick, short travel. The bus fleet is trending towards low emissions and with the support of the council, more than seventy buses have retro-fitted exhausts which provide substantially lower oxide of nitrogen emissions. Further investment in low emissions buses will enable new cleaner vehicles to be rolled out every year including the introduction of hybrid and electric buses.

Following successful bids by the council for funding from the Office of Low Emission Vehicles, this year 200 Electric Vehicle charging points will be installed in residential areas. Registration of electric vehicles in the city is rising towards 500 and developing the cities infrastructure will enable us to provide further charging points for off and on Highway parking. Updates on charging points can be found on Zap Map[7]

We will also be developing electric hubs with rapid charging facilities for taxis to support local taxi companies who want to introduce electric vehicles to their fleet by ensuring they have the infrastructure to operate.

We have been working in partnership with Sustrans and Living Streets to raise awareness of the issue of air quality in the city's schools. In March 2019, the council facilitated road closures and timed traffic restrictions around St Luke's Primary School in East Brighton as part of School Streets Day. This event highlighted the issues of congestion, emissions and road safety concerns that many schools experience during drop-off and pick-up times. St Luke's school is also taking part in a year-long air quality project facilitated by Sustrans, on data analysis, an awareness campaign and clean air route-mapping. This project has raised important awareness about air pollution as a serious environmental risk to human health and has encouraged behavioural change by encouraging children and their carers to make more journeys on foot, by bike or on public transport, or turning off the car engine when stationary.

[7] Zap Map for the latest on electric charging points https://www.zap-map.com/

Conclusions and Priorities

Consistently high monitoring data capture indicates in most places air quality is improving. The area of poor air quality in the city is getting smaller. Exceedance of the nitrogen dioxide standard is within the previously declared AQMAs. This includes public transport corridors such as North Street and Queens Road and where general traffic[8] approaches urban interchanges namely; Preston Circus and Vogue Gyratory. Traffic comes together to pass under the railway line at New England Road and The Drove or climbs a hill such as Terminus Road. Significant portions of the AQMAs are now compliant with UK air quality standards. Following 2019 monitoring a review of the AQMA boundaries is recommended for 2020/21. In accordance with the Local Air Quality Management Policy Guidance, a new air quality plan will be presented to Environment, Transport and Sustainability committee for consideration within twelve months of any new AQMA declaration. Action areas moving forward include, but are not limited to:

- Investment in lower emission fleets; buses, taxis, council, business, port haulage, and emergency services
- Investment in infrastructure for cycling, walking and electromotive charging points
- Planning and City Plan Development strategy for no emission travel to encourage non-combustion renewable solutions and avoidance of emissions
- Awareness raising for schools and businesses, including cleaner healthier travel choices

As Brighton & Hove is not a government top tier Clean Air Zone City it has become increasingly challenging to win the most substantial government grants to improve emissions in our established Ultra Low Emission Zone (ULEZ). Further air quality assessment provides an update to the cities dispersion model and source apportionment. Using ADMS-Urban[9], this is the most detailed air quality assessment available for the area, identifying where exceedances of air quality limits and guidelines continue.

[8] General Traffic that is mixed vehicle types: Car, LGV (Light Goods Vehicles), HGV (Heavy Goods Vehicles), taxis, coaches and motorcycles.
[9] ADMS-Urban is a sophisticated Atmospheric Dispersion Model information found at: https://www.cerc.co.uk/environmental-software/ADMS-Urban-model.html

Local Engagement and How to get Involved

There are lots of ways residents and communities can work together to improve the city's air for everyone. Here are some examples:

- Give your car time off; walk, cycle or scooter to school, work and leisure
- If you can, work from home or an alternative with less travel
- Ask that local deliveries arrive by cargo bike or electric vehicle
- Use public transport the bus fleet is investing in cleaner buses every year and new trains will use less electricity
- Go electric. This year we're installing 200 electric vehicle charging points across the city, making it easier to recharge an electric car or van. Consider switching to electric today.
- Don't idle your engine. If you do have to drive, you can help by turning off your engine when your vehicle is stationary and it is safe to do so. Some cars have auto-engine shut of technology (the engine stops when the vehicle is still).
- When you pull over to use a mobile, charge a device or pick up a passenger think: are my vehicle emissions affecting a living neighbourhood?
- Consider a smaller vehicle with reduced footprint
- Don't park in the vicinity of the school gates. If driving your child is the only option, why not park a little way from the school? You could also start to car-share which will save money on fuel, while also reducing emissions and congestion outside schools at peak times.
- Clean home heating without burning coal or wood in open fireplaces; consider replacing old boilers for ground or air source heat pumps
- Do not dispose of building or domestic waste by burning.

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1 Local Air Quality Management

This report provides an overview of air quality in Brighton & Hove City Council. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance of a set standard for the protection of human health is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the legally binding standards. 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 E1 in Appendix E. Recently the Secretary of State for the Environment has recommended the UK adopt World Health Organisation (WHO) guidelines for $PM_{2.5}$ (10 µg/m^3 annual mean). This is for the protection of the most vulnerable in society[10]. Whilst Brighton & Hove is fully compliant with EU limits on particulate, further improvement is required to achieve the more stringent WHO level throughout the city.

[10] WHO Limits for Particulate Matter will be enshrined in UK law, pledges Minister found at: https://airqualitynews.com/2019/07/16/who-limits-for-particulate-matter-will-be-enshrined-in-uk-law-pledges-gove/

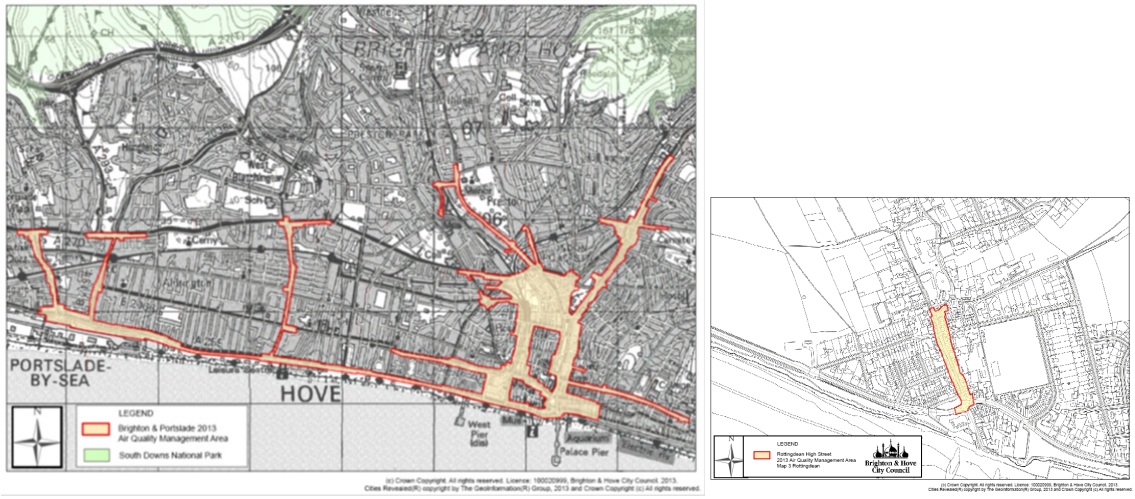
2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of extant 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 at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=35. AQMA for the whole country can be found at https://uk-air.defra.gov.uk/aqma/list?la=B&country=all&pollutant=all.

Figure 1 Brighton & Hove City Council AQMAs declared 2013



Appendix D: Map(s) of Monitoring Locations which provides for a map of air quality monitoring locations in relation to the extant AQMA(s).

No amendment of the designated AQMAs is anticipated before the next report to include 2019 monitoring results. In previous years appraised reports have been released to the public domain in August.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	On Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
AQMA 1 Brighton & Hove and Portslade	August 2013 (A23 and Lewes Road first declared 2004)	NO_2 Annual Mean	Brighton Hove & South Portslade	Extensive area around the sea front and following several major roads inland for some distance	NO	83	µg/m^3	58	µg/m^3	Brighton & Hove City Council Air Quality Action Plan	2015	See Footnote
AQMA 1 Brighton & Hove and Portslade	August 2013	NO_2 Annual Mean	Brighton Hove & South Portslade	Extensive area around the sea front and following several major roads inland for some distance	NO	114	µg/m^3	91	µg/m^3	Brighton & Hove City Council Air Quality Action Plan	2015[11]	Updates set out in Table 2.2

[11] Brighton & Hove City Council Air Quality Action Plan 2015 found at: https://www.brighton-hove.gov.uk/sites/brighton-hove.gov.uk/files/Air%20Quality%20Action%20Plan%202015%20%28pdf%201.6%20MB%29.pdf

AMQA 2 Brighton & Hove Rottingdean High Street	August 2013	NO_2 Annual Mean	Rottingdean High St from the A259 junction to the T-junction with Vicarage Lane.	AMQA 2 Brighton & Hove Rottingdean High Street	YES	46	µg/m3	37 at the same height 39 at a lower height	$\mu g/m^3$	Brighton & Hove City Council Air Quality Action Plan	2015	Updates set out in Table 2.2

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

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

Defra's 2018 appraisal of the City Council's 2017's Annual Status Report (ASR) acknowledged that monitoring showed widespread exceedances of the annual mean NO_2 objective within the Brighton & Hove. Identified for; The City Centre South Portslade and Rottingdean AQMAs, including one location, site BH6, that has seen a significant increase in the number of hourly mean NO_2 exceedances between 2016 (zero exceedances) and 2017 (69 exceedances). At that time there was no roadside monitoring outside of the declared AQMAs. This was rectified in 2018.

The appraisal noted that further measures and behaviour change beyond the current action plan will be required to reach the air quality objective levels in the declared AQMAs. August 2018 the Appraisal on behalf of Defra noted:

1. The Council have provided a very informative report that continues to highlight significant exceedances within the Brighton AQMA, in streets that have been clearly identified.

2. The long-term trends in monitoring results in Brighton show that there are consistent reductions in pollution concentrations, but not at a rate that is likely to deliver compliance with the objectives by 2020. The Council acknowledge that further measures and behaviour change will be required in order to meet the air quality objectives in the declared AQMAs (p.6).

3. The Council has responded to the recommendation made in the 2017 ASR review report, that source apportionment be updated. The Council has ordered traffic counters and states that the modelling will be updated and submitted as addendum.

4. The Council has provided generally detailed information on its current action plan measures, including information on status and timeframes. However, it is difficult to see how a number of the KPIs can be measured, or how progress against these can be tracked. The Council is encouraged to consider how progress can be measured using KPIs across its action plan measures.

5. P. ix of the Executive Summary refers to a bike-share scheme due to start. The commencement data has been updated accordingly.

Brighton & Hove City Council has taken forward a number of direct measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

The City Council expects the following measures to progress over the course of the next reporting year (up to July 2020):

- Electric Taxi Hub
- Advance with implementation of Valley Gardens Phase 1 & 2
- Local Transport Plan 5
- Rottingdean Air Quality Project

The principal challenges and barriers to implementation that Brighton & Hove City Council anticipates facing include:

Funding is required to accelerate continued uptake of low emission buses. Additional infrastructure is required to make it possible for a significant portion of the taxi trade to switch to electric. To be effective this is likely to be a series of projects. The government needs to put in measures to incentivise production of Euro-VI Heavy good Vehicles so haulers have a choice of low emission options for ridged and articulated lorries. The government needs to encourage production of zero emission wheel chair accessible taxis so a decent market choice is available to operators.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Brighton & Hove City Council anticipates that further additional measures not yet funded will be required in subsequent years to achieve compliance and enable majority or complete revocation of AQMA1. That said a significant proportion of AQMA1 (to be determined) could be revoked prior to 2021. Exact timings will depend on LAQM findings 2019/20 and the will of Environment Transport and Sustainability (ETS) committee. Progression with Phase I & II of the Valley Gardens landscaping and transport scheme is also predicted to have benefits. Following election of new members May 2019 an updated AQMA designation would give the opportunity for the current administration to take ownership of a new Air Quality Action Plan.

Effective actions will need to work towards compliance with set air quality objectives (AQS Standards) and be quantifiable in how they deliver these Key Performance Indicators. Local Source apportionment (2018) and long term traffic profiles identify streets where vehicle emission reductions (bus, lorry, van and car) need to happen.

Trial proposals for AQMA 2 (Rottingdean) require working group approval to proceed this autumn term. Details of the scheme including member's recommendations are beyond the scope of this report. The latest monitoring and dispersion model for Rottingdean is included. Funding is allocated for a new Automatic Traffic Counter for the High Street.

Table 2.2 – Progress on Measures to Improve Air Quality Completed and Ongoing

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 deck 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	New batch of vehicles every year	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	Promoting Low Emission Transport	Taxi emission incentives	EP and DfT Clean Vehicle Transport Fund Citycabs and	2014	2016/17	NOx emission reduction on high mileage vehicles plying	77% reduction in NOx emissions on minibus	Fitted 16/22 taxis (minibuses and saloons with SCRT). Track test at	Early 2018	Access to working vehicles to carry our SCRT design and fits is challenging.

	Saloons			Radiocabs Low Carbon Vehicle Partnership			trade through the AQMA and on school services		Millbrook.		Operators not used to Ad-blue dosing
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 Managem ent	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 Managem ent	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 Infrastruct ure	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 Assessme nt of New	Transport Planning and	Public transport improvements-	EP to Liaise with Highways	2015	ongoing	Improve traffic flow, reduce queuing and	To be monitored	Advice on Valley Gardens Scheme	Phase I 2018	Other considerations of Highways Schemes

	Transport Schemes	Infrastructure	interchanges stations and services				idling, reduce emission enclosure, increase distance between exhaust and 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	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

	to air to insure effective dispersion										
16	Ensure Development does not have negative impact on local air quality and Public exposure especially around the AQMA	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	EP and Planning Policy, Development Control	2007	Ongoing	Best Practice	Developments that are beneficial for emissions and air quality compared with previous land use	Development of urban sites that have a lower pollution footprint than the previous land use: light industrial, petrol station, car park	Ongoing	Traffic contribution on some new developments
17	Any domestic fuel burning to use smokeless and seasoned fuels with Defra exempt stoves and appliances	Public Information	Via the Internet	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	Policy Guidance and Development	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

	Ultralow Emission Vehicles, signs & lines, foliage and planting	Control									
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	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

	Street										
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 Alternatives	Intensive active travel campaign & infrastructure	Transport and Health Joint Working Group	2017	2017	Increase active travel to work and education	More healthy workers	Funding Secured	2017	Officer Allocated
34	Bike Share	Transport Planning and Infrastructure	Public cycle hire scheme	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, Sustrans	2017	2019	Educational Engagement	Travel Awareness and Anti-Idling Sings at NO2 hotspots with queuing traffic	Cllr Support	2018	Seeking Financial Support from various sources
36	Routing of HGV assigned to Hospital Construction	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	Highways Planning, EP and Lang O'Rourke	2016	2017-2023	Construction Environment Management Plan (CEMP) Traffic to minimise movements in AQMA	Reduce congestion and emissions impacts in and around the AQMA	Starts with Construction Project	2017/2018	Waiting at Consolidation Centre

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

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases. The Public Health Outcomes Framework (PHOF) sets out the fraction of mortality attributable to particulate air pollution[12]

Brighton & Hove City Council is taking the following measures to address $PM_{2.5}$:

- Construction Environment Management Plans (CEMPs) to target stringent emission standards for Heavy Good Vehicles (HGV), Non-Road Mobile Machinery (NRMM including cranes and bulldozers)
- The considerate construction scheme includes a number of dust suppression techniques – most dust from mechanical activities or fugitive emissions are coarse. Fine and ultra-particles can arise from combustion.
- Discussions with Shoreham Harbour Transport sub Group and port haulage about lower emission HGV working towards increased uptake of the Euro-VI standard which will reduce NO_x emissions, nitrate- particulates and have benefit for the Portslade environment
- Response to complaints about bonfires
- Plugged in places so events can avoid and minimise the use of static diesel generators
- Awareness campaigns around coal and wood burning produced by Defra assisted by BHCC and the Air Quality Advisory Group[13]. (Further work will be carried out across Sussex during 2019).
- BHCC has five Smoke Control Area declared under the Clean Air Act 1968[14].

[12] Fraction of mortality attributable to particulate air pollution found at: https://fingertips.phe.org.uk/search/air%20pollution#page/11/gid/1/pat/6/par/E12000004/ati/102/are/E06000015
[13] Defra Open Fires and Wood Burning Stoves found at: https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1901291307_Ready_to_Burn_Web.pdf

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

Brighton & Hove City Council in combination with UK Automatic Urban Rural Network (AURN) and University of Brighton undertook automatic (continuous) monitoring at four sites during 2018 within the local authority area. Table A.1 in Appendix A shows the details of the sites. Lullington Heath Automatic monitoring site (in Wealden District) is also included as the site is representative of air quality across the South Downs National Park (SDNP). Just over 40% of Brighton & Hove's Unitary Authority area (33 km^2) is part of the park[15]. 59% of the Local Authority area (50 km^2) comprises Brighton & Hove's Local Planning Authority (LPA). This report focuses on air monitoring in the LPA's urban area where population increase is approaching 5800 people per km^2. As the jurisdiction has one of the highest population densities and one of the highest visitor numbers (11 million per year) actions and measures to improve air quality will benefit many thousands of people.

In the most recent full year (2018) monitoring has not led to any changes to the existing AQMAs last amended in 2013.

3.1.2 Other Pollutants

1,3 butadiene (associated with petrochemical processes or synthetic rubber production) and lead (galena processing or metal smelting) are not an issue in Brighton & Hove. Roadside lead levels reduced substantially following the phasing out of leaded gasoline in the mid-1990s. Benzene, carbon monoxide and Polycyclic Aromatic Hydrocarbons (PAH) have previously been monitored in Brighton & Hove. Concentrations and were found to be well within Air Quality Assessment Levels (AQAL) that are set out in the AQS (UK devolved administrations Air Quality Strategy). Formaldehyde is monitored by the University of Brighton, results are

[14] Brighton and Hove Smoke Control found at: https://www.brighton-hove.gov.uk/content/environment/noise-and-pollution/using-solid-fuels-safely-and-legally
[15] Brighton & Hove and the South Downs National Park found at: https://www.brighton-hove.gov.uk/content/leisure-and-libraries/parks-and-green-spaces/south-downs-national-park

available for five pollutants[16]. National monitoring results can be downloaded from Defra[17].

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

3.1.3 Non-Automatic Monitoring Sites

Brighton & Hove City Council undertook non- automatic (passive) monitoring of NO_2 at sixty-one different locations during 2018. One site has triplicate diffusion tubes co-located next to the Automatic Analyser BH10. This helps to calibrate two different monitoring methods. One of the locations in Rottingdean has sample points at different heights to determine if NO_2 levels vary at ground floor residential height. Extra monitoring outside AQMA2 boundary has tested NO_2 levels adjacent with Marine Drive (A259) in Rottingdean on the south and north sides. A reinstated monitor on Old Steiene has determined base line NO_2 prior to the implementation of the Valley Gardens Phase III transport scheme. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

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

NO_2 is dominated by local emissions and shows considerably more spatial variation than particulate this is why locally resolved maps are required to show how concentrations vary. Whilst gram for gram $PM_{2.5}$ has the most influence on health in Brighton & Hove, NO_2 is the most plentiful pollutant. In some places monitoring suggest NO_2 is several times more concentrated than $PM_{2.5}$. This should provide an opportunity for researchers to better distinguish the health impacts of the two main

[16] University of Brighton real time monitor found at: https://tools.brighton.ac.uk/air-quality/display/last-24-hours
[17] UK Air and Automatic Urban Rural Network found at: https://uk-air.defra.gov.uk/data/

pollutants. Urban streets in the AQMA have a mixture of pollution in the gas and particulate phase. Parks, gardens and the sea frontage have low levels of prevailing pollution and are the healthiest outdoor places for active mobility and relaxation.

3.2.1 Nitrogen Dioxide (NO_2)

In 2018 all exceedances of the air quality standards for NO_2 were within the existing AQMAs. In Rottingdean new monitoring (East 25 and East 26) just outside an AQMA tested building facade levels closest to the A259 and these were found to be within limits at three sample points. The worse of the three continues to monitor during 2019.

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past nine years (since 2010) with the air quality standard of 40µg/m^3.

For diffusion tubes, the full 2018 (last full calendar year) dataset of monthly mean values is provided in Appendix B.

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

Annual means greater than 60µg/m^3, indicate that an exceedance of the 1-hour mean objective is also likely at these sites. Monitorng indicates that the annual mean could exceed on North Street (west of Windsor Street) and close to Cheapside at the southern end of London Road. Exceedances of the NO_2 annual mean continue to be recorded along the building line or rediential façade adjacent with following road links in order of severity:

- Bus Ultralow Emission Zone; North Street, Castle Square and part of Western Road
- London Road, Cheapside & Oxford Street
- Roads connecting with Vogue Gyratory including; Lewes Road, Hollingdean Road and Coombe Terrace
- Roads connecting with Preston Circus including: Old Shoreham Road (Eastend) tied with New England Road, Preston Road, Beaconsfield Road, Viaduct Terrace and London Road

- Valley Gardens; Marlbrough Place and Grand Parade
- Roads linking with the main railway station including; Queens Road, Terminus Road and Frederick Street
- The Drove under the railway
- Portslade Wellington Road and approach to the Southern Cross Junction
- Rottingdean close to 40 µg/m^3 at 1m level in the High Street

3.2.2 Particulate Matter (PM_{10})

In accordance with Public Health policy the council monitors $PM_{2.5}$ instead of PM_{10} (monitored and reported historically).

3.2.3 Particulate Matter ($PM_{2.5}$)

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

$PM_{2.5}$ can travel long distances and is sometimes referred to as a transboundary pollutant. Unlike NO_2 a significant proportion of the pollutant is emitted outside the bounds of the local authority, for this reason it is not a statutory duty for Local Authorities to assess and therefore not covered by LAQM. The Public Health Outcomes Framework (PHOF) set out by Public Health England is based on $PM_{2.5}$ (reference given above). Environmental Protection in the UK is likely to change with the new Environment Bill[18].

Brighton and Hove complies with EU limits for $PM_{2.5}$ that is 25 µg/m^3 as an annual mean. That said levels above the WHO (World Health Organisation) guidline level; (10 µg/m^3 annual mena) have been recorded in the City Centre. Since 2012 three local sites suggest an improving trend in $PM_{2.5}$. The mitigation of emission from vehicles can be a balance between oxides of nitrogen and soot. For euro-5 (light vehicles) and euro-V (heavy vehicles) emission standards, diesel particulate traps to some extent reduce tailpipe soot, but can significantly contribute to NO and NO_2. Local road traffic is the main contributor to NO and NO_2, it has a much smaller contribution to prevailing particulate.

[18] Government's New Environment Bill Interim found at: https://www.gov.uk/government/news/new-environment-protections-set-out-in-flagship-bill--2

3.2.4 Sulphur Dioxide (SO_2)

The University of Brighton continues to monitors SO_2. No exceedances of SO_2 objectives are anticipated in Brighton & Hove City Council.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

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	NO2, PM2.5	YES	API Chemiluminescent, TEOM	1	1.5	3
BH10	North Street near Ship Street	Roadside	530995	104271	NO2, PM2.5	YES	API Chemiluminescent	0	6	3.5
BH0	Preston Park AURN	Urban Background	530526	106218	NO2, PM2.5, O3	NO	API Chemiluminescent, Partisol	N/A	200	5
LL	Lullington Health AURN	Rural	553800	101600	NO2, O3, PM10, SO2	NO	API Chemiluminescent	N/A	N/A	3
UB	University of Brighton	Suburban	534653	108503	NO2, PM1,PM2.5, PM10, SO2, nitrous acid, formaldehyde	NO	Differential Optical Absorption Spectroscopy	N/A	~150	3.5

Notes:

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

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)
C02-09	Old Steine	Roadside	531361	104006	NO2	YES	0	5.2	NO	2.7
C03-96	St James Street	Roadside	531439	104045	NO2	YES	0	3.8	NO	2.7
C04-10	Lower North Street-Castle Square	Roadside	531228	104088	NO2	YES	0	5.7	NO	2.7
C05-12	Pavilion Gardens Background BG	Urban Background	531230	104260	NO2	NO	>100	102	NO	2.8
C09-05	Marlborough Place	Roadside	531302	104392	NO2	YES	0	4.3	NO	3.2
C10-12	North Street BH10 Triplicate	Roadside	530995	104271	NO2	YES	0	6.1	YES	2.5
C11-07	North Street Central	Roadside	530947	104284	NO2	YES	0	6.5	NO	3
C11-12	North Street Clock Tower	Kerbside	530890	104302	NO2	YES	0	2.7	NO	2.5
C12-10	Queens Street north of Clock	Roadside	530900	104451	NO2	YES	0	4.2	NO	3
C12-13	Main Station Taxi Rank	Roadside	531014	104874	NO2	YES	0	2.8	NO	2.5
C13-14	Lower Dyke Road-Churchill Square	Roadside	530770	104363	NO2	YES	0	3.3	NO	3.1
C14-10	West Street	Roadside	530833	104276	NO2	YES	0	4.8	NO	2.8

	south of Clock Tower									
C15-05	Gloucester Place re-instated 2014	Roadside	531401	104669	NO2	YES	0	8.4	NO	3
C16-13	York Place	Roadside	531400	104844	NO2	YES	0	4.9	NO	2.8
C17-12	Cheapside near Pelham Street	Roadside	531364	104982	NO2	YES	0	3.4	NO	2.4
C18-14	London Road near Oxford	Kerbside	531376	105012	NO2	YES	0	3	NO	2.8
C18-10	Oxford Street-London Road	Roadside	531376	105012	NO2	YES	0	3.3	NO	2.5
C19-09	Oxford Street-Ditchling Road	Roadside	531472	105161	NO2	YES	0	3.4	NO	2.6
C20-05	Ditchling Road-Viaduct Terrace	Roadside	531496	105315	NO2	YES	0	4.7	NO	2.2
C21-05	Viaduct Terrace	Roadside	531451	105356	NO2	YES	0	3.6	NO	3.1
C23-05	London Road-Preston Circus	Roadside	531189	105375	NO2	YES	0	5.4	NO	3
C24-05	New England Road-Preston Circus	Roadside	531101	105443	NO2	YES	0	3.6	NO	3
C25-10	New England Road-Argyle Road	Roadside	530985	105419	NO2	YES	0	3.5	NO	2.7
C27-10	Trafalgar Street	Roadside	531151	104850	NO2	YES	0	2.8	NO	2.5
C28-10	Frederick Place	Roadside	531032	104843	NO2	YES	0	2.8	NO	2.4

E01-10	Preston Road-Preston Circus	Roadside	531101	105498	NO2	YES	0	4.5	NO	2.8
E02-09	Preston Road-Preston Drove	Roadside	530233	106515	NO2	YES	0	4	NO	2.7
E02-12	The Drove	Roadside	530063	106368	NO2	YES	0	2.6	NO	2.5
E06-05	Beaconsfield Road-Preston Circus	Roadside	531102	105615	NO2	YES	0	4	NO	2.6
E07-12	Lewes Road Elm Grove Junction	Roadside	531805	105303	NO2	YES	0	2.9	NO	2.8
E08-96	Lewes Road-Inverness Road	Roadside	532090	105752	NO2	YES	0	4.4	NO	2.6
E10-15	Vogue Gyratory Island	Roadside	532126	105838	NO2	YES	0	3	NO	2.7
E12-02	Hollingdean Road	Roadside	532021	105946	NO2	YES	0	4.9	NO	2.7
E14-07	Lewes Road Lectern Pub	Roadside	523377	106314	NO2	YES	0	3.4	NO	2.9
E15-12	Lewes Road Coombe Terrace	Roadside	532300	106159	NO2	YES	0	3.7	NO	2.6
E16-96	Grand Parade Middle	Roadside	531465	104629	NO2	YES	0	4.4	NO	2.6
E16-15	37 Grand Parade Middle West Façade	Roadside	531426	104514	NO2	YES	0	5	NO	3.2
E17-03	Grand Parade University Building	Roadside	531394	104338	NO2	YES	0	3.2	NO	2.8

E17-18	181 Edward Street North Facing Façade	Roadside	531408	104233	NO2	YES	0	2.9	NO	2.7
E18-07	astern Road near Hospital	Roadside	532759	103810	NO2	YES	0	3.5	NO	2.9
E22-09	High Street Rottingdean East Side	Roadside	536970	102280	NO2	YES	0	0.2	NO	2.6
E23-10	High Street Rottingdean West Side	Kerbside	536966	102273	NO2	YES	0	0.2	NO	2.6
E24-16	Marine Drive, Rottingdean	Roadside	537003	102237	NO2	YES	0	2.5	NO	2.8
E25-18	Marine Drive, Rottingdean	Roadside	537014	102238	NO2	NO	0	2.7	NO	2.8
E26-18	Marine Drive A259 Southside	Roadside	537023	102222	NO2	NO	0	2	NO	2
E27-18	Woodingdean Falmer Road	Roadside	535634	105890	NO2	NO	0	3	NO	2.4
E28-18	Woodingdean Falmer Road	Roadside	535634	105897	NO2	NO	0	3	NO	2.4
E29-18	Under E23	Kerbside	536966	102273	NO2	NO	0	0.1	NO	1
W01-05	Queens Road	Roadside	530969	104785	NO2	YES	0	4.5	NO	2.8
W02-14	Surrey Street	Roadside	530963	104837	NO2	YES	0	5.3	NO	2.6
W03-06	Terminus Road Hill	Roadside	530963	104994	NO2	YES	0	3.5	NO	3
W04-06	Chatham Place-New England Road	Roadside	530809	105340	NO2	YES	0	3.4	NO	3
W05-06	Old Shoreham Road- Hill	Roadside	530778	105362	NO2	YES	0	3.6	NO	3.2

W07-14	Dyke Road-Seven Dials	Kerbside	530561	105134	NO2	YES	2	3	NO	3
W08-06	Buckingham Place-Seven Dials	Roadside	530586	105104	NO2	YES	0	8.4	NO	3.5
W10-06	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
W16-16	Boundary Road Bakers	Roadside	526404	105500	NO2	YES	0	2	NO	3.2
W16-16	Wellington Road-Basin Road	Roadside	526248	104857	NO2	YES	0	7	NO	2.7
W17-09	Wellington Road-Church Road	Roadside	525931	104961	NO2	YES	0	3	NO	2.7
W18-10	Vale Park, Portslade BG	Urban Background	525970	105230	NO2	NO	~50	97	NO	2.8
W19-09	Trafalgar Road, Portslade facade	Roadside	525658	105695	NO2	YES	0	3.9	NO	2.8
W21-10	Sackville Road-Old Shoreham Rd	Roadside	528389	105930	NO2	YES	0	3.4	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).

Table A.3 – Annual Mean NO_2 Monitoring Results Active in 2018

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
BH6	Roadside	Automatic	N/A	99.8	**48.7**	**39**	**46.2**	**51.1**	37.8
BH10	Roadside	Automatic	N/A	98.9	**56.4**	**52.5**	**47.1**	**50.3**	**49.5**
BH0	Urban Background	Automatic	N/A	89	16	14.8	16.5	16.9	16.3
LL1	Rural	Automatic	N/A	96.3	6.4	7	7.8	8.2	7.6
C02-09	Roadside	Diffusion Tube	100%	40%					30.8
C03-96	Roadside	Diffusion Tube	Full Year	75	36.3	33	35.3	34.1	35.5
C04-10	Roadside	Diffusion Tube	Full Year	94	**59**	**50.1**	**49**	**43.8**	**48.2**
C05-12	Urban Background	Diffusion Tube	Full Year	88	22.6	22.5	26.1	23.6	22
C09-05	Roadside	Diffusion Tube	Full Year	99	**58.7**	**47.3**	**48.4**	**47.4**	**47.2**
C10-12	Roadside	Diffusion Tube	Full Year	94	**53.6**	**52.5**	**48.3**	**45.2**	**45.5**
C11-07	Roadside	Diffusion Tube	Full Year	99	**68.3**	**59.8**	**60.3**	**57.3**	**54.6**
C11-12	Kerbside	Diffusion Tube	Full Year	78	**121.5**	**91.9**	**100.3**		**90.8**
C12-10	Roadside	Diffusion Tube	Full Year	93	**52.3**	**42.1**	**45.9**	**43.1**	**45.3**
C12-13	Roadside	Diffusion	Full Year	91	**52.5**	39.2	**44.7**	**43.1**	**40.5**

		Tube							
C13-14	Roadside	Diffusion Tube	Full Year	91	**53.2**	**41.7**	**41.5**	**41.6**	**40.5**
C14-10	Roadside	Diffusion Tube	Full Year	99	35.3	33.6	37.7	**40.6**	34.1
C15-05	Roadside	Diffusion Tube	Full Year	99	**45.7**	**43.1**	**44.3**	35.2	37.1
C16-13	Roadside	Diffusion Tube	Full Year	99	**48.3**	**43.8**	**45.1**	**44.6**	38.9
C17-12	Roadside	Diffusion Tube	Full Year	100	**64.2**	**61.3**	**55.4**	**44.5**	**53.9**
C18-14	Kerbside	Diffusion Tube	Full Year	99	**76.4**	**75.7**	**72.2**	**63.1**	**57**
C18-18	Roadside	Diffusion Tube	Full Year	99	**62.1**	**60.2**	**64.3**	**58.1**	**54.7**
C19-09	Roadside	Diffusion Tube	Full Year	93	**49.2**	**43.2**	**43.8**	**44.9**	39.2
C20-05	Roadside	Diffusion Tube	Full Year	99	**47.5**	39.7	**41.3**	**40.5**	**40.7**
C21-05	Roadside	Diffusion Tube	Full Year	99	**62.7**	**54.6**	**52.2**	**49.7**	**45.8**
C23-05	Roadside	Diffusion Tube	Full Year	91	**46.2**	**43.9**	**46**	**47**	**43.1**
C24-05	Roadside	Diffusion Tube	Full Year	99			**52.4**	**54.8**	**51.1**
C25-10	Roadside	Diffusion Tube	Full Year	99	**52.9**	**45.3**	**50.2**	**47.8**	**44.3**
C27-10	Roadside	Diffusion Tube	Full Year	99	39.8	37.6	39.5	39.8	36.4
C28-10	Roadside	Diffusion Tube	Full Year	99	**44.6**	**44.6**	**43.1**	**46**	**42.9**
E01-10	Roadside	Diffusion Tube	Full Year	70	37.6	33.8	37.8	39.9	**41.9**
E02-09	Roadside	Diffusion Tube	Full Year	99	**41.2**	39	**41.3**	**40.3**	**41.1**

E02-12	Roadside	Diffusion Tube	Full Year	99	39.7	**41.5**	**42.2**	**44.4**	**44.7**
E06-05	Roadside	Diffusion Tube	Full Year	99	38.6	35.6	37.6	39.3	38.1
E07-12	Roadside	Diffusion Tube	Full Year	67	**60**	**54.9**	**57.4**	**48**	**55.5**
E08-96	Roadside	Diffusion Tube	Full Year	88		**57.1**	**55.4**	**55.7**	**52.6**
E10-15	Roadside	Diffusion Tube	Full Year	88		**45.4**	**40.9**	**43**	**40.8**
E12-02	Roadside	Diffusion Tube	Full Year	88	**46.9**	**45.2**	**45.6**	**46.2**	**45.3**
E14-07	Roadside	Diffusion Tube	87	63	39.2	35.7	37.4	37.2	39.3
E15-12	Roadside	Diffusion Tube	Full Year	79	**44.4**	39.7	**43.7**	38.6	**40.7**
E16-96	Roadside	Diffusion Tube	Full Year	90	**41.9**	37.5	**42.4**	39.4	**41.4**
E16-15	Roadside	Diffusion Tube	Full Year	99		**42.7**	**49.3**	**51.1**	**44.8**
E17-03	Roadside	Diffusion Tube	Full Year	83	**52.3**	**51**	**46.1**	**44.2**	**46.8**
E17-18	Roadside	Diffusion Tube	Full Year	76					**40.4**
E18-07	Roadside	Diffusion Tube	Full Year	91	**40.5**	35.4	**43.6**	**42.2**	35
E22-09	Roadside	Diffusion Tube	Full Year	100	39.7	31.6	39.1	**41.4**	36.2
E23-10	Roadside	Diffusion Tube	Full Year	92	**41.3**	37.7	38.4	35.3	37.2
E24-16	Roadside	Diffusion Tube	100	57			32.4	30.4	33.3
E25-18	Roadside	Diffusion Tube	Full Year	99					35.5
E26-18	Roadside	Diffusion Tube	Full Year	89					30.1

E27-18	Roadside	Diffusion Tube	Full Year	100					23.6
E28-18	Roadside	Diffusion Tube	Full Year	100					21.4
E29-18	Roadside	Diffusion Tube	Full Year	91					39.2
W01-05	Roadside	Diffusion Tube	Full Year	90	**47.9**	**41.3**	**45.7**	**43.1**	**41.1**
W02-14	Roadside	Diffusion Tube	Full Year	95	38.1	34.5	37.9	37.9	39.2
W03-06	Roadside	Diffusion Tube	Full Year	98	**54.3**	**42.2**	**40.4**	**42.6**	**40.4**
W04-06	Roadside	Diffusion Tube	Full Year	98	**46.6**	38.4	**42**	**41**	39.9
W05-06	Roadside	Diffusion Tube	Full Year	89	**50.6**	**46.3**	**47.2**	**44.9**	**44.5**
W07-14	Roadside	Diffusion Tube	77	48	**40.4**	34.3	38.2	38.2	36.9
W08-06	Roadside	Diffusion Tube	Full Year	89	**41**	38	38.8	37.3	36.5
W10-06	Roadside	Diffusion Tube	Full Year	88	**50**	**42.9**	**41.9**	**40.9**	**41.4**
W12-12	Roadside	Diffusion Tube	Full Year	98	38.3	32.7	34.5	35.3	33
W16-16	Roadside	Diffusion Tube	100	48			35.5	28.5	29.6
W16-09	Roadside	Diffusion Tube	Full Year	98	38.2	40.1	37.8	40.5	38.4
W17-09	Roadside	Diffusion Tube	Full Year	98	**45.1**	**41.5**	**42.4**	**44.4**	**42**
W18-10	Urban Background	Diffusion Tube	Full Year	98	20.1	21	19.8	22.3	20.2
W19-09	Roadside	Diffusion Tube	Full Year	98	**44.8**	39.7	**40.2**	38.1	**41.7**
W21-10	Roadside	Diffusion Tube	Full Year	98	**44.5**	37.2	**40.1**	39.4	36.6

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

☒ **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**.

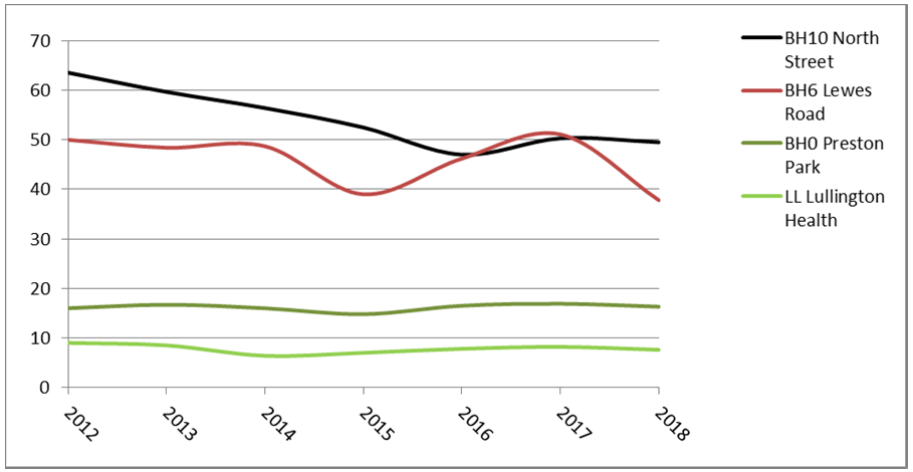
NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) 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 Automatic Analysers



Units: µg/m^3. Standard and Key Performance Indicator for the Annual Mean is 40 µg/m^3.

Long Term Diffusion Tubes Trends for NO_2

Figure 2 AQMA1 Diffusion Tubes Eastern Brighton

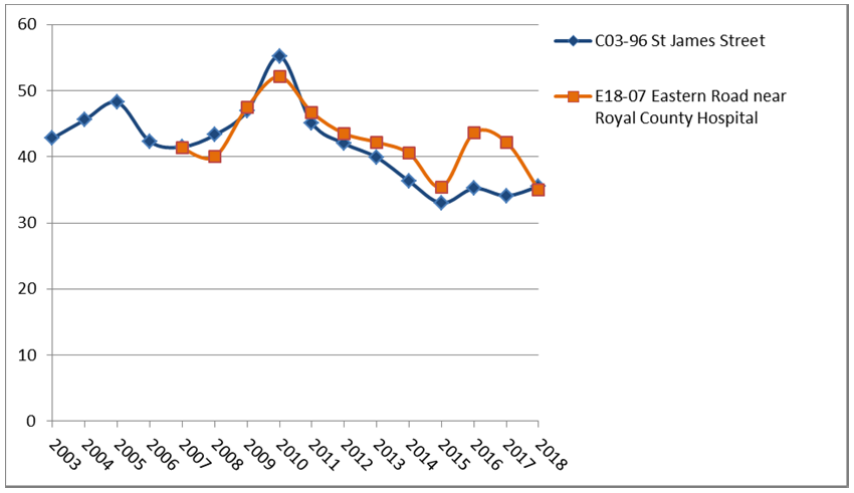


Figure 3 AQMA1 Hove (Background for Comparison)

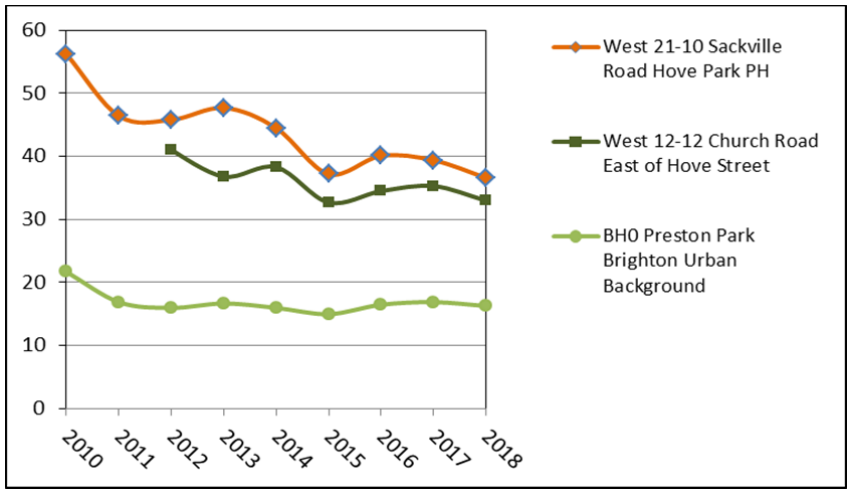
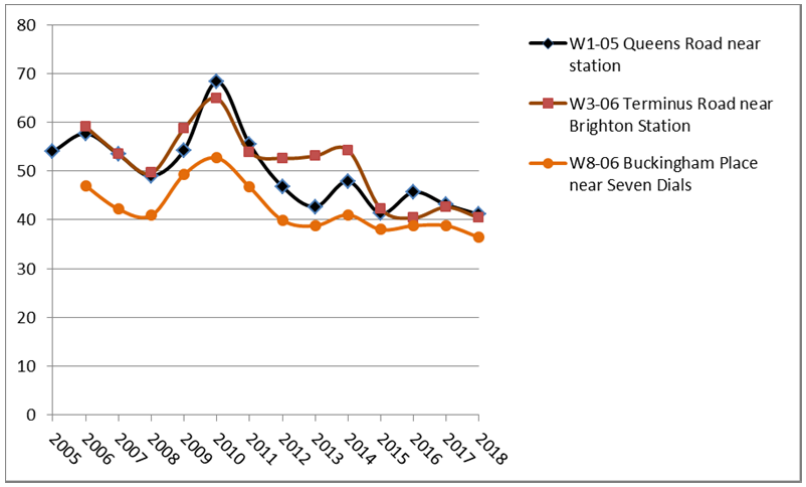


Figure 4 AQMA1 Seven Dials & Gateway to the Sea



as Fig 4 including monitoring started 2012 or 2014

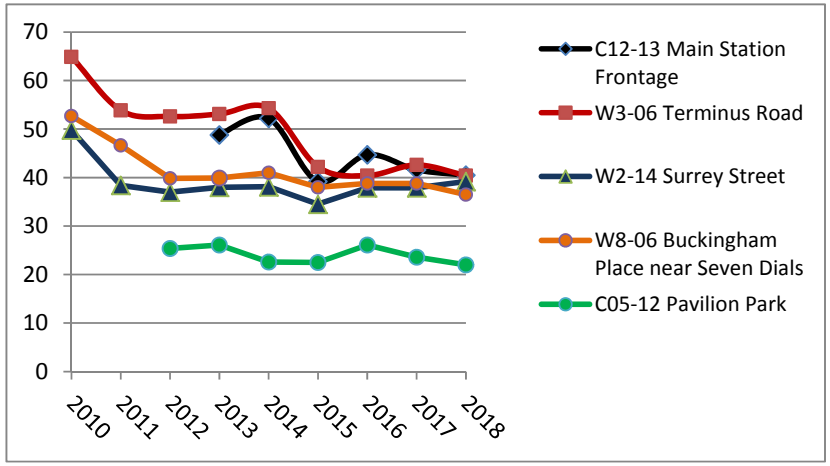
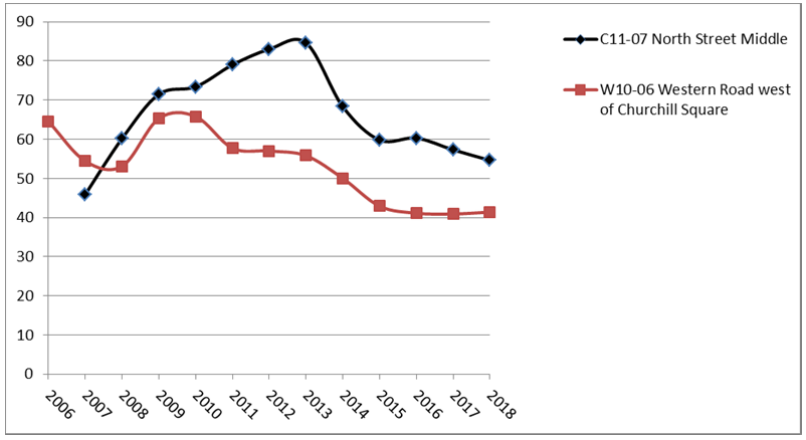


Figure 5 AQMA1 Ultralow Emission Zone



as Fig 5 Including monitoring started 2012

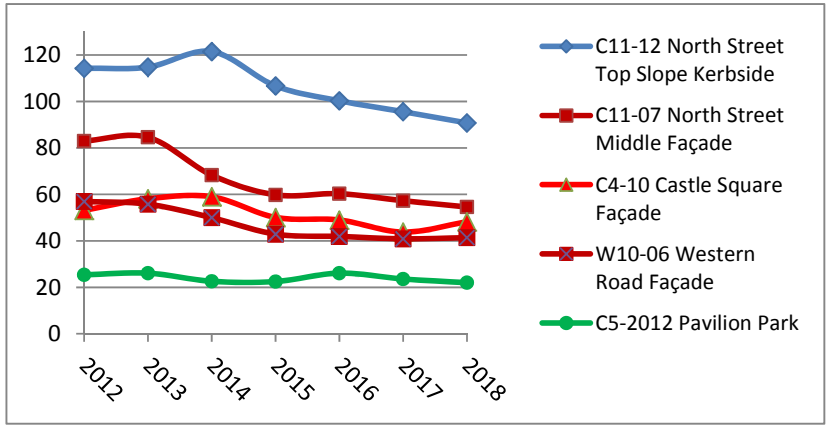


Figure 6 AQMA1 Old Shoreham Road & Chatham Place

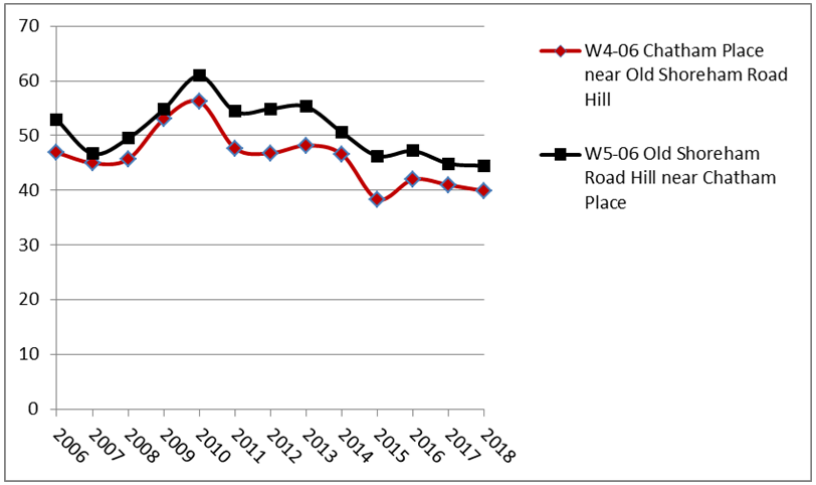


Figure 7 AQMA1The Drove and Preston Road

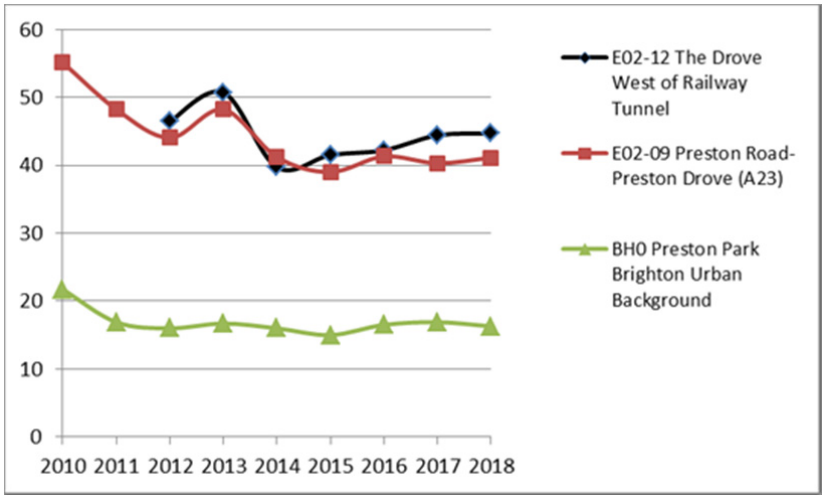


Figure 8 AQMA1 North Laine near the Main Railway Station

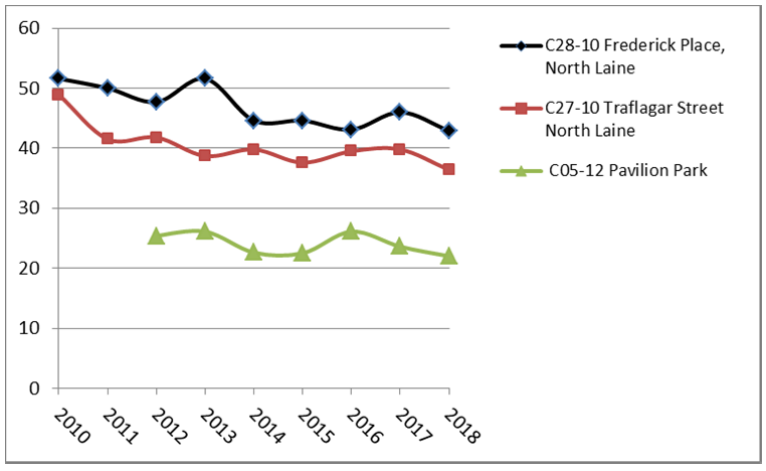


Figure 9 AQMA1 Valley Gardens East Side since 2010

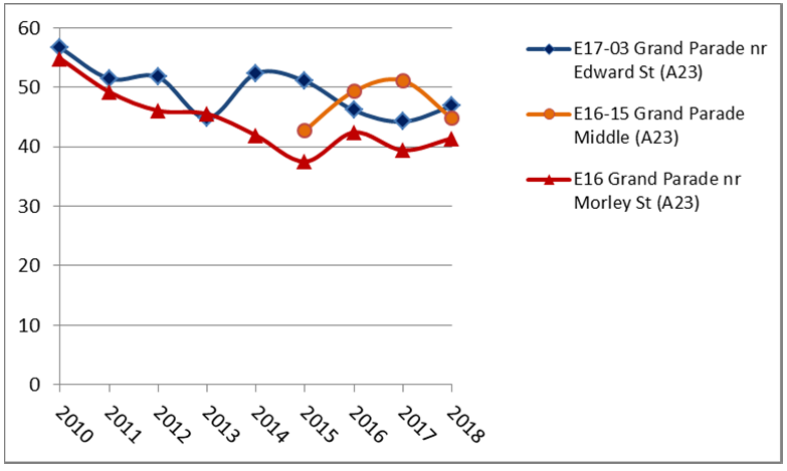


Figure 10 AQMA1 Valley Gardens East Side Since 2003

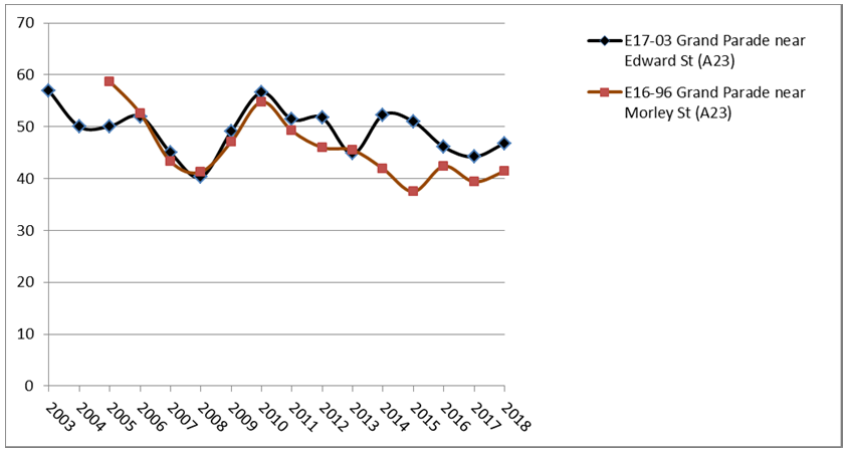


Figure 11 AQMA1 Valley Gardens West Side Since 2005

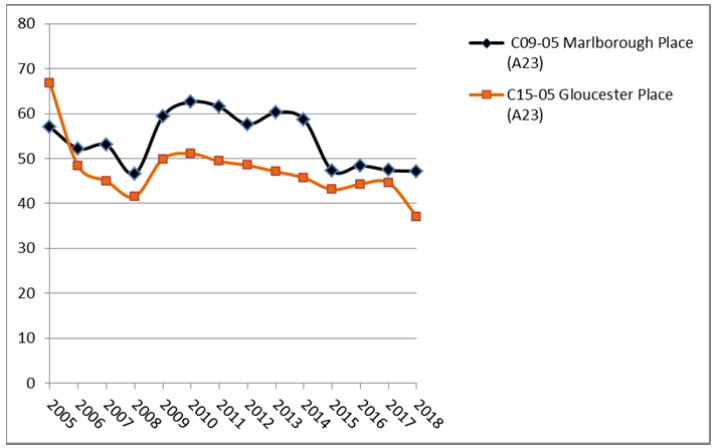


Figure 12 AQMA1 Lewes Road Area since 2003

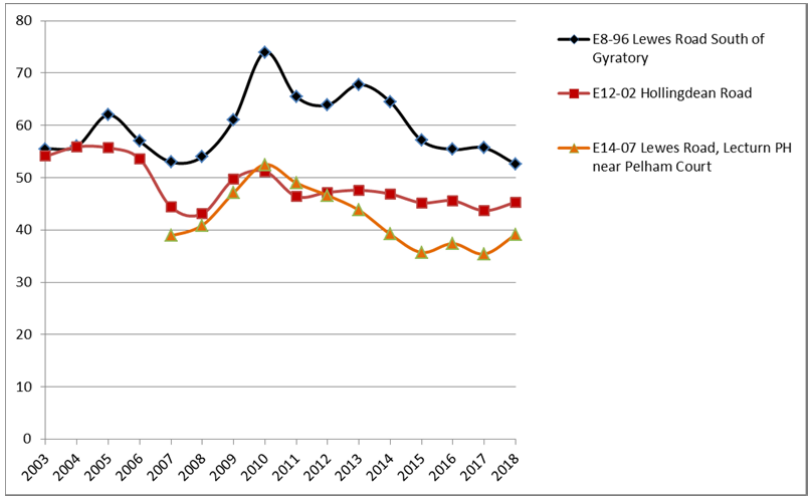


Figure 13 AQMA2 Rottingdean Village since 2010

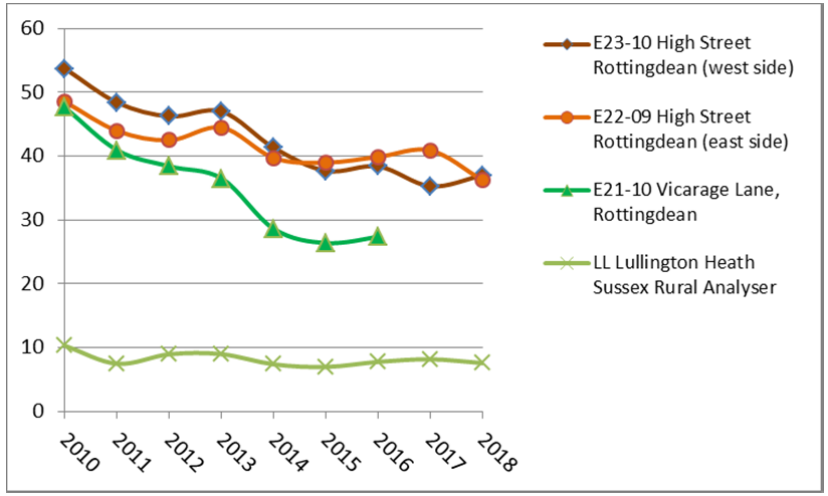
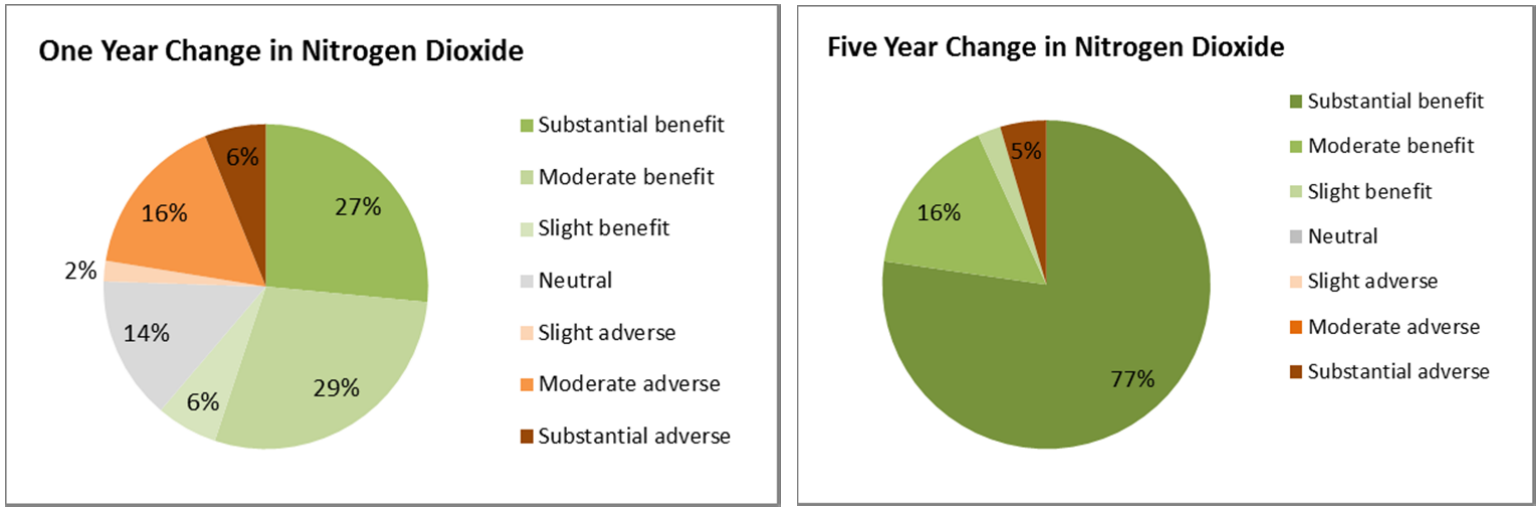


Figure 14 Indicative Summaries: Trend Changes in Nitrogen Dioxide



Level of significance references the UK Planning Guidance[19]

[19] UK Planning for Air Quality Guidance https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

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 2018 (%) [2]	NO_2 1-Hour Means > 200µg/m^3 [3]				
					2014	2015	2016	2017	2018
BH6	Roadside	Automatic	N/A	99.8	**33**	1	0	**69**	16
BH10	Roadside	Automatic	N/A	98.9	8	13	0	**0**	3

Notes:

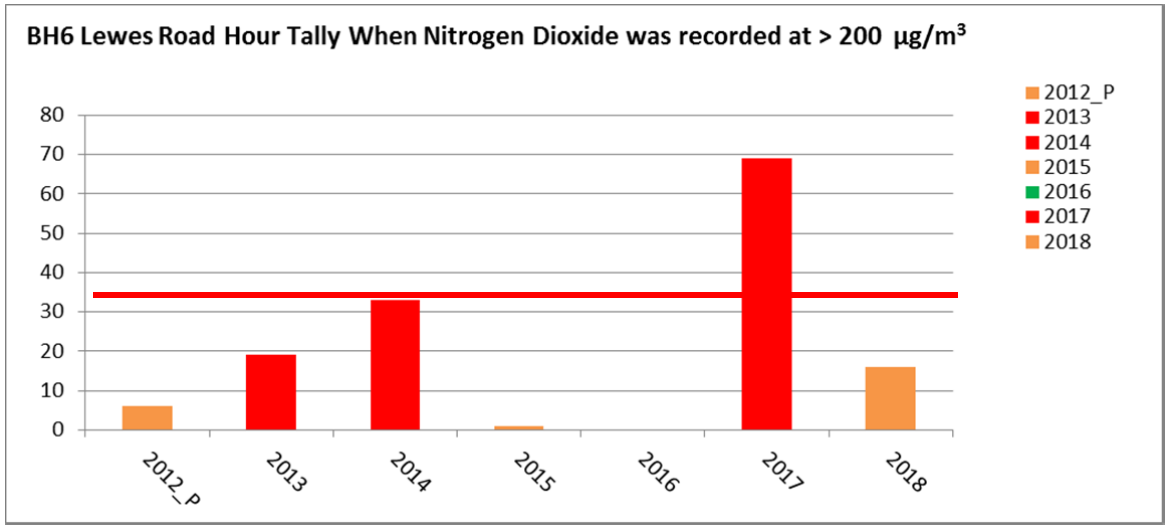
Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

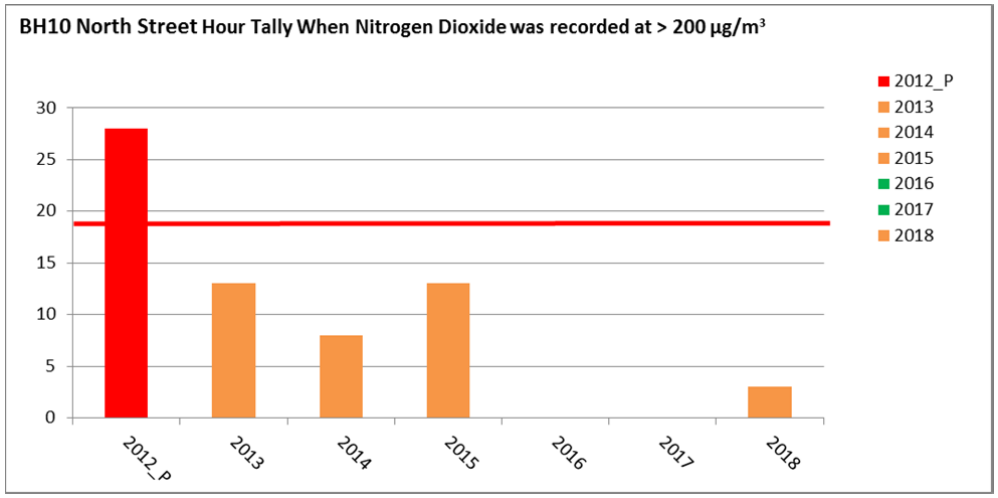
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(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 99.8th percentile of 1-hour means is provided in brackets.

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





Results for 2012 are for part of the year and are annualised

200 µg/m^3 English Legal Limit and Target under Directive 2008/50/EC not to be exceeded more than 18 hours a year (red). Local aim is to eliminate hourly concentrations > 200 µg/m^3.

Figure 15 BH6 Lewes Road Hourly NO_2 Results 2018

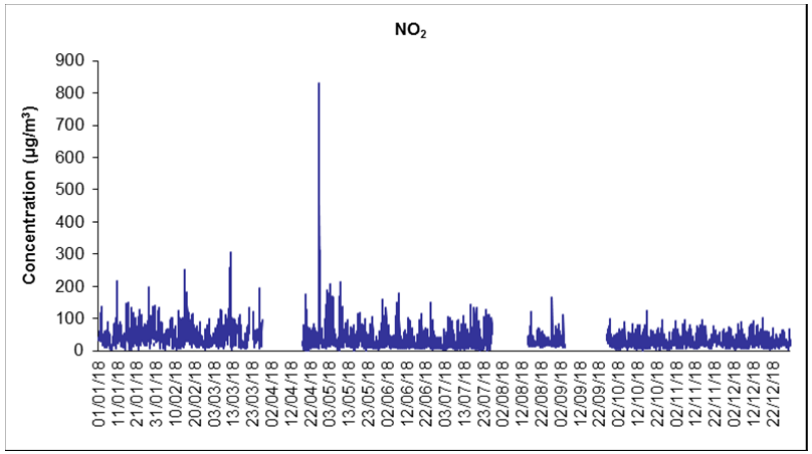


Figure 16 BH10 North Street Hourly NO_2 Results 2018

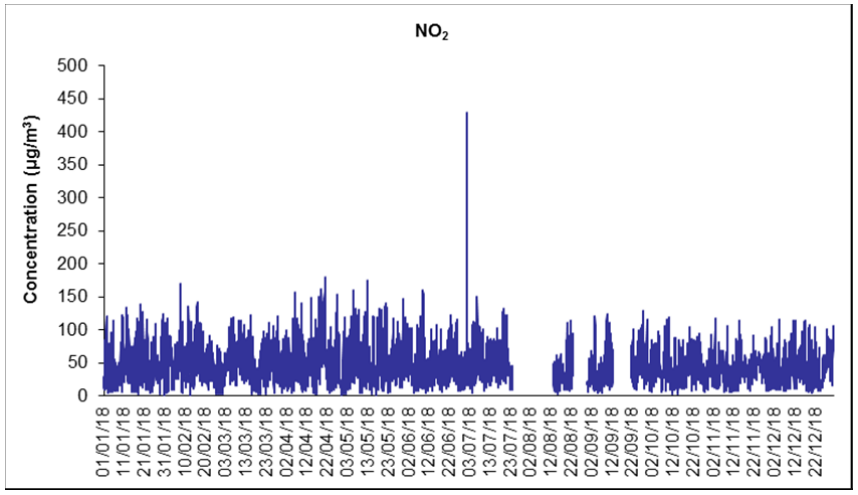


Table A.5 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) [3]				
				2014	2015	2016	2017	2018
BH6	Roadside	N/A	97.3		6.8	7.2	6.4	5.8
BH10	Roadside	N/A	93.9		13	11	10.6	10.3
BH0 AURN	Urban Background	N/A	87	9.6	9.3	9	8.9	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.

Figure A.3 – Trends in Annual Mean $PM_{2.5}$ Concentrations

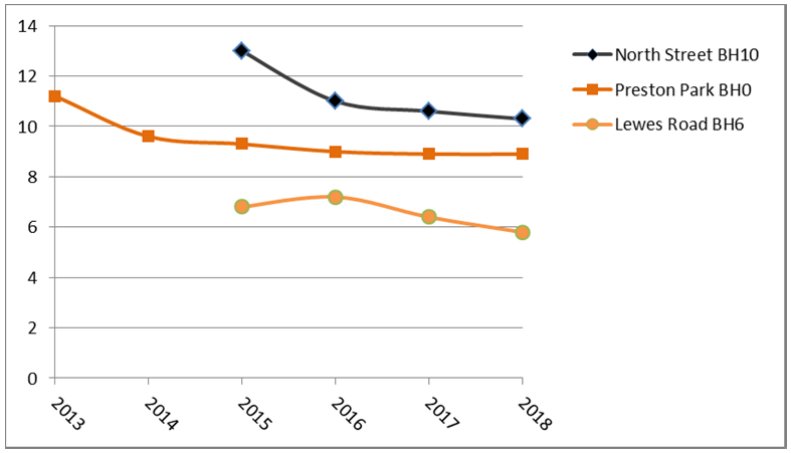
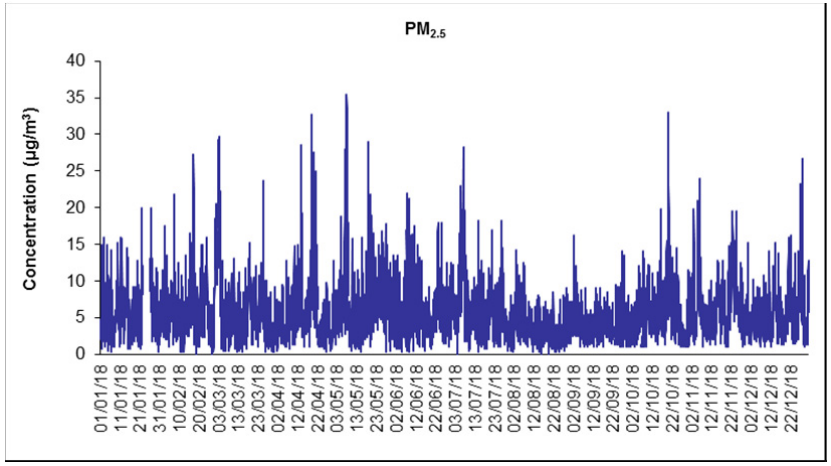
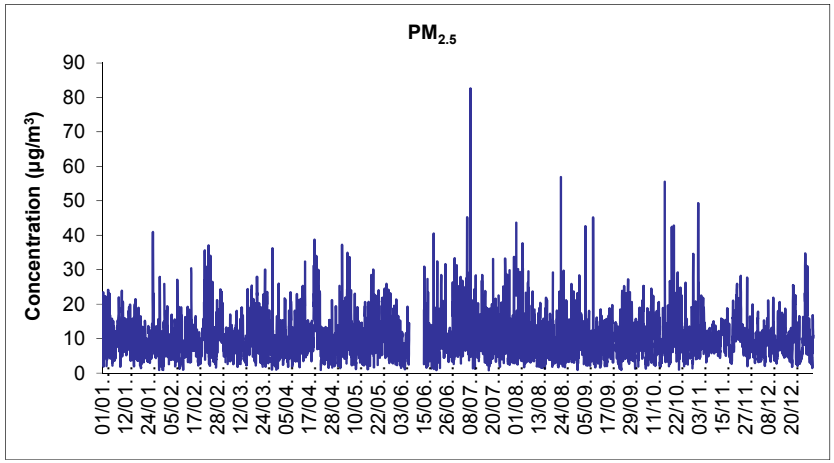


Figure 17 BH6 Lewes Road (left) and BH10 North Street (right) hourly $PM_{2.5}$ monitoring 2018





Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results – 2018

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)
C02-18								31.8	30.4	**40.9**	28.7	29.0	32.2	29.9	29.9
C03-96	36.4	37.1	33.8	**42.0**	**44.3**	28.0	34.7	**51.8**	35.0	**41.0**	32.0	**41.8**	38.1	35.5	35.5
C04-10	**55.4**		**54.4**	**57.6**	**60.8**	**43.5**	**60.7**		**51.0**	**49.8**	**41.7**	**43.5**	**51.8**	**48.2**	**48.2**
C05-12	26.8	31.5	22.0		27.5	19.0		13.7	21.0	27.6	21.8	25.2	23.6	22.0	22.0
C09-05	**56.1**	**46.8**	**49.8**	**49.5**	**54.2**	**44.2**	**56.8**	**49.0**	**52.2**	**51.0**	**51.2**	**45.6**	**50.5**	**47.2**	**47.2**
C10-12	**49.3**	**47.1**	**43.2**	**53.8**	**56.7**	**42.4**	**57.5**	**51.5**	**43.3**	**52.9**	**45.4**	**43.4**	**48.9**	**45.5**	**45.5**
C11-07	**62.2**	**52.6**	**52.2**	**65.4**	**67.0**	**52.7**	**76.5**	**46.2**	**57.6**	**57.7**	**56.7**	**57.7**	**58.7**	**54.6**	**54.6**
C11-12	**108.3**	**80.2**	**86.7**	**109.1**			**119.3**	**104.7**	**96.5**	**97.1**	**85.2**	**89.0**	**97.6**	**90.8**	**90.8**
C12-10	**48.6**	**51.7**	**45.6**	**53.6**	**60.6**	**42.3**	**61.4**	**46.6**	**45.0**		**46.4**	**42.0**	**49.4**	**45.3**	**45.3**
C12-13	**48.3**	**45.8**	**45.3**		**48.8**	**40.4**	**49.0**	**44.0**	**35.9**	**46.3**	**40.4**	**35.0**	**43.6**	**40.5**	**40.5**
C13-14	**41.3**	**41.0**	35.2	**50.8**	**51.1**	**40.2**	**52.3**	**34.3**	**38.5**	**49.6**	**44.4**	**0.0**	**43.5**	**40.5**	**40.5**
C14-10	**40.5**	43.6	32.2	**45.8**	**44.0**	32.5	35.3	24.7	34.8	**43.9**	31.2	31.2	36.6	34.1	34.1
C15-05	38.7	33.2	**44.2**	**40.2**	**44.1**	38.1	**46.3**	39.8	**41.6**	**40.2**	33.3	39.4	39.9	37.1	37.1
C16-13	**43.2**	39.0	**43.4**	**38.7**	**40.7**	**35.2**	**46.4**	**42.6**	**45.4**	**47.4**	**40.3**	**39.2**	**41.8**	38.9	38.9

C17-12	65.1	51.3	62.4	55.1	54.2	51.4	66.8	53.9	57.0	61.6	65.6	51.1	58.0	53.9	53.9
C18-14	65.9	58.5	61.4	60.0	61.7	57.3	76.7	62.6	65.2	59.3	51.2	54.4	61.2	57.0	57.0
C18-18	65.0	56.4	52.9	51.3	69.2	57.9	62.9	59.5	60.4	65.1	54.8	47.8	58.6	54.7	54.7
C19-09	42.3	41.4	40.8	42.6	45.3	40.8	39.8	45.3	43.4		40.9	41.0	42.1	39.2	39.2
C20-05	38.1	47.6	47.4	48.4	42.2	40.6	46.4	40.7	41.6	48.2	44.3	39.4	43.7	40.7	40.7
C21-05	48.4	47.3	53.3	56.9	39.9	46.6	48.8	54.8	51.5	53.1	46.1	44.5	49.3	45.8	45.8
C23-05	44.9	43.0	47.4	44.7	62.0		36.9	47.8	47.3	46.4	43.0	43.0	46.0	43.1	43.1
C24-05	60.2	59.6	62.7	52.7	52.3	48.8	54.8	51.3	56.9	60.0	51.1	48.5	54.9	51.1	51.1
C25-10	48.4	45.0	48.3	47.2	39.5	45.7	57.5	51.7	53.8	51.0	40.1	43.9	47.7	44.3	44.3
C27-10	33.4	37.4	42.2	37.5	43.8	34.1	57.2	36.0	38.5	38.5	34.1	36.4	39.1	36.4	36.4
C28-10	54.7	47.4	45.9	45.2	43.3	39.8	54.5	44.6	45.6	44.0	44.4	41.1	45.9	42.9	42.9
E01-10	45.0	43.2	39.6	48.0	60.2	45.5	44.2	31.7	42.7	48.5	48.9	39.9	39.9	41.9	41.9
E02-09	50.6	46.8	48.7	47.0	46.9	36.5	48.3	36.3	44.8	42.2	40.4	39.2	44.0	41.1	41.1
E02-12	50.5	53.1	53.5	48.0	52.6	49.7	43.0	38.0	49.0	42.9	51.5	45.1	48.1	44.7	44.7
E06-05	47.3	44.2	39.7	41.3	40.1	30.6	40.6	37.1	43.9	39.7	42.4	41.5	40.7	38.1	38.1
E07-12	66.4	56.9	60.1	51.9	70.0	52.2	58.1		65.0	67.6	55.6	53.2	59.7	55.5	55.5
E08-96	62.5	50.3	52.5	55.3		59.6	51.6	53.3	64.7	59.2	56.7	52.5	56.2	52.6	52.6
E10-15	50.5	38.6	44.4	43.8		43.6	42.5	42.9	54.1	42.2	46.3	31.7	43.7	40.8	40.8
E12-02	54.6	49.4	54.0	46.7		43.9	46.9	40.5	52.0	49.5	46.8	47.7	48.4	45.3	45.3
E14-07	42.2	41.5	46.1	43.2	48.8	38.8	39.4	39.2	46.1	45.4	39.1	37.4	42.3	39.3	39.3
E15-12	45.4	42.7		40.4		47.2	37.3	50.9	42.8	41.9	46.6	42.1	43.7	40.7	40.7
E16-96		44.6	47.9	47.1	55.5	40.2	48.2	39.8	41.4	47.4	40.9	33.3	44.2	41.4	41.4
E16-15	44.8	45.3	55.2	47.6	62.7	43.0	53.8	42.0	45.4	52.0	48.6	37.8	48.2	44.8	44.8
E17-03	39.5	41.1	61.4	52.2	63.1		58.4	49.3	43.2	52.1		42.1	50.2	46.8	46.8
E17-18	44.9	43.2	37.7	46.7	50.5	38.7	48.3	42.0	32.8	50.5	40.4	45.0	43.4	40.4	40.4
E18-07	48.8	42.8	47.1	38.6	33.4	27.7		33.7	31.7	39.8	32.4	32.0	37.3	35.0	35.0
E22-09	32.7	37.8	42.2	37.9	47.1	35.0	46.9	39.6	39.9	41.4	30.3	35.8	38.9	36.2	36.2

E23-10	38.9	37.2	**42.4**	36.6	39.5	33.5	**52.3**		32.6	**41.0**	**40.3**	**43.7**	39.8	37.2	37.2
E24-16	35.9	37.9	38.7	32.4	**42.3**	37.3	34.0		Monitor	Ceased			36.9	33.3	33.3
E25-18	38.4	**42.0**		39.4	**47.5**	**40.7**	**40.0**	30.2	32.4	**41.3**	33.6	31.3	37.9	35.5	35.5
E26-18		28.0	37.4	33.9	35.2	28.1	**40.0**		Monitor	Ceased			32.1	30.1	30.1
E27-18	26.9	25.3	26.9	23.4	29.0	23.5	25.5	23.9	24.6	29.8	23.9	22.0	25.4	23.6	23.6
E28-18	26.7	21.0	22.7	22.4	20.3	17.2	24.2	24.6	24.6	23.5	21.7	24.3	22.8	21.4	21.4
E29-18	35.1	**46.6**		**50.0**	**44.7**	**40.4**	**60.5**	20.5	**42.4**	**46.5**		34.7	42.1	39.2	39.2
W01-05	**47.4**	**47.7**	**36.7**	**52.4**		**38.3**	**52.6**	**46.6**	**41.9**	**49.9**	**38.2**	**34.8**	**44.2**	**41.1**	**41.1**
W02-14	38.5	**44.5**	**43.5**	**42.4**	39.4	**40.1**	37.8	38.8	37.5	**49.9**	**42.6**	**36.2**	**42.2**	39.2	39.2
W03-06	**44.8**	**45.7**	**45.5**	**46.0**	**44.6**	30.2	**47.8**	**43.9**	**43.0**	**49.0**	38.0	**41.6**	**41.6**	**40.4**	**40.4**
W04-06	**44.8**	**44.5**	**45.2**	**43.5**	**44.3**	39.5	**40.0**	**41.4**	**46.3**	**48.9**	37.2	39.6	**42.9**	39.9	39.9
W05-06	**49.8**	**43.2**	39.3	**46.1**	**61.2**	**49.0**	**51.6**	**49.5**	**43.8**		**47.8**	**44.4**	**47.8**	**44.5**	**44.5**
W07-14		39.2	39.0	40.0	41.2	34.7	43.9		Monitor	Ceased			**39.7**	36.9	31.1
W08-06	**42.9**	39.0	**53.2**	36.2	36.7	29.9		39.0	37.0	**41.4**	37.6	39.5	39.3	36.5	36.5
W10-06	**48.1**	**45.2**	**47.1**	**49.4**	**41.2**	35.9	**48.5**		39.1	**49.9**	37.3	**47.2**	**44.4**	**41.4**	**41.4**
W12-12	37.6	36.6	36.2	37.8	34.9	24.9	36.3	31.9	29.1	**41.2**	31.8	34.7	34.4	33.0	33.0
W16-16	36.3	32.4	31.0	30.0	34.8	26.6			Monitor	Ceased			31.9	29.6	29.6
W16-09	**48.2**	**46.9**	38.3	**44.7**	**45.0**	33.7	**46.8**	**40.6**	36.5	38.6	36.3	**40.3**	**41.3**	38.4	38.4
W17-09	**50.3**	35.8	**44.5**	**45.0**	**59.7**	**45.0**	**46.1**	**43.6**	**45.4**	**48.6**	37.9	**40.3**	**45.2**	**42.0**	**42.0**
W18-10	27.1	28.3	23.3	21.5	19.7	16.4	17.4	16.5	19.1	21.8	21.7	27.4	21.7	20.2	20.2
W19-09	**47.3**	**43.3**	**46.7**	**45.2**	**47.1**	**40.3**	**46.4**	**46.5**	**44.8**	**51.9**	36.3	**40.9**	**44.7**	**41.7**	**41.7**
W21-10	**42.4**	**41.7**	**41.2**	39.8	33.1	34.1	38.4	36.6	37.4	**43.0**	**38.8**	**43.1**	39.3	36.6	36.6

☒ **Local bias adjustment factor considered**

☒ **National bias adjustment factor used**

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

☒ **Where applicable, data has been distance corrected for relevant exposure (example in appendix**

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

(3) Diffusion Tube Site IDs standardised: C stands for Central, E for East and W for West. W1-05 is West One with monitoring records that started in 2005.

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

3.3 Additional Sources

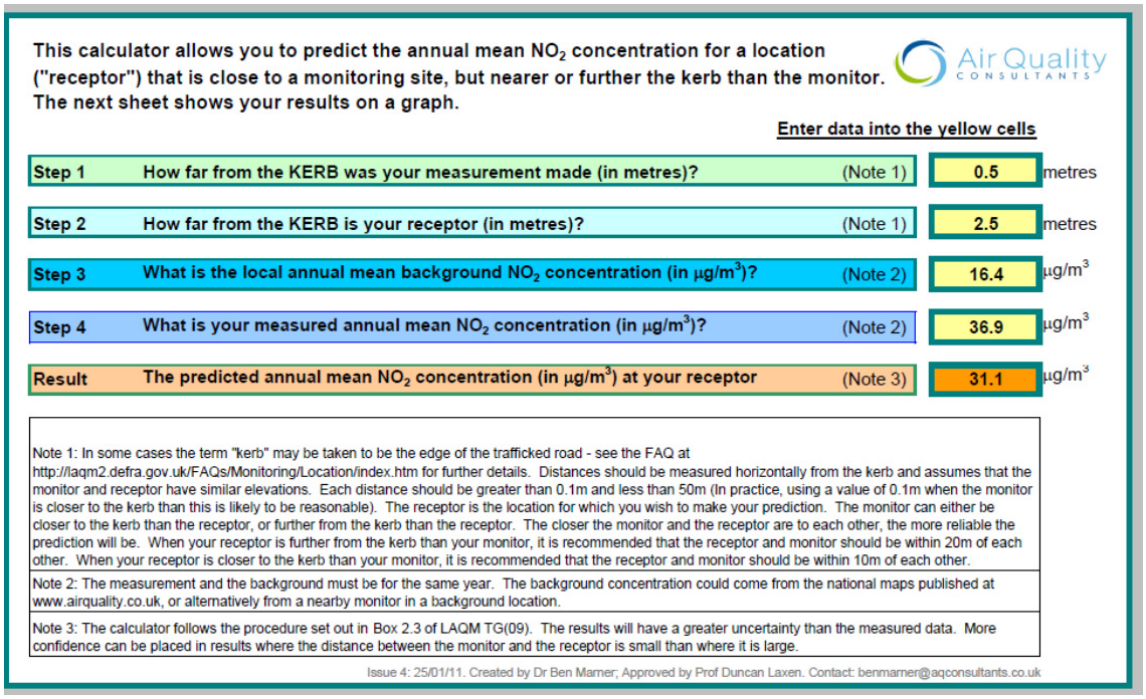
Expectations are that air quality will continue to improve. During 2018 **additional sources** include construction activity in vicinity of Lewes Road and Grand Parade. Rail replacement and events tend to use older buses than those deployed on regular services. Models of future air quality have often assumed rapid market uptake of low and no emission vehicles. In practice many motorists are keeping ageing vehicles that do not have the latest exhaust technology designed to mitigate pollution. The average age of vehicles across the EU and UK is increasing[20]. This has slowed the anticipated rate of emission improvement. SUV car sales show strong growth compared with compact models and account for a third of new cars sales[21].

3.4 Relevance to Public Exposure

All monitoring sites in the City are representative of public exposure with exception of:

- Background monitors in; Preston Park (BH0), Pavilion Park (C05-12) and Vale Park (C05-12). In accordance with the technical guidance it is important to have some background monitoring so roadside concentrations affected by local emission can be compared with general background typical of the region. Pollution episodes that affect Sussex or the South East will be picked up by background, roadside and kerbside monitors. Local road traffic emissions will influence roadside and kerbside air quality much more than the background; across parks, gardens and suburbs.

- Kerbside W07-14 monitor next to Seven Dials has been adjusted for distance to the nearest residential receptor as follows:



This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

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Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	0.5	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	2.5	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	(Note 2)	16.4	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	(Note 2)	36.9	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	(Note 3)	31.1	µg/m^3

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

Issue 4: 25/01/11. Created by Dr Ben Marner; Approved by Prof Duncan Laxen. Contact: benmarner@aqconsultants.co.uk

[20] Average Vehicle Age in the EU also applies to the UK https://www.acea.be/statistics/tag/category/average-vehicle-age
[21] SUV car sales https://europe.autonews.com/sales-segment/europes-suv-sales-boom-despite-flat-market-2018

In 2018 the City returned monitoring results for 70 samples including; four automatic analysers, three diffusion tubes co-located with the North Street analyser and a multiple-height study in Rottingdean. 62 passive diffusion tube monitors at roadside were located on the building-line to represent scores of residential dwellings often along a parade or terrace. Since the 1990s the City Council's monitoring records are amongst the most diligent in England outside of London.

Kerbside monitors on North Street (C11-12) and London Road (C18-14) typically show the highest concentrations of NO_2 and are positioned to monitor hourly human exposure. The sample positions represent people (shoppers and visitors) spending at least half-hour in the vicinity of the concourse, both locations have high pedestrian footfall along the pavement. The annual average does not apply at the sample localities because no person is present for the duration of the annual air quality standard set out in the Air Quality Strategy.

3.5 Annualisation and Data Quality Assurance and Quality Control

Sixty-seven monitoring locations (all methods) are reported in Table A3. This does not include the University of Brighton's monitoring station. The triplicate diffusion tubes C10-12 are included as an average. 61 out of 67 sample locations have data capture of 75% or more.

Annualisation adjusts monitoring results where <75% of the calendar year is monitored, for example eight months out of twelve. The ratio for the adjustment to achieve an annual equivalent was derived from the triplicate diffusion tubes results at C10-12 that is co-located (within one meter) of the automatic analyser BH10.

Diffusion tube monitor E24-16 is compliant and therefore was stopped after six months of 2018. The area adjacent with Marine Drive (A259) outside AQMA2 is represented by E25-18 that consistently showed slightly higher results compared with E24 (north side) and E26 (south side). At the triplicate monitor (North Street) the second half of the year showed lower concentrations. An annual adjustment of 0.97 was applied to the monitor sampling the first half of the calendar year (January through to the end of June) to provide and annual equivalent.

Monitor C02-09 (Old Steine) resumed in August 2018. The monitor was added to determine ambient NO_2 in the vicinity of Valley Gardens Phase III transport scheme. Sampling started for the year during August. To annualise results for the calendar year an adjustment 1.03 was applied. This was the ratio for the sample period compared to the annual average at the diffusion tube triplicate site. A summary of annualisation where annual data capture is <75% is given below.

Table 3 Annualisation applied to monitors with <75% data capture 2018

Monitoring Site	Valid Data Capture for the monitoring period if less than a Full Year	Valid Data Capture for 2018 %	Result for Period µg/m^3	Adjustment based on C10-12 ratios	Annual Equivalent µg/m^3
C02-09	100%	40	29.9	1.03	30.8
E01-10	Full Year	70	42.3	0.99	41.9
E14-07	87%	63	39.1	1.01	39.3
E24-16	100%	57	34.3	0.97	33.3
W07-14	77%	48	36.9	1	36.9
W16-16	100%	48	29.6	1	29.6

For quality control and quality assurance of the monitoring data in accordance with the LAQM Technical Guidance (TG 2003 and 2016) bias correction factor is applied to all 2018 diffusion tube results. This checks if the diffusion tubes are over or under predicting compared to one or more automatic analysers. The 2018 bias correction factor of 0.93 and has not changed significantly in recent years. This is based on the national average factor for Gradko method (20% TEA in water) provided by National Physical Laboratory (Spring-2019). The approach is consistent with previous years so the results featured in long term trend graphs are comparable. The locally derived adjustment

figure (C10-12 diffusion tube triplicates co-located with BH10) submitted to National Physical Laboratory (NPL) is included in the national average for diffusion tubes of this type. The workings are given below:

Table 4 Brighton & Hove Co-Location Diffusion Tube with Automatic Analyser

Diffusion Tube Collocation Data Questionnaire For Local Authorities

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

	Date form filled in	Name of Local Authority	Your name	Phone number	Contact email
Your Details	06/03/2019	Brighton & Hove City Council	Samuel Rouse	01273 292256	samuel.rouse@brighton-hove.co.uk

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

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

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

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

Period	Start Date (dd/mm/yy)	End Date (dd/mm/yy)	% Data Capture	Ratified / Provisional	NOx (if available) (ug/m^3)	Nitrogen Dioxide (ug/m^3)
1	05/01/2018	14/02/2018	99.8	Ratified	142	50.4
2	14/02/2018	07/03/2018	100	Ratified	143	52.1
3	07/03/2018	06/04/2018	99.4	Ratified	148.9	52.9
4	06/04/2018	04/05/2018	99.6	Ratified	148.7	57.9
5	04/05/2018	06/06/2018	100	Ratified	129.9	57.1
6	06/06/2018	19/07/2018	99.8	Ratified	120.6	53
7	19/07/2018	08/08/2018	24.4	Ratified	124.6	52.5
8	08/08/2018	06/09/2018	58	Ratified	100.6	36
9	06/09/2018	09/10/2018	73	Ratified	156.9	49.2
10	09/10/2018	01/11/2018	99.6	Ratified	133.1	42.6
11	01/11/2018	02/12/2018	99.7	Ratified	199.7	39.9
12	02/12/2018	01/01/2019	99.9	Ratified	140.8	45.3
13						

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

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

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

Period		Tube 1	Tube 2 (if available)	Tube 3 (if available)	Tube 4 (if available)
1		50	50.4	47.6	
2		43.5	48	49.8	
3		44.8	41.7	43.2	
4		54.9	45.9	60.5	
5		58.6	57.1	54.5	
6		41.7	41.4	44.2	
7			59.4	55.7	
8		51.4	51.6		
9		44.4	46.6	38.8	
10		54.1	50.3	54.2	
11		42.7	46.5	47.1	
12		44.9	43.5	41.8	
13					

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

3.6 Dispersion Model

Emission analysis and dispersion model ADMS-urban[22] used to determine the AQMAs has been thoroughly updated during 2019. A detailed report to committee can be provided in advance of any changes to the existing AQMAs designations.

Recent modelling has verified against monitoring carried out over the past three years to produce a pollution map for the City, last published in the 2015 Air Quality Action Plan.

Established and new Automatic Traffic Counters (ATC) in or near the AQMAs have provided 2018 weekday traffic flows as follows:

Table 5 Automatic Traffic Counters (ATC 2018) for Air Quality Assessment

ATC Number	Road Name	Road Number	Total	Motorbike	Car	LGV	HGV	Bus
22	Wellington Road	A259	21667	191	18820	1420	899	337
74	New England Road	A270	15719	281	13771	1355	287	24
300	Hollingdean Road	C-Link	15987	225	14313	1110	273	45
301	Lewes Road S of Hartington	A270	16756	307	13469	1016	685	801
302	North Street	B2066	7000	235	3071	535	417	2742
303	London Road Co-Op	A23	9135	479	6394	651	719	892
304	Frederick Place	Link to B2119	4045	195	3480	242	126	3
305	Queens Road	A2010	7366	189	5613	916	193	455
509	London Road N Preston Dr	A23	17305	110	15375	1158	494	285
614	Marine East Rottingdean	A259	26805	209	24131	1644	315	507
802	Western Road	B2066	7433	260	5165	411	386	1210
809	Preston Road N of PC	A23	13357	399	11356	831	508	249
810	Beaconsfield Rd N of PC	A23	14957	277	12948	971	521	241
813	Lewes near Coombe Terrace	A270	20632	281	17801	1117	691	741

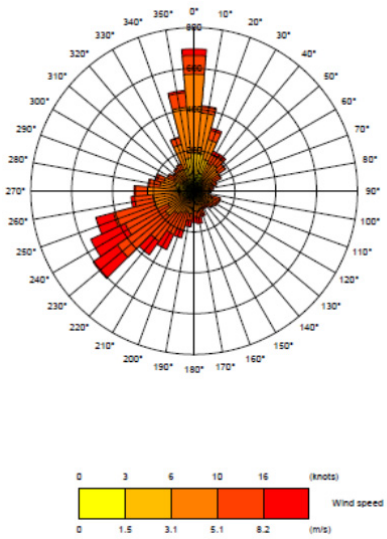
The 2018 data is for a minimum of four months and twelve months in case of ATC 22 and 74. The ATC counter data continues during 2019 and can be used to determine any amendments of the extant AQMAs.

[22] ADMS Urban https://www.cerc.co.uk/environmental-software/ADMS-Urban-model.html

The traffic counts have been used to determine source apportionment for areas that continue to exceed the nitrogen dioxide legal limit consistent with the series of monitoring sites featured in the long term trend graphs reported each year.

For the citywide model the 2018 ATC data has been supplemented with DfT traffic counts[23] estimates or actual counts are for 2017 for main roads and 2016 for minor roads. Emission sources other than road traffic are included in the model with emission data downloaded from the National Atmospheric Emissions Inventory[24]. Emission Factors were calculated using the EMIT tool[25] and the Emission Factor Toolkit EFT v8.0. The "Urban England" scenario was selected. Consistent with previous assessments the dispersion model uses meteorological data from Shoreham Airfield for example:

Figure 18 Shoreham Wind rosé used for Dispersion Modelling



[23] DFT Traffic Counts https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints
[24] NAEI http://naei.beis.gov.uk/
[25] EMIT https://www.cerc.co.uk/environmental-software/EMIT-tool.html

Appendix D: Map(s) of Monitoring Locations

NO_2 model maps refer to a three year average 2016-2018: blue and yellow are compliant, red exceeds. Zoom in to see higher resolution legend details for example on the Rottingdean map.

Figure 19 Automatic Analysers and Modelled NO_2

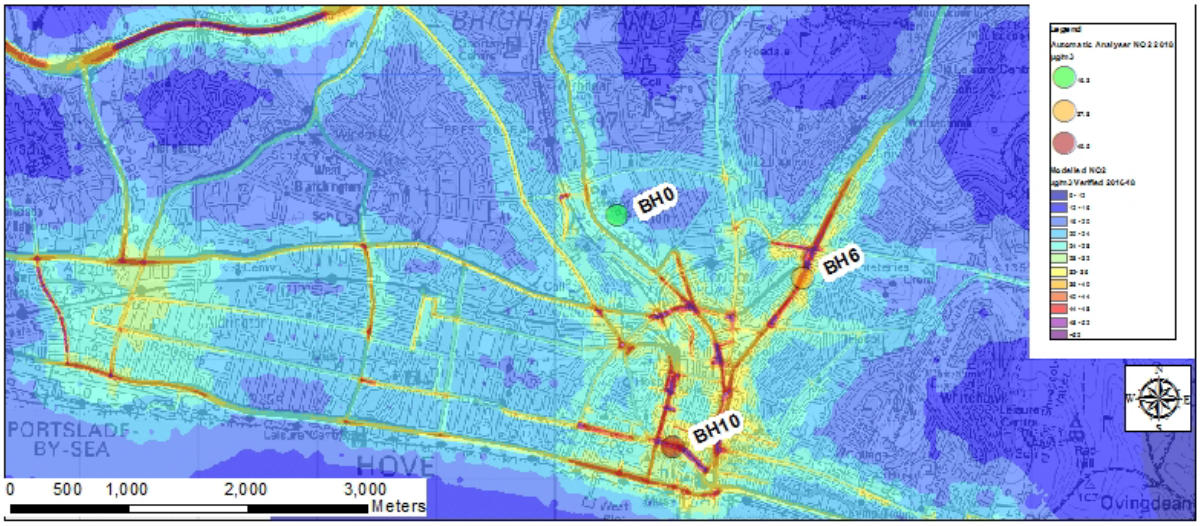


Figure 20 Hove and Portslade NO_2 Diffusion Tubes 2018

Note: Labelled sample sites are those active in 2018. Archive monitors (before 2018) are not labelled but included as points on the background map. Blue, green and yellow monitoring locations indicate compliance with the Air Quality standards for nitrogen dioxide NO_2. Red and purple exceed the NO_2 limit in 2018.

Figure 21 Preston Circus and The Drove NO_2 Monitors 2018

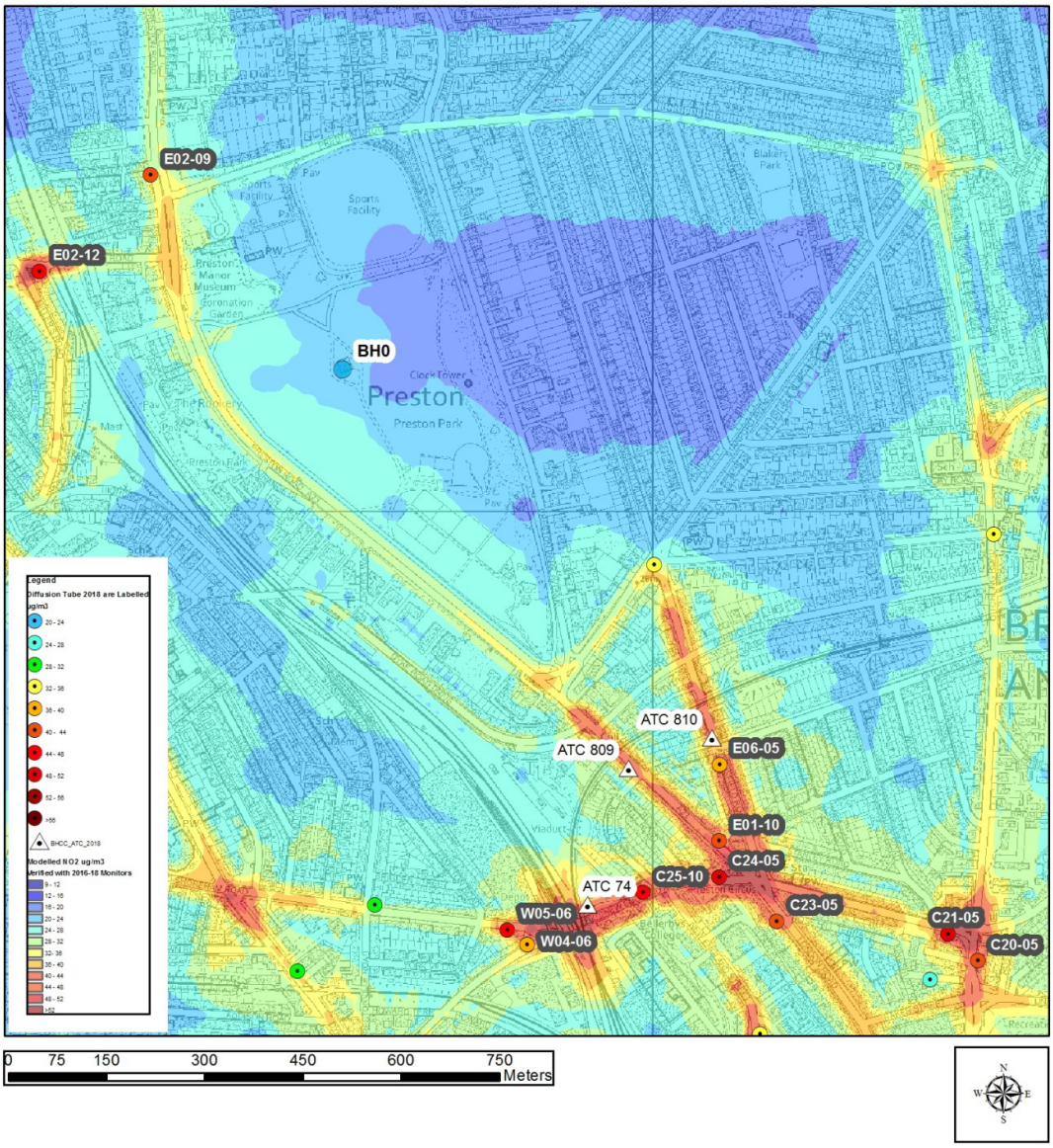
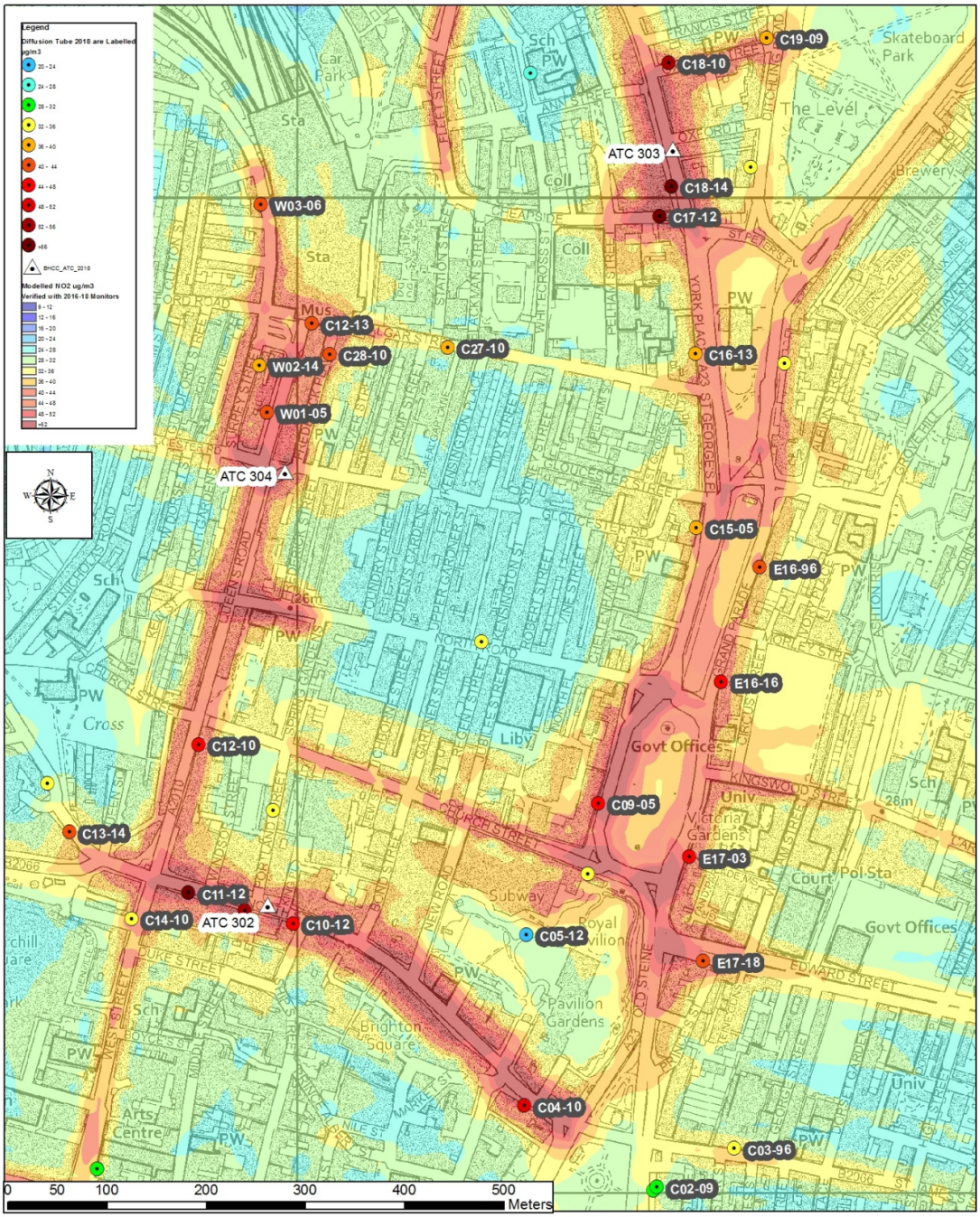


Figure 22 Queens Road and North Street NO_2 Diffusion Tubes 2018



Note sample location E16-16 commenced in 2015 and is referred to E16-15 in the tabular list of monitors.

Figure 23 Lewes Road NO_2 Diffusion Tubes 2018

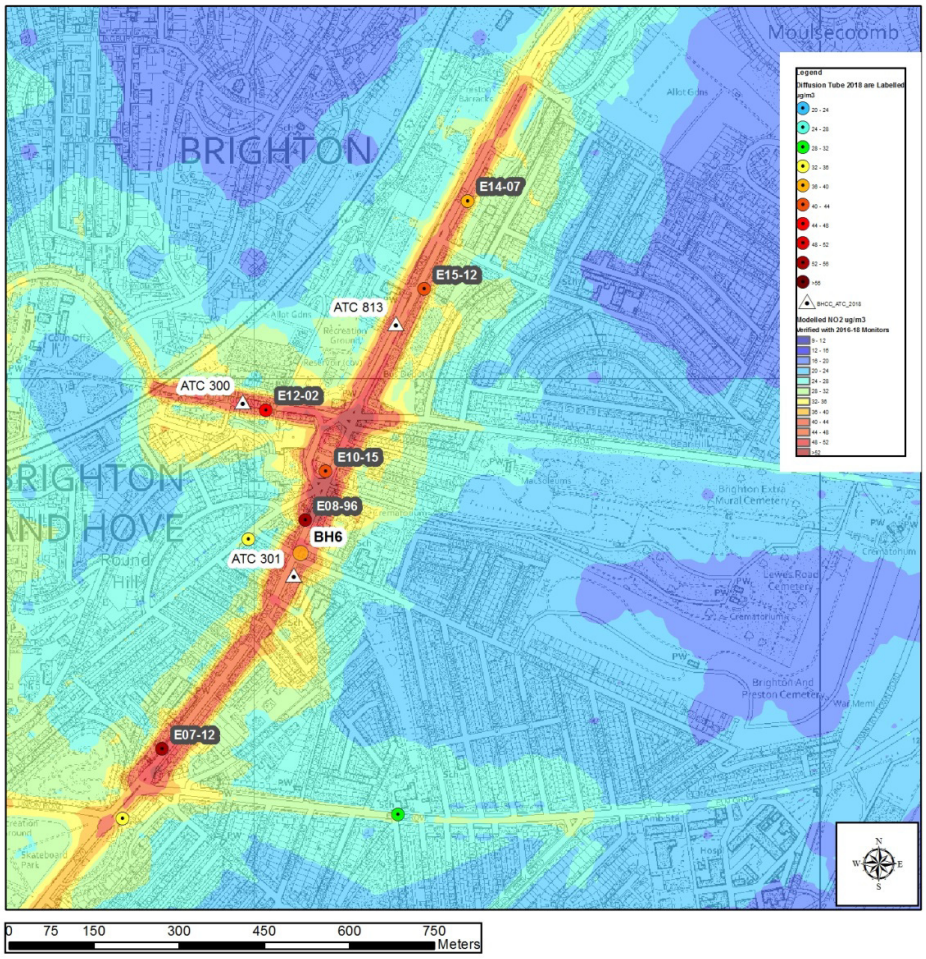


Figure 24 East Brighton NO_2 Diffusion Tubes 2018

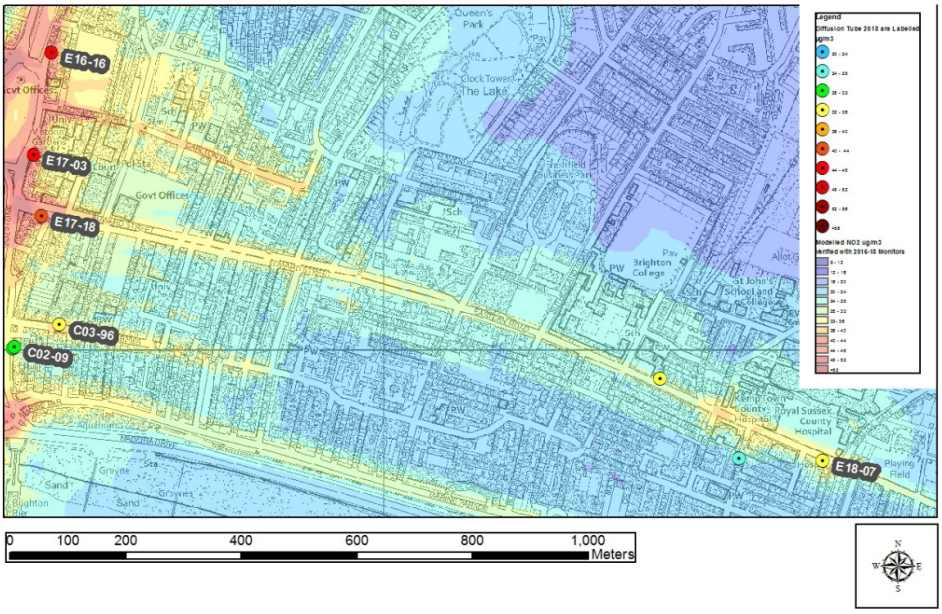


Figure 25 Rottingdean AQMA2 Modelled NO_2

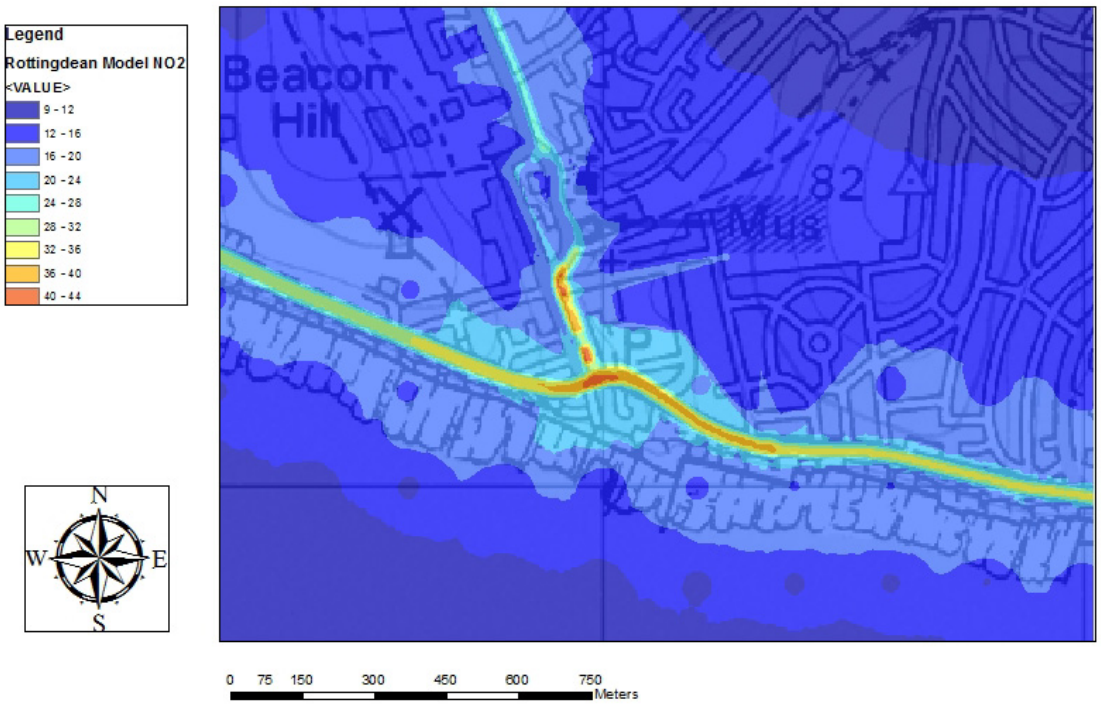
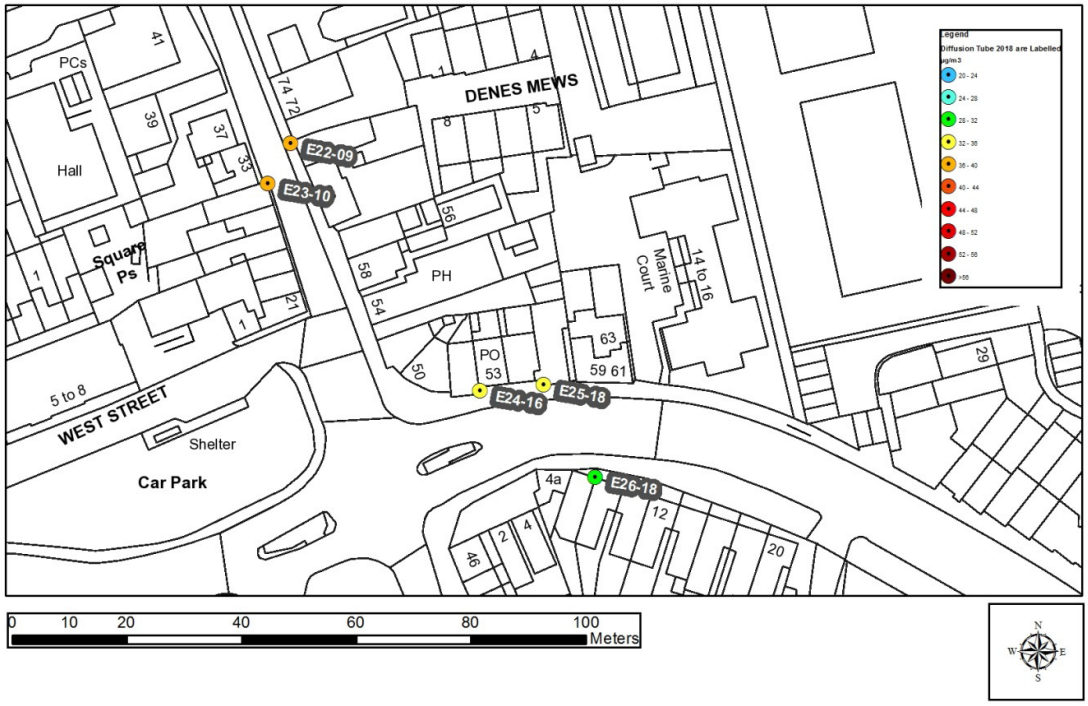


Figure 26 Rottingdean AQMA2 NO_2 Diffusion Tube Monitors 2018



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[26]	
	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

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

Glossary of Terms

Abbreviation	Description
ADMS-Urban	Atmospheric Dispersion Model System
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air Quality Annual Status Report
ATC	Automatic Traffic Counter
AURN	UK Automatic Urban Rural air Monitoring Network
CAZ	Clean Air Zone
CEMP	Construction Environment Management Plans
COMEAP	Committee on the Medical Effects of Air Pollutants
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EFT	Emission Factor Toolkit
EMIT	Atmospheric Emissions Inventory Toolkit
EU	European Union
HGV	Heavy Goods Vehicle
LAQM	Local Air Quality Management
LAQM (TG)16	LAQM Technical Guidance 2016
LAQM (PG)16	LAQM Policy Guidance 2016
LGV	Light Goods Vehicle

NRMM	Non Road Mobile Machinery
NAEI	National Atmospheric Emissions Inventory
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen usually an emission rather than an outdoor concentration
NPL	National Physical Laboratory
PHE	Public Health England
PHOF	Public Health Outcomes Framework
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SCA	Smoke Control Zone
Section 106	Section 106 Planning Agreement Under Town and Country Planning Act
SO_2	Sulphur Dioxide
SUV	Sports Utility Vehicle
ULEZ	Ultralow Emissions Zone

References

1. [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
2. [1] Long Term Exposure to Traffic Related Air Pollution on Lung Function in Children https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5446841/
3. [1] Smoking Cessation https://cks.nice.org.uk/smoking-cessation
4. [1] In the UK fewer people are starting to smoke found at: https://www.bbc.co.uk/news/health-39192635
5. [1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
6. [1] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
7. [1] Defra. Abatement cost guidance for valuing changes in air quality, May 2013
8. [1] The Air Quality Strategy for England https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf
9. [1] By General Traffic is mixed vehicle types: Car, LGV (Light Goods Vehicles), HGV (Heavy Goods Vehicles),taxis, buses, coaches and Motorcycles.
10. [1] ADMS-Urban is sophisticated Atmospheric Dispersion Model information found at: https://www.cerc.co.uk/environmental-software/ADMS-Urban-model.html
11. [1] Defra Open Fires and Wood Burning Stoves
12. [1] WHO Limits for particulate matter will be enshrined in UK law, pledges Minister found at: https://airqualitynews.com/2019/07/16/who-limits-for-particulate-matter-will-be-enshrined-in-uk-law-pledges-gove/
13. [1] Brighton & Hove City Council Air Quality Action Plan 2015 found at: https://www.brighton-hove.gov.uk/sites/brighton-hove.gov.uk/files/Air%20Quality%20Action%20Plan%202015%20%28pdf%201.6%20MB%29.pdf
14. [1] Fraction of mortality attributable to particulate air pollution found at: https://fingertips.phe.org.uk/search/air%20pollution#page/11/gid/1/pat/6/par/E12000004/ati/102/are/E06000015
15. [1] Brighton and Hove Smoke Control found at: https://www.brighton-hove.gov.uk/content/environment/noise-and-pollution/using-solid-fuels-safely-and-legally
16. [1] Brighton & Hove and the South Downs National Park found at: https://www.brighton-hove.gov.uk/content/leisure-and-libraries/parks-and-green-spaces/south-downs-national-park
17. [1] University of Brighton real time monitor found at: https://tools.brighton.ac.uk/air-quality/display/last-24-hours
18. [1] UK Air and Automatic Urban Rural Network found at: https://uk-air.defra.gov.uk/data/
19. [1] UK Planning for Air Quality Guidance https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf
20. [1] Average Vehicle Age in the EU also applies to the UK https://www.acea.be/statistics/tag/category/average-vehicle-age
21. [1] SUV car sales https://europe.autonews.com/sales-segment/europes-suv-sales-boom-despite-flat-market-2018
22. [1] DFT Traffic Counts https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints
23. [1] NAEI http://naei.beis.gov.uk/
24. [1] EMIT https://www.cerc.co.uk/environmental-software/EMIT-tool.html