

Brighton & Hove City Council

2016 Air Quality Annual Status Report (ASR) for Brighton & Hove City Council

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

July 2016

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Overview of Air Quality in Our Area

Air Quality in Brighton & Hove City Council

Brighton & Hove City Council's area is compliant with all pollutants listed in the national Air Quality Strategy (AQS) with the exception of nitrogen dioxide (NO₂). The city has had an Air Quality Management Area (AQMA) for none compliance with the NO₂ national standard since 2004. Two AQMAs declared in 2013 include Brighton & Hove Centre connected with West Portslade and Rottingdean High Street as a standalone AQMA.

Brighton's sea frontage and the South Down National Park have some of the cleanest air in the South East of England. A number of parks and green spaces in the city have consistently record clean air with evidence of an improving trend for both nitrogen dioxide and fine particulate. Distinguishable from this wider scene are places where diesel traffic stops and starts in confined spaces and the national NO₂ limit is exceeded by a factor of two. Ribbons of pollution run parallel with certain transport corridors that include A, B and C roads. Typically, these urban and village centres have high density of dwellings and passing people. This is important when considering the dose and exposure to pollutants inhaled and lifelong impacts on overall health and lung condition.

The Environment, Transport and Sustainability Committee approved the Cities' latest Air Quality Action Plan in October 2015. This followed departmental and public consultations, during Spring 2015. The Council is working closely with bus and taxi operators, the Low Carbon Partnership and the National Air Quality Unit. There is cross border discussion with adjacent local authorities through the Sussex Air Quality Partnership. We will be liaising with the Environment Agency regarding the permitting of a new part-A recovered oil power station located near the Portslade-Shoreham boundary. Sea access is via the West Sussex Wharf with road access via Brighton & Hove City Council. The council monitors Particulate Matter less than 2.5 microns (PM_{2.5}) and aims to meet national exposure reduction objectives and World Health Organisation guidelines for this pollutant.

The 2015 Air Quality Action Plan (based on the typical situation 2009-2013) sets out where air quality improvement is priority. Since that time, recent results show an improving trend in nitrogen dioxide.

The Environmental Protection team at Brighton & Hove is working closely with the Joint Air Quality Unit that includes the Department for Transport (DfT) and Defra (Department for the Environment Food and Rural Affairs). A series of photographs are set out below with commentary showing the situation in Brighton & Hove's two AQMAs. It is important to note that the national model does not include B and C road which are important road links in the AQMA.



Figure 1 The Brighton & Hove Bus Low Emission Zone (LEZ) is a B-road public transport corridor.

Buses and taxis dominate this route. Retail, residential, hotel, restaurant and entertainment uses surround the street with very high pavement footfall. Buses on the uphill carriageway (towards the camera) dominate emissions of oxides of nitrogen within the street canyon. Bus counts are one hundred an hour, approaching three thousand daily. This is one of the busiest bus corridors in the UK comparable with Oxford Street, Westminster and Oxford Road, Manchester. NO₂ has been recorded at 60-80 µg/m³ at the façade (height 2m to 3.5m) and >100 µg/m³ at kerbside above the pavement (2.6m). Ambient monitoring suggests substantial improvements as the bus company invests £12 million (2015-2017) in new Euro-6 emission standard double-deckers. The City Council has won almost £1.5 million

(2013-2015) for vehicle retrofits from the Clean Bus and Vehicle Transport Funds that target reduction in emissions of oxides of nitrogen. The schedule is for frequent bus services in this area to be euro-5 or euro-6 by 2018.

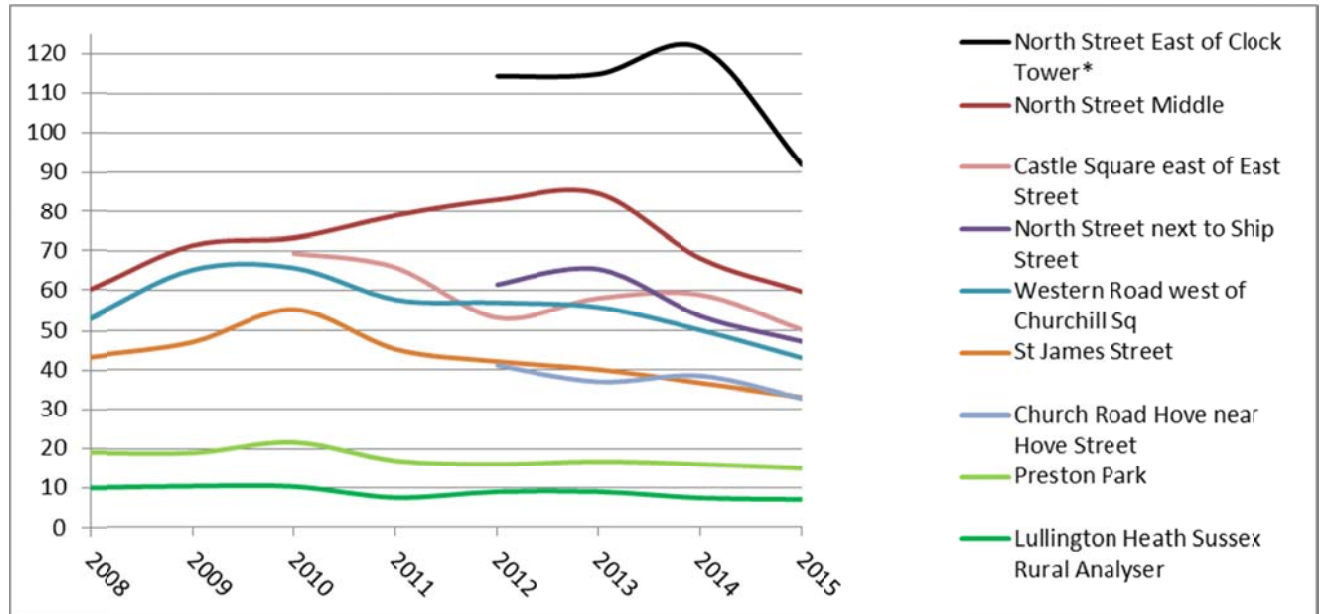


Figure 2 Nitrogen Dioxide Diffusion Tube Trends Bus LEZ and surroundings (B2066)



Figure 3 St James Street is a B Road with buses, taxis and vans in a confined space on a hill climb.

First developed in the 1790s the street is a building conservation area within the AQMA. It has high population density with flats and maisonettes above retail and high pedestrian footfall on the pavement. Since a reduction in bus emissions, (actual numbers in combination with improved exhaust technology) monitoring suggests an improvement in ambient nitrogen dioxide. Recent monitoring results at the façade and kerb show an indication of compliance with the national NO₂ limit for the first time in many years.



Figure 4 North of Valley Gardens.

The London Road area has some of the highest levels of nitrogen dioxide in the city characterised by contributions from mixed traffic; buses, taxis, vans and cars. The area has busy markets with high pedestrian footfall. An increase in the number of diesel buses in this area could delay compliance with the 2010 nitrogen dioxide limit of 40 µg/m³.

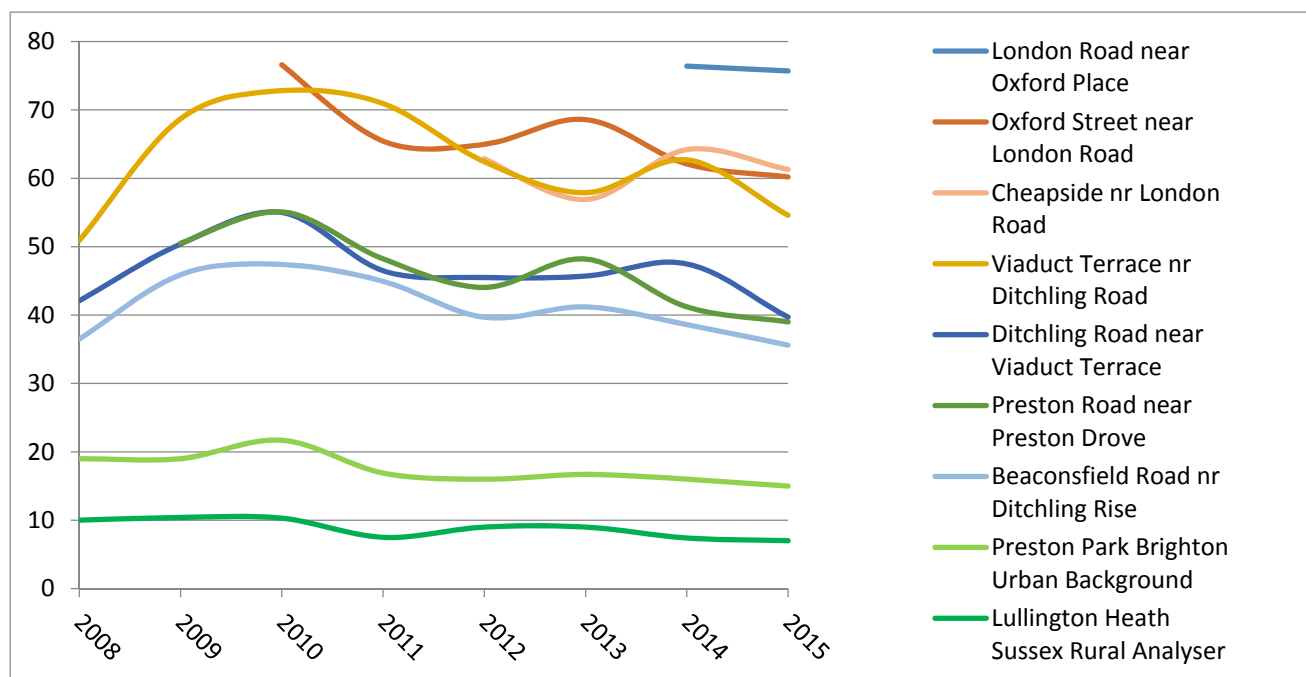


Figure 5 Nitrogen Dioxide Trends North of Valley Gardens (A23)



Figure 6 Valley Gardens part of the A23 corridor

Valley Gardens has exceedance of the nitrogen dioxide on both sides including with mixed traffic adjacent to Grand Parade with five-storey facade.

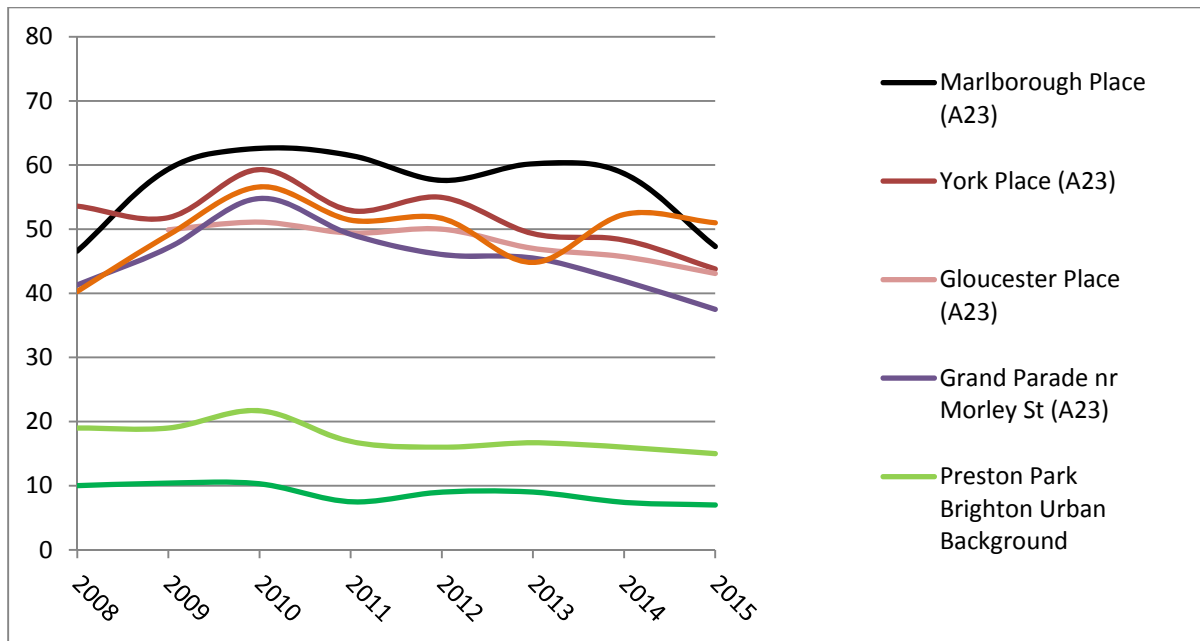


Figure 7 Valley Gardens Nitrogen Dioxide Trends (A23)



Figure 8 Rottingdean High Street a B-road through a building conservation area.

The AQMA has ground and first floor residential exceptionally close to road traffic and tailpipe emissions. Close the cities boundary with East Sussex it is vulnerable to developments outside of the Brighton & Hove City Council's Unitary Authority area.

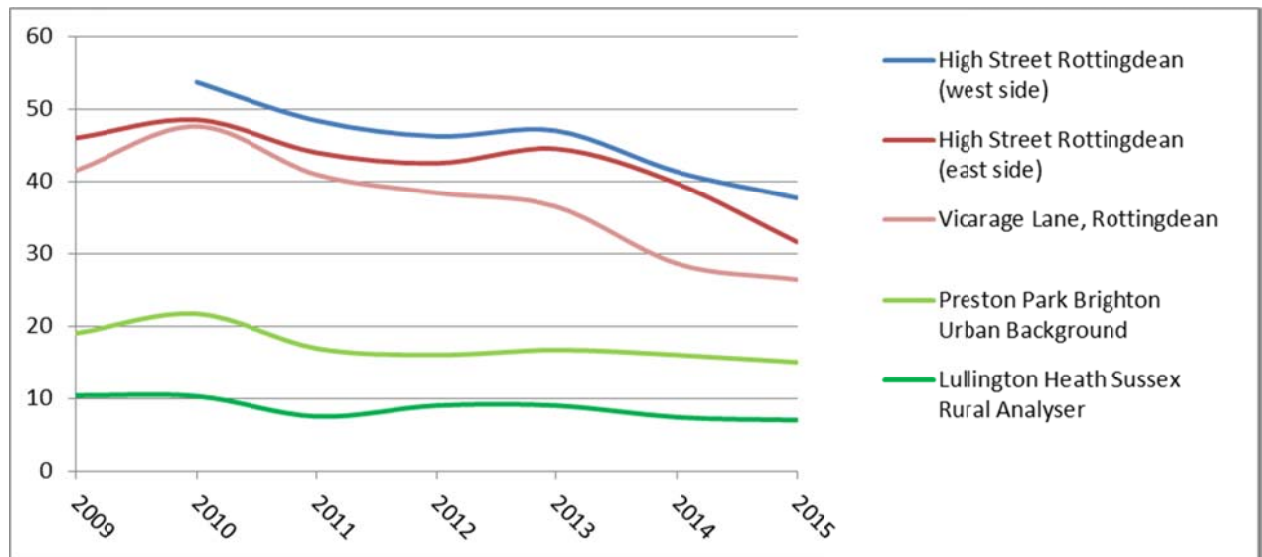


Figure 9 Nitrogen Dioxide Diffusion Trends Rottingdean High Street (B2123)

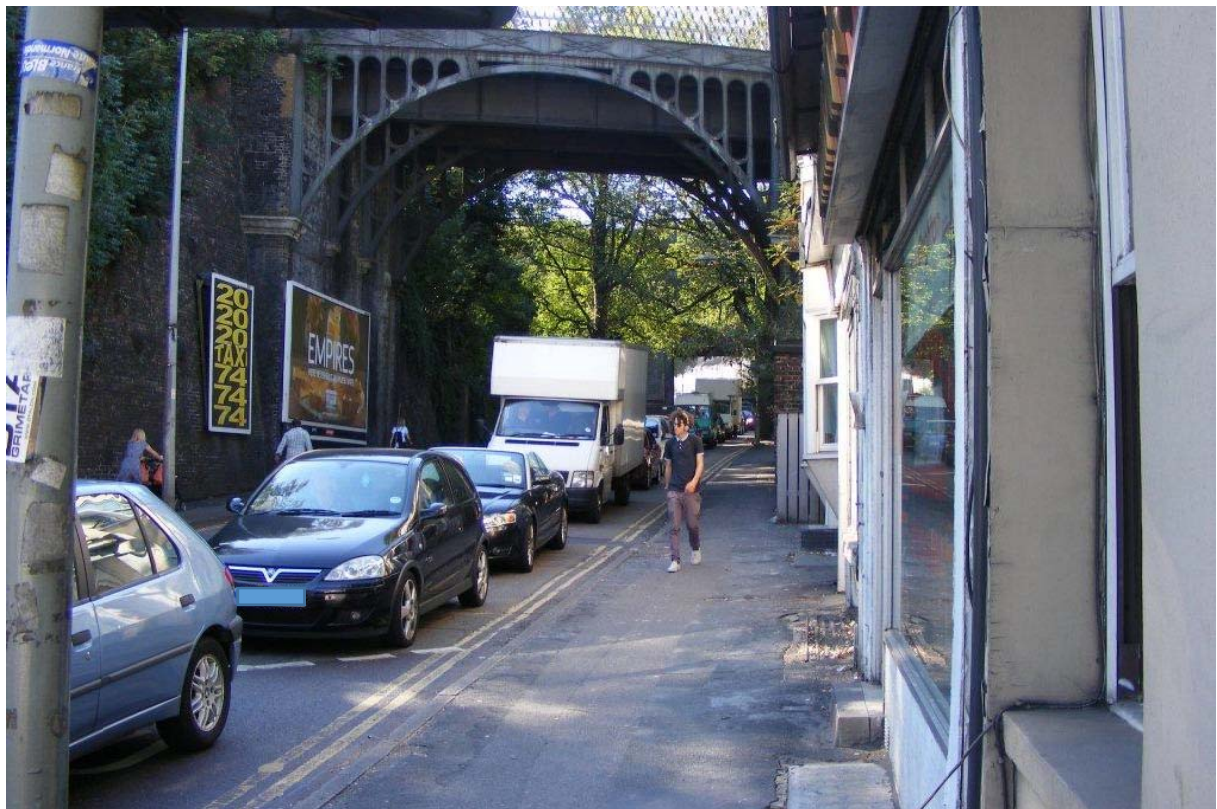


Figure 10 New England Road A270 with high frequency and duration queuing traffic.

NOx emissions are from cars and vans. Houses are a few metres from the road carriageway. Buses have do not have much influence on pollution concentrations in the vicinity.

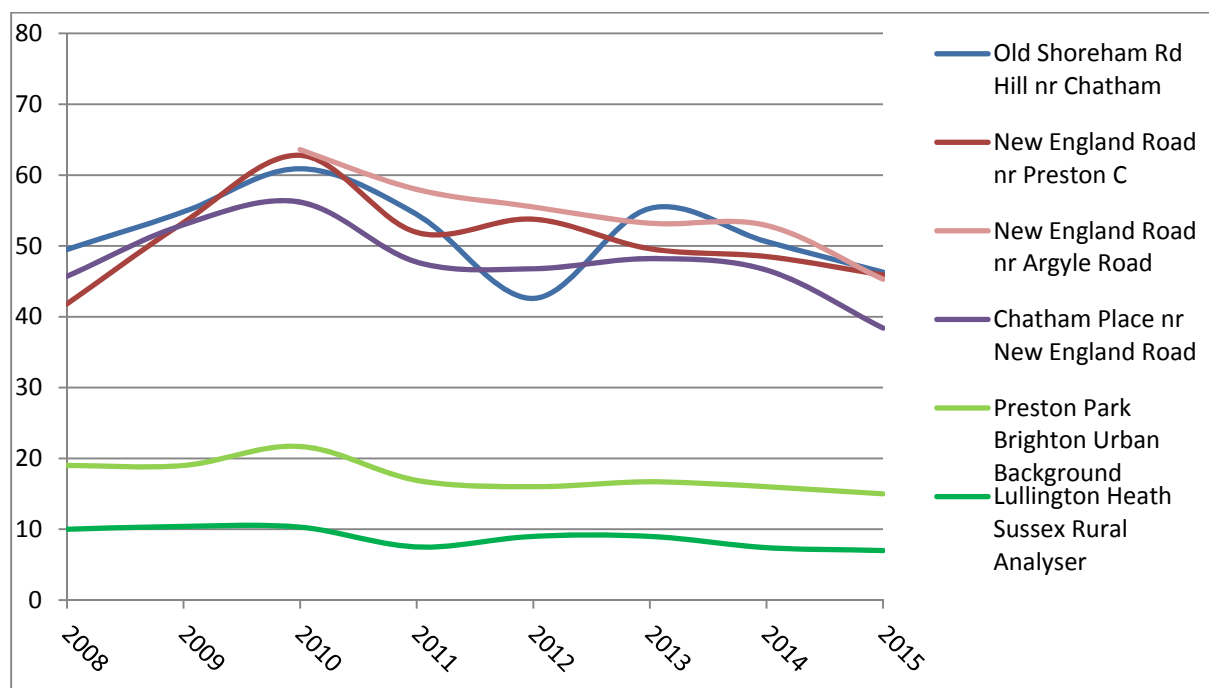


Figure 11 New England Road –Lower Old Shoreham Road NO₂ trends (A270)

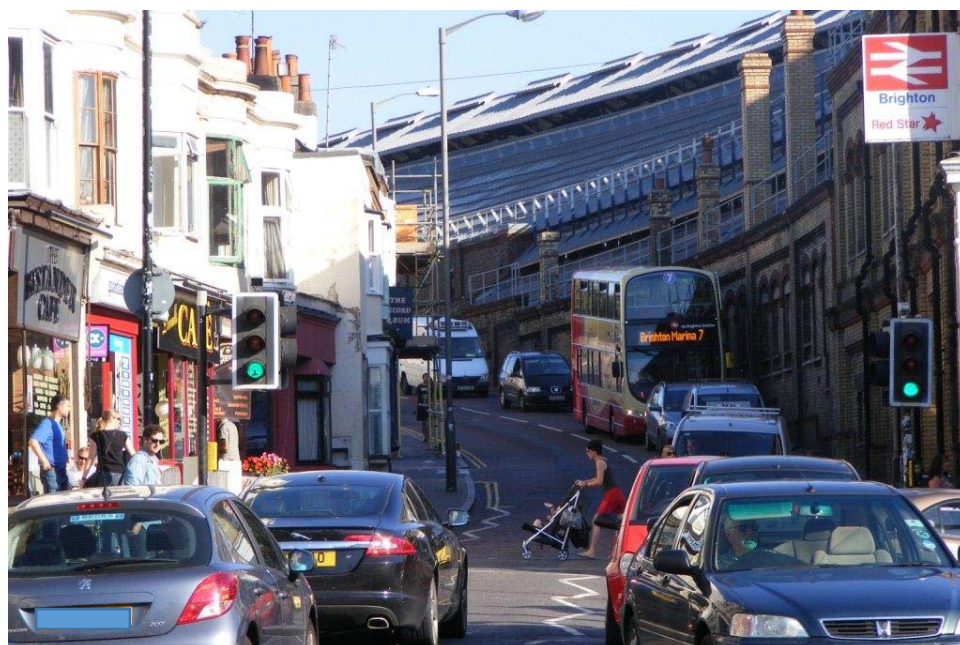


Figure 12 Terminus Road **A2010** a hill climb to the west side of Brighton's mainline station.

It has retail, flats and terrace houses close to the kerb. Traffic is buses, taxis, vans and cars.

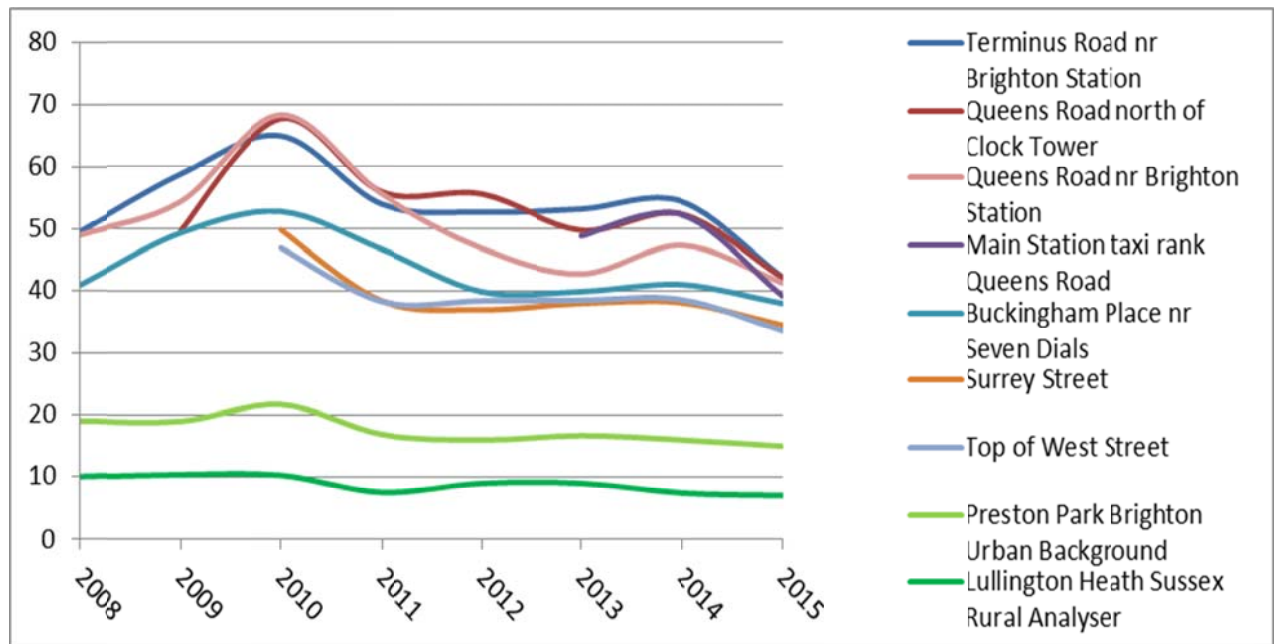


Figure 13 Nitrogen Dioxide Trends Queens Road-Terminus Road-7Dials (A2010)



Figure 14 Lewes Road **A270-A2073** has a bus lane, cycle lane and general traffic corridor surrounded by retail and residential.

About a third of the roadside nitrogen dioxide (excluding background) is from buses, a third from HGV and a third from cars or vans.

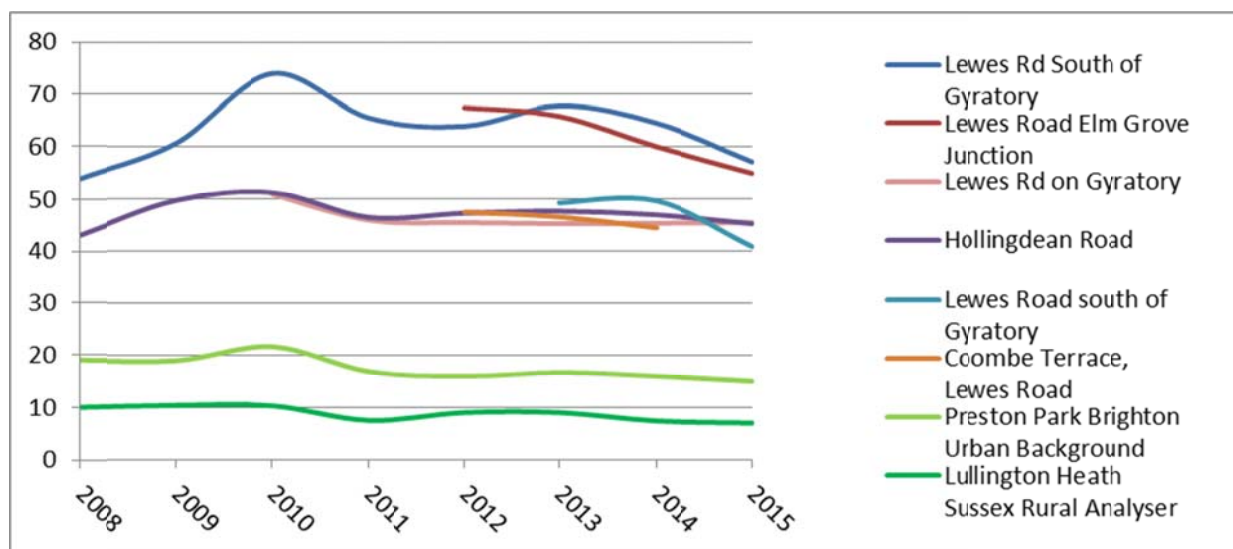


Figure 15 Lewes Road Area Diffusion Tube Trends A270-A2073



Figure 16 Terminus Road B2193 haulage route.

The route passes within a few metres of residential on the way from Shoreham Docks, it combines with the A259 Wellington Road. This is the Portsalde, AQMA that continues to have nitrogen dioxide compliance issues. Close to the cities boundary

with West Sussex it is vulnerable to the impact of developments outside of the Brighton & Hove City Council Unitary Authority.

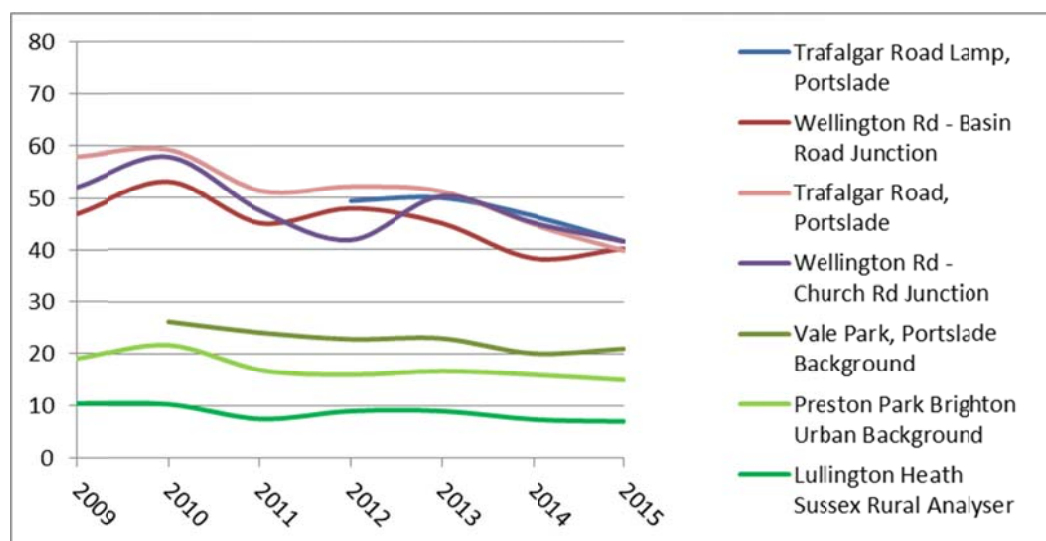


Figure 17 Nitrogen Dioxide Trends Wellington Road-Trafalgar Road (A259-B2193)

Actions to Improve Air Quality

Over the past three years, the council has been successful in winning almost £1.5 million in grants from the Clean Bus Transport Fund (CBTF) and the Clean Vehicle Transport Fund (CVTF) for retrofits of buses and minibus taxis. The work includes:

- SCRT retrofits on 110 local buses and minibuses (2014-2017) for lower emissions of oxides of nitrogen
- Research into the fitment of Selective Catalytic Reduction Technology (SCRT) on different sizes of vehicles including downsizing exhaust technology for minibus taxis and saloon cars
- Monitoring of tailpipe emission performance and comparisons with ambient monitoring trends

At the same time as funded retrofits of older vehicles the bus companies are procuring new euro-6 buses. These brand new buses will come into service from 2015 with more mid-2016 and 2017.

Nitrogen dioxide monitoring suggests an improvement in ambient levels since 2013.

Brighton has the highest bus usage in the UK outside of London. In recent years progress has been made in the uptake of low emission travel with increases in walking, cycling and electromotive.

Developers are asked to consider alternatives to combustion plant located amongst the high-density building canopy in order to further reduce NOx emissions within the AQMA. The planning process looks to avoid the introduction of new residential to an area of poor air quality. In exceptional circumstances, avoidance of pollution to lower levels can be achieved with, passive house ventilation strategy and fresher air intakes from the roof.

The following figures show examples of new bus stops with cycle lanes behind and electromotive charging near Brighton Town Hall.



Figure 18 New Cycle Lanes on the inside of bus stops along the Lewes Road Corridor, Brighton. Initiatives supported by the Local Sustainable Transport Fund (LSTF).



Figure 19 Electromotive and hybrid uptake is increasing with cars, vans and buses

Local Priorities and Challenges

Priorities include a reduction in nitrogen dioxide adjacent to bus routes achieved through a combination of retrofits and new purchases. Alternative solutions are required to improve nitrogen dioxide at locations where buses are not the main contributors to oxides of nitrogen. For example:

- Rottingdean High Street B2123
- New England Road A270
- Viaduct Terrace- Grand Parade A23
- Wellington Road-Trafalgar Road in Portslade A259-B2193

How to get Involved

In the Brighton AQMA 62% of households do not own a car which is one of the highest percentages anywhere in England. Bus patronage has doubled in twenty years. The city centre has good transport choice. This is less true around the urban

fringe, Rottingdean and Saltdean where many residents are some distance from train stations and bus hubs.

How can the public improve air quality and health in your area?

Use active or low emission travel for short distance journeys when in Brighton, Portslade and Rottingdean. Promote walking and cycling as a the healthy option for children and adults. Consider bus, taxi and train options for some journeys. Be aware of car club and car share options. For longer journeys or when carrying a load or passengers consider electromotive and petrol cars. Your diesel car may be a high emitter of oxide of nitrogen; consider the recall facility offered by VW-Audi. Finance is available to buy newer cleaner vehicles. When buying a new vehicle or procuring a new fleet consider what the oxide of nitrogen and fine particulate emissions might be through the neighbourhood where the vehicles will be used. This is especially applicable if the vehicles will need to work in stop-start traffic situations amongst the urban or village environment. Engines on going nowhere causes offence avoid idling engines when stationary; Miles per Gallon will be zero (MPG = 0). Driver responsibility is to be considerate to others in a shared space. Idling engines in a traffic queue causes residence, children, the elderly, pedestrians, runners and cyclists to inhale vehicles emissions.

Officers from transport have door knocked on thousands of properties in East Brighton to share information on travel options and concerns people have regarding transport, in their neighbourhoods. Air Quality has been a main item on the agenda. This has also been the case at Local Action Team (LAT) meetings and for Rottingdean Parish Council. Join your Local Action Team (LAT) or community group to raise the profile of local air quality and healthier cities and villages.

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1 Local Air Quality Management

This report provides an overview of air quality in Brighton & Hove City Council during 2014. 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 and standards are likely to be achieved. Where an exceedance is 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 legal limit. 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 made since previous reports.

The statutory air quality objectives applicable to LAQM in **England** can be found in Table 1.1 in Annex D.

2 Actions to improve air quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) must be declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12 months (LAQM PG.16) setting out measures it intends to put in place in pursuit of the legal limit.

A summary of the current 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 can be found online at: <https://www.brighton-hove.gov.uk/content/environment/air-quality-and-pollution/air-quality-management-city>. There are no plans to amend or revoke the existing AQMA during 2016.

Table 1 Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
AQMA Name 1	NO ₂ Annual and Hourly Average	Brighton, Hove and Portslade	Transport Corridors in and out of the City Centre main roads and South Portslade	2015
AQMA Name 2		Rottingdean	Rottingdean High Street	2015

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

Brighton & Hove City Council has taken forward a number of measures in the past two years in pursuit of improving local air quality. Details of all measures completed or planned are set out in Table 2.2. More detail on these measures can be found in the 2015 Action Plan and bus Low Emission Zone. Key completed measures are: retrofit of euro-3 double decker buses to better than euro-5 standard. New design of bespoke Selective Catalytic Reduction for intermediate sized vehicles such as minibus taxis.

Progress on the following measures has been slower than expected due to: to the fact that taxis are committed to school and disability contracts and are not always available for retrofits, emission testing and exhaust design work. Garage space for undercarriage and exhaust retrofits is locally in short supply.

Over the course of the next reporting year Brighton & Hove City Council expects the following measures to be delivered:

Bus operators are working towards a fleet with lower emissions of oxides of nitrogen.

A combination of public sector funded retrofits and private sector funded new procurements are making progress with this aim. There is an improving trend in ambient nitrogen dioxide but levels must continue to improve at a faster rate.

Brighton & Hove City Council priorities for the coming year are to lobby the Director of Public Health, Transport, Planning and Legal to see air quality improvement as a higher priority for the city in all the decisions it makes.

Table 2 2015 Action Plan Measures

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Low Emission Zone for Buses Approved by Committee	Promoting Low Emission Transport	Low Emission Zone (LEZ)	Transport Authority	2013	2015	In the LEZ phase out buses that do not comply with Euro-5	Nitrogen Dioxide levels targeted in the bus LEZ and City AQMA	Scheme in place further improvement to buses required in order to comply with it	DONE	Aim for 36 $\mu\text{g}/\text{m}^3$ NO ₂ at continuous analyser on North Street was 63 currently lower 50s
2	2014 CBTF SCRT £750,000 Retrofit Programme for Buses	Promoting Low Emission Transport	Other	Transport Authority Environmental Protection Team	2014	2015	50 Euro-3 double decker buses fitted		50 Fits Completed	DONE	
3	2016 CBTF SCRT £500,000 Retrofit Programme for Buses	Promoting Low Emission Transport	Other	Environmental Protection Team	2015	2016	35 buses fitted to better than euro five standard		Bid Successful Press Release 3 rd January 2016	2016/17	
4	2015 CVTF SCR £195,000 Retrofit Programme for Minibus Taxis	Promoting Low Emission Transport	Other	Environmental Protection Team	2014/15	2015/16	Bespoke Design 22 mini buses fitted, 3 tested at Millbrook		Design work, four fits and one test completed	2016/17	Using Garage in Crawley for design and fits

Brighton & Hove City Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5	Flywheel Hybrid and new Euro-VI bus Purchases	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	Brighton & Hove Bus Company, Metro Bus and the Go Ahead Group	2014/15	2015/16	Increase euro 6 Fleet Share Reduce Dependence on diesel	Yes	24 New Buses in Regular Service in and around the LEZ / AQMA	2015/16	New buses euro-6 hybrid replace euro-3 without SCRT
6	Taxi Licence Policy	Promoting Low Emission Transport	Taxi emission incentives	Taxi Licence Forum	2014/15	2015/16	Increase Petrol Hybrid and Retrofit Taxis	Yes	Considered by Committee	2016/17	Taxis can Licence in other LAs so scope needs to be wider
7	Anti-Idling signs on taxi ranks in and around the AQMA	Promoting Low Emission Transport	Taxi emission incentives	Taxi Licence Forum	2014/15	2014/15	Reduce unnecessary fuel burn at AQMA taxi ranks	Yes	Delivered	DONE	Second Print Run tbc
8	Assess junction light phasing to reduce traffic queuing in the AQMA	Traffic Management	Other	Transport Authority Consultee Environmental Protection Team	2015/16	2016/17	Less traffic congestion, idling and standing starts in AQ hotspots	Yes	Scoping Studies	2016/17	EP need to liaise with Transport

Brighton & Hove City Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
9	Rapid vehicle charging network OLEV funded project with electromotive	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, and Gas fuel	Sussex Air Quality Partnership	2013/14	2014/15	Rapid, fast and slow electromotive charge choices in BHCC and Sussex	Wider Area with potential benefits for more than one AQMA	Implemented 2014/15 use is monitored on the network is Withdean in Brighton on London Road route into AQMA	DONE	Infrastructure part of wider South East network
10	Alternative fuel Infrastructure for vehicles in the AQMA	Promoting Low Emission Transport		Environmental Protection Team	2014/15	2015/16	Transport Options on Fuel Ethanol, Vegetable Oils Bio-methane	Yes	Discussion with innovative partners	Proposal	Requires company or grant to progress
11	Air Quality Assessment for Major Transport Schemes in the AQMA seek opportunities for AQ improvement	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	Transport Authority and Environmental Protection Team	2014/15	Ongoing	Transport schemes in the AQMA assess how air quality can be improved as priority?	Better traffic flow, wider concourse, planting & amenity green space	Detailed Assessments carried out for Valley Gardens	Ongoing	Transport Funds such as Local Sustainable Transport Fund (LSTF) must prioritise AQ in AQMA's

Brighton & Hove City Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
12	Assess Environment Capacity of transport corridors through the AQMA	Transport Planning and Infrastructure	Public transport improvements - interchanges stations and services	Environmental Protection Team	2014/15	Ongoing	Identify where too many vehicles of a certain emission category for the confined space, street or road link	Assess heavy vehicle numbers relative to NO ₂ limit consider likely constraints and capacity limitations	2015/16	2017/18	Guidance for Executive Leadership Team and Policy Decisions
13	Actively seek alternative renewable solutions and avoid combustion plant in the AQMA	Avoid Combustion Plant and Seek Alternatives	Other measure for low emission fuels for stationary and mobile sources	Active via the planning process	2015 AQ action plan policy	2014/15	Solid fuel burning prone to emission peaks on starting up. NOx and PM higher than for oil and coal	Yes	Ongoing	ONGOING	Appropriate location for carbon saving strategies such as wood burning is not likely to be in high density AQMAs and or Smoke Control Areas

Brighton & Hove City Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
14	If Development in the AQMA must have combustion plant aim for ultralow NO _x emission rates better than Code for Sustainable Homes	Promoting Low Emission Plant after seeking alternatives	Other measure for low emission fuels for stationary and mobile sources	Active via the planning process		2014/15	>20 mg/MJ NO _x for new gas boilers in and adjacent to the AQMA	Yes	Ongoing	ONGOING	A number of development using electric for hot water and temperature control
15	Where new gas combustion plant is proposed in the AQMA to have vertical flue terminations above roof apex in accordance with guidance on flue terminations	Promoting Good Dispersion on Fixed Plant	Other measure for low emission fuels for stationary and mobile sources	Active via the planning process	Policy of the 2015 AQ action plan	Conditions on planning applications	Effective dispersion and exposure avoidance Planning permission could be refused for effective flue height if not an industrial area	Yes	Some fixed plant applications in the AQMA not received planning permission	Ongoing	Measure relates to flue height, location & dispersion and not emission rate

Brighton & Hove City Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
16	Mitigate plans for residential adjacent to roadside	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Active via the planning process	Policy of the 2015 AQ action plan	Where appropriate Conditions on planning applications	Measure is not about emissions. Effective exposure avoidance	Avoid pollution in the AQMA	constant	Ongoing	Ventilation strategy to avoid dose and exposure to pollutants
17	Encourage domestic solid fuel burning to use smokeless fuels and exempt appliances	Domestic Solid Fuel Burning	Clean Air Act	Environmental Protection Team duties relating to Statutory Nuisance and the Clean Air Act	2012/13	Now	Less NOx, PM and smoke reduction of indoor CO	Pamphlet and web sites Delivered	Public Engagement	Constant	Reduce complaints from solid fuel burning in the home
18	Households and building trade to avoid fires to dispose of waste in the AQMA	Domestic Solid Fuel Burning	Statutory Nuisance	Environmental Protection Team duties relating to complaints and Nuisance	2012/13	Now	Less NOx, PM and smoke	Web information	Advice given when complaint received	Constant	Reduce complaint for fires

Brighton & Hove City Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
19	Explore Infrastructure and Project Development S106 policy for offsite e.g low emission vehicles signs and lines planting	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Planning	2015/16	Funding stream open to support AQ improvement	Insure beneficial change from new development	Part of AQAP	Talks across departments	Constant	Developer Contribution to improve AQ needs more commitment from government
20	Intervention measures to consider alternative routings trails for traffic	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	Transport Authority	To consider	NO2	Reduce Traffic entering AQMA especially with a view to main contributors	To be considered	Talks	Proposal	Use road closures and diversions to assess benefits or impacts on local air quality
21	Higher Standards for bus LEZ Moving towards Euro-6 and higher % of Hybrid	Promoting Low Emission Transport	Low Emission Zone (LEZ)	Transport Authority and Environmental Protection Team	2016/17	Frequent Services to be Euro-6 or Hybrid. OME Euro-5 fine-tuned for operation and drive circuit	Target bus corridors in AQAP assessment	LES Phase II First mention in AQAP March 2015	ONGOING		

Brighton & Hove City Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
22	Explore Grant or Developer Support for low emissions from construction traffic	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising uptake of low emission vehicles	Transport Authority and Environmental Protection Team	To Confirm	Seek funds for retrofits and or make up the difference of hybrid purchases	Target haulage corridors	First mention in AQAP 2015	Idea	Aim for 90% NOx reduction with monitor check	Lang O Rouke contractor on Hospital Expressed Interest
23	Explore Grant Application for Lower Emission Standard for frequent HGV from the Port Inland	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising uptake of low emission vehicles	Transport Authority	2017	Seek funds for retrofits and or make the difference on hybrid purchase	Target haulage corridors	First mentioned in AQAP 2015	Idea	Aim for 90% NOx reduction with monitor check	Fund application 2016
24	Consider impact of pedestrian crossing points on traffic flow and impact on emissions and air quality	Traffic Management	Other	Road Safety	To consider	Reduction in frequency of queuing breaking and accelerations	Improve Flow of traffic, cyclists and pedestrians	Included on consultation comments on walk to school transport schemes	Traffic refuge Islands	Constant	Dialogue

Brighton & Hove City Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
25	Review Central parking spaces that attracts traffic into the AQMA	Traffic Management	Emission based parking or permit charges amount of AQMA Parking	Parking	Proposed	Reduction in general traffic attracted to the Central AQMA	Reduction in emission for general traffic	First mentioned in AQAP 2015	Project	Take out general traffic emissions	Make sure parking based emissions are for NOx and not only CO ₂
26	Consider Freight Consolidation Centres 3km along A23 and A270 from AQMA boundary to City Centre	Freight and Delivery Management	Freight Consolidation Centre Freight Partnerships for city centre deliveries	Transport Authority Consultee Environmental Protection	2015/16	Reduce HGV impact on AQMA	Impact on AQMA	Discussed in the past and referenced in LTP4	Consider	Avoidance of HGV emissions in AQMA for frequent services	Could be Taken forward by LTP4
27	Based on Existing Evidence Buses to reduce emissions for steep uphill sections. Consider preference for downhill routings	Traffic Management	Other	Environmental Protection Team Bus Company	Idea discuss at public meeting	NO ₂ on uphill sections monitored to determine trends	At steeper road links with bus routes	Due to works North Street Hill climb first half of 2015	For a trial some buses avoid St James Street	Substantial emission reduction where engines are in load	Discuss with Eminox and Ricardo

Brighton & Hove City Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority or BHCC Department	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
28	Location of new Taxi Ranks to consider ambient air quality	Traffic Management	Other	EP Taxi licence Forum	2014/15	2015	At modal interchanges and new developments	Discussions on routing around Station Gateway	Ongoing	Move to locations away from residential & better for dispersion	Discussed with Councillors
29	Coach Strategy	Traffic Management	Other	Transport Authority Consultee Environmental Protection Team	4 year plan	2016/17	Mentioned in LTP4	Response to complaints	fewer complaints	Around coach parking areas	LTP4 to Progress

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

Local Authorities are expected under Chapter 7 of Policy Guidance LAQM.PG(16) to work towards reducing emissions and/or concentrations of fine Particulate Matter (PM_{2.5}). There is clear evidence that particulate matter (PM_{2.5}) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Brighton & Hove City Council is working to address PM_{2.5} through the following ways: Since early 2015 PM_{2.5} is monitored at two sites in Brighton. The finer particulates are targeted instead of PM₁₀ to align more closely with the Public Health Outcomes Framework (PHOF) England and health interests of the annual Joint Strategic Needs Assessment (JSNA). The results are reported to the City Council's Executive Leadership Team (ELT) which steers interdepartmental policy and priorities.

The following projects have progressed during 2015/16

- Selective Catalytic Reduction Technology (SCRT) on the bus and minibus taxi fleet primarily to mitigate emission of NO_x, but also with consideration for emission of soot, black carbon, fine particulate and nanoparticles
- Construction Environment Management Plans (CEMP) to use conditions to suppress dust and avoid particulate emissions from fixed diesel plant
- Where possible construction barges un-load by sea as with the i-360 (Brighton Tower) instead of road freight through the AQMA
- University of Brighton and the Sussex network to improve understanding of PM_{2.5} speciation including; sea salt, long range and from anthropogenic local sources
- PAH monitor at background in Hove is compliant with all objectives and shows a seasonal pattern. high concentrations in the winter are thought to relate to solid fuel burning in domestic properties and or lack of vertical dispersion, convective movements, sea- land breezes during the winter heating season that are more prevalent during the spring and summer

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 has undertaken automatic (continuous) monitoring set back from North Street and adjacent to Lewes Road since 2012. The active sites have a committed contract to monitor the air until at least 2018. Table A.1 in Appendix A shows the details of the sites. National monitoring results that are part of the Automatic Urban Rural Network (AURN) are available at <http://uk-air.defra.gov.uk/networks/network-info?view=aurn>.

Maps showing the location of the monitoring sites are provided in Appendix A. Further details on how the monitoring data is quality assured and is included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Brighton & Hove City Council undertook non- automatic (passive) monitoring of nitrogen dioxide (NO₂) at sixty-four sites during 2014. Table A.2 in Appendix A shows the details of the sites. There are two triplicate sets co-located with the roadside continuous analysers.

Maps showing the location of the monitoring sites are provided in Appendix A. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual pollutants

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

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³. For diffusion tubes, the full 2014 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

3.2.2 Particulate Matter (PM₁₀)

Table A.5 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

Table A.6 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year.

There has been no exceedence of the standard in five years the council is now committed to monitoring PM_{2.5} instead of PM₁₀.

3.2.3 Particulate Matter (PM_{2.5})

The council started to monitor PM_{2.5} at roadside in 2015. This is the first LAQM report to include locally monitored PM_{2.5} that is not part of a broader network such as the Automatic Urban Rural Network (AURN). Since there were no evident exceedances of PM₁₀ it is justifiable to switch local monitors to PM_{2.5}. In 2011 Defra ceased to monitor PM₁₀ at roadside near Pavilion Parade and instead started PM_{2.5} monitoring in Preston Park at the AURN site. This has helped to establish the baseline for PM_{2.5}. The objective is to reduce PM_{2.5} baseline across the population by 15% in time for 2020. This is equivalent to an annual average of 11 µg/m³. The World Health Organisation (WHO) guideline for PM_{2.5} is 10 µg/m³ as annual average. As an objective this aligns more closely with the aims of the Health Directorate and the Joint Strategic Needs Assessment and is aligned with the Public Health Outcomes Framework (PHOF) indicator.

3.2.3.1 Polycyclic Aromatic Hydrocarbons PAH and Benzo[a]Pyrene

Upto the end of 2015 the UK PAH Monitoring and Analysis Network measures the concentrations of PAHs in ambient air at thirty-one monitoring sites across the UK¹.

¹ National Physical Laboratory Polycyclic Aromatic Hydrocarbons (PAH) Network <http://www.npl.co.uk/environmental-measurement/products-and-services/polycyclic-aromatic-hydrocarbons-pahs-network>



Figure 20 Location of UK PAH monitoring Stations (image from Defra)

The Network discharges the UK Government's obligation under the EC Air Quality Fourth Daughter Directive to monitor the mass concentration of benzo[a]pyrene (B[a]P) in the PM₁₀ fraction (particles with an equivalent aerodynamic diameter of 10 µm or less) of ambient air. The target value for B[a]P in the PM₁₀ fraction of ambient air, averaged over a calendar year, is 1.0 ng.m³ (one nanogram per cubic meter of air). The PAH monitor at Leyton Road (LR see map) near Alidrington railway station has monitored below this threshold for several years. The monitor indicates compliance with all objectives and shows a seasonal pattern. Relatively high concentrations appear to be markers for colder months and are thought to relate to solid fuel burning. Further research would be required to determine cause and effect. Sea-land breezes and well mixed unstable atmospheric conditions are common in the spring and summer. Mid winter lacks the vertical convective movements that are effective for pollutant dispersion. Results and graphs are presented in the Appendix B section of this report.

3.2.4 Sulphur Dioxide (SO₂)

The city council has not monitored Sulphur Dioxide (SO₂) since 2009. Past results were well within European and UK air quality limits. The University of Brighton has received funding from the JOQUIN European fund to monitor a number of pollutants including Sulphur Dioxide and results are likely to be available in time for the next round of Sussex Annual Status Reports.

Appendices

Appendix A Map of Continuous Analysers

Appendix B: Tables: Monitoring Details

Appendix C: Full Monthly NO₂ Diffusion Tube Results

Appendix D: Supporting Technical Information/QA-QC for Air Quality
Monitoring Data

Appendix E: Summary of Air Quality Objectives in England

Appendix A

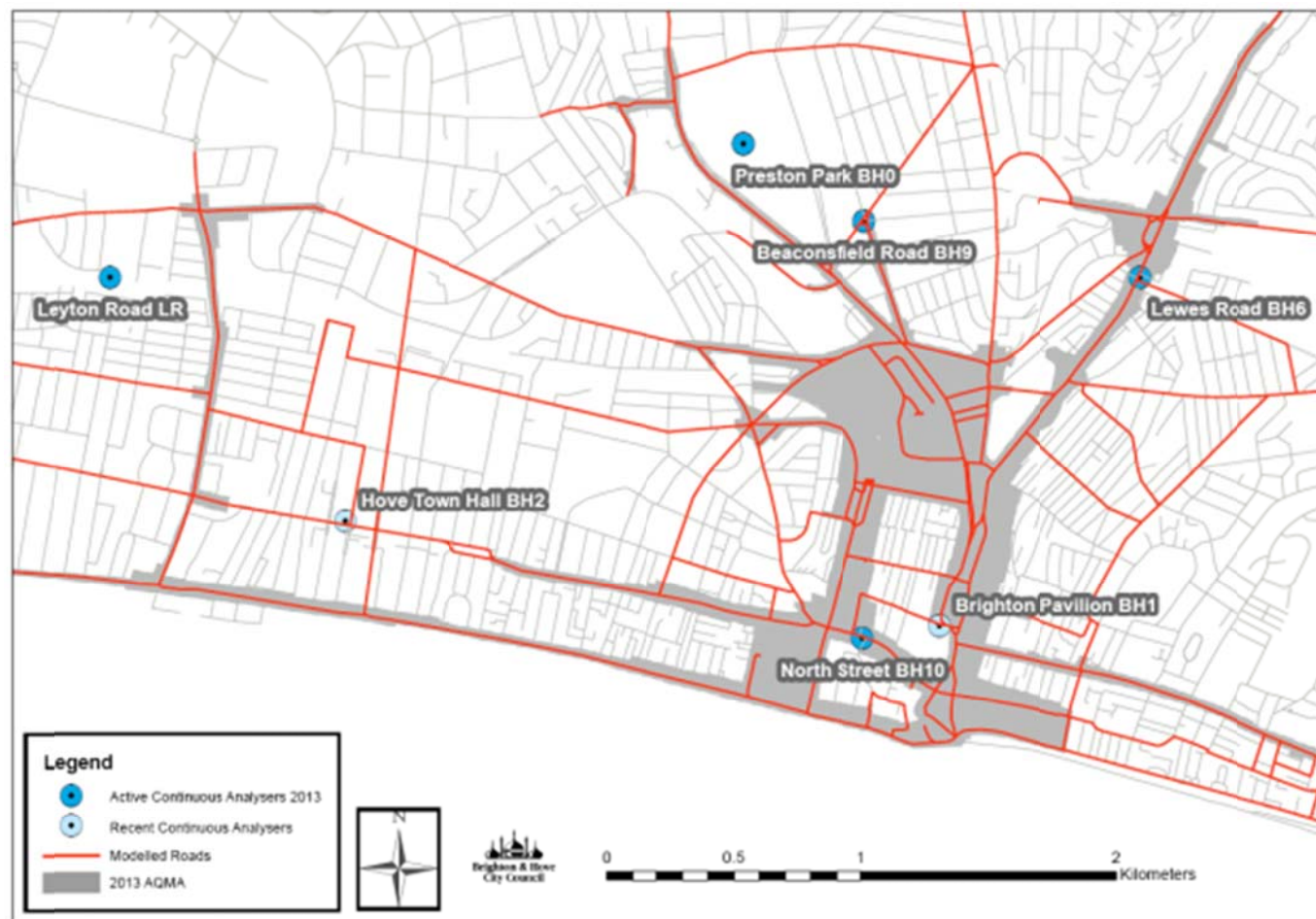


Figure 21 Recent and Active Automatic Analysers Central Brighton & Hove

Appendix B: Monitoring Results

Table 3 Details of Local and National Automatic Monitoring Sites Brighton & Hove

Site Name	Site Type	Active Monitoring Period	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In NO ₂ AQMA?	Monitoring Analyser Techniques	Relevant Exposure?	Triangular Distance to kerb of main road (m)	Does this location represent worst-case exposure?
Beaconsfield Road Monitor BRM BH9	Roadside	Feb 2011 to Jan 2014	531002	105918	NO _x , O ₃ , PM ₁₀	Yes near Boundary	API and TEOM	Nearby houses and doctors surgery	3	No
Lewes Road Monitor BH6	Roadside	Since June 2012	532082	105694	NO _x	Yes	API	Yes (3)	1.5	Yes
North Street Monitor BH10	Roadside	Since April 2012	530995	104271	NO _x		API	Yes (0)	6	
Preston Park BH0	Urban Background	Since 2006	530526	106218	NO _x , O ₃ , PM _{2.5}	No	API and Partisol	No	200	No
Hove Town Hall BH2	Roadside	1998 to 2012	528963	104731	NO _x	No	API	In Line	5	No
Brighton Pavilion BH1	Urban	1998 to 2010	531295	104319	NO _x		API	No	18	No
Stanmer Park BH8	Rural	Since March 2010	533457	109526	O ₃	N/A	API	No	> 200	No
Foredown Tower BH3	Rural	Up to 2010	525690	107169	O ₃	N/A	API	No	150	No
Lullington* Heath Wealden AURN	Regional Background	Since 1990s	553800	101600	NO _x , O ₃ , SO ₂	No	API	No	N/A	No
Telscombe Cliffs, LS01 Lewes DC	Roadside	2002 to 2009	540010	101305	NO _x , O ₃ , PM ₁₀	No	API, TEOM	No	4	No
Leyton Road, Hove LR	Urban Background	Since 2002	528041	105693	PAH	N/A	Anderson Analyser	No	N/A	No

Table 4 Details of Non-Automatic Monitoring Sites for West, Central and East parts of Brighton & Hove

Archive Diffusion Tube Number or year started	Diffusion Tube change order in West Area	X OS Grid Ref	Y OS Grid Ref	Street	Near A or B Road?	Horizontal Distance to kerb of road (m)	Estimated Height (m)	Triangular Distance to kerb of road (m)	Does this location represent worst-case exposure?
DT 05	W01-C12	530969	104785	Queens Road	A2010	3.5	2.8	4.5	Y
2010	W02	530963	104837	Surrey Street	A2010	4.6	2.6	5.3	Y
DT 06	W03	530963	104994	Terminus Road Hill	A2010	1.8	3	3.5	Y
DT 73	W04	530809	105362	Chatham Place-New England Road	B2122	1.6	3	3.4	Y
DT 74	W05	530776	105400	Old Shoreham Road- Hill	A270	1.7	3.2	3.6	Y
2014	W07-2014	530554	105142	Dyke Road-Seven Dials RS*	A2010	0.2	3	3.0	Y
DT 69	W08	530586	105104	Buckingham Place-Seven Dials	A2010	7.6	3.5	8.4	Y
DT 76	W10	530302	104415	Western Road west of Churchill Sq	B2066	3.2	3.2	4.5	Y
2012	W12-12	528423	104809	Church Road Hove	B2066	3	2.7	4.0	Y
DT 57	W16	526248	104857	Wellington Road-Basin Road	A259	2.1	2.7	3.4	Y
DT 59a	W17	525931	104961	Wellington Road-Church Road	A259	1.3	2.7	3.0	Y
2010	W18	525970	105230	Vale Park, Portslade BG	PARK	97	2.8	97.0	N
DT 58a	W19	525657	105696	Trafalgar Road, Portslade facade	B2139	2.7	2.8	3.9	Y
2010	W20-12	525653	105717	Trafalgar Road, Portslade kerbside	B2139	1.5	2.8	3.2	Y
DT 52	W21	528406	105874	Sackville Road-Old Shoreham Rd	A2023	2	2.8	3.4	Y
DT02	W22	530578	104046	Kingsway the Grand Hotel	A259	2.6	2.8	3	N

All West Area sites are inside the 2013 revised AQMA with exception of W18 background. West Area ("W" codes) include a tube replacement circuit orienteered from the City Centre through to Hove and Portslade. All monitors are located on residential building-lines or facades with exception of those denoted with: **RS** = Roadside and **BG** = Background.

Archive Diffusion Tube Number or year started	Diffusion Tube change order in Central Area	X OS Grid Ref	Y OS Grid Ref	Street	Near A or B Road?	Horizontal Distance to kerb of road (m)	Estimated Height (m)	Triangular Distance to kerb of road (m)	Does this location represent worst-case exposure?
2010	C01	531171	103962	East Street		2.7	2.4	3.6	N
2010	C02	531231	103919	Near Pool Coach Station		1.2	2.5	2.8	Y
DT 40	C03	531439	104045	Saint James Street	B2118	2.7	2.7	3.8	Y
2015	C3-15	531448	104034	St James Street Lamppost	C-Link	1	2.8	3	Y

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Archive Diffusion Tube Number or year started	Diffusion Tube change order in Central Area	X OS Grid Ref	Y OS Grid Ref	Street	Near A or B Road?	Horizontal Distance to kerb of road (m)	Estimated Height (m)	Triangular Distance to kerb of road (m)	Does this location represent worst-case exposure?
2010	C04	531228	104088	Lower North Street-Castle Square	B2066	5	2.7	5.7	Y
2012	C05-12	531230	104260	Pavilion Gardens Background BG	N/A	102	2.8	102	N
DT 86	C08	531292	104321	Brighton Pavilion Lower	A23	18	2.4	18.2	N
DT 09	C09	531302	104392	Marlborough Place	A23	2.8	3.2	4.3	Y
2012	C10-12	530995	104271	North Street Ship Street BH10 Triplicate	B2066	6	2.5	6.1	Y
DT 77	C11	530947	104284	North Street Central	B2066	5.8	3	6.5	Y
2012	C11-12	530890	104302	North Street Clock Tower	B2066	>1	2.5	2.7	Y
2011	C12	530900	104451	Queens Street north of Clock Tower	A2010	3	3	4.2	Y
2012	C12-12	531014	104302	Main Station Taxi Rank	A2010	2.5	2.5	2.8	Y
2014	C13-14	530770	104363	Lower Dyke Road-Churchill Square	B2121	1	3.1	3.3	N
2010	C14	530833	104276	West Street south of Clock Tower	A2010	3.9	2.8	4.8	N
DT 10	C15	531401	104669	Gloucester Place re-instated 2014	A23	7.8	3	8.4	Y
DT 11	C16	531400	104844	York Place	A23	4	2.8	4.9	Y
DT 15a	C17-12	531364	104982	Cheapside nr Pelham Street	A270	2.4	2.4	3.4	Y
2014	C18-14	531376	105012	London Road near Oxford	A23	1.3	2.8	3	Y
2014	C18	531376	105012	Oxford Street-London Road	C-Link	2.2	2.5	3.3	Y
DT 27a	C19	531472	105161	Oxford Street-Ditchling Road	C-Link	2.2	2.6	3.4	Y
DT 25	C20	531496	105315	Ditchling Road-Viaduct Terrace	A23	4.2	2.2	4.7	Y
DT 24	C21	531451	105356	Viaduct Terrace	A23	1.8	3.1	3.6	Y
DT 26	C22	531424	105286	Kingsbury Street ceased >2013 BG	N/A	57	3	57.1	N
DT 17	C23	531189	105375	London Road-Preston Circus	A23	4.5	3	5.4	Y
DT 16	C24	531101	105443	New England Road-Preston Circus	A270	2.2	2.8	3.6	Y
2010	C25	530985	105419	New England Road-Argyle Road	A270	2.3	2.7	3.5	Y
2010	C27	531151	104850	Trafalgar Street	B2199	1.3	2.5	2.8	Y
2010	C28	531032	104843	Frederick Place	B2199	1.4	2.4	2.8	Y
2014	C29	530848	103970	Kingsway Facade	A259	4	2	4.2	Y

All Central Sites are inside the 2013 AQMA with exception of C01 East Street and C05-12 Pavilion Gardens Background. All Central ("C") diffusion tube monitors are located in Central Brighton.

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Archive Diffusion Tube Number or year started	Diffusion Tube change order in East Area	X OS Grid Ref	Y OS Grid Ref	Street	Near A or B Road?	Horizontal Distance to kerb of road (m)	Estimated Height (m)	Triangular Distance to kerb of road (m)	Does this location represent worst-case exposure?
DT19 moved	E01	531090	105510	Preston Road-Preston Circus	A23	3.5	2.8	4.5	N
DT21	E02	530233	106515	Preston Road-Preston Drove	A23	3	2.7	4.0	Y
2012	E02-12	530233	103369	The Drove	C-Link	2.4	2.5	2.6	Y
DT 22	E06	531102	105615	Beaconsfield Road-Preston Circus	A23	3	2.6	4.0	Y
2012	E07-12	531805	105303	Lewes Road Elm Grove Junction	A2073	2.4	2.8	2.9	Y
DT 30	E08	532085	105740	Lewes Road-Inverness Road	A2073	3.5	2.6	4.4	Y
2010	E09	532107	105735	Lewes Rd East side of Gyratory	A2073	5	2.7	3	Y
2010	E10	532126	105838	Vogue Gyratory Island	A270	4.1	2.7	4.9	Y
DT 31	E12	532021	105946	Hollingdean Road	C1060	1.7	2.9	3.4	Y
DT 32	E14	532409	106370	Lewes Road Lectern Pub	A270	2.7	2.6	3.7	Y
2012	E15-12	532300	106159	Lewes Road Coombe Terrace	A270	3.6	2.6	4.4	Y
DT 38	E16	531396	104344	Grand Parade Middle	A23	3.8	3.2	5.0	Y
2015	E16-2015 -	531429	104514	37 Grand Parade Middle West Façade	A23	3	2.8	3.2	Y
DT 08	E17	531402	104365	Grand Parade University Building	A23	4.2	2.7	5.0	Y
2013	E17-2013	532614	103813	Paston Place adjacent to taxi rank	N/A	1	3	3.2	Y
2015	E17-2015	531440	104225	174 Edward Street North Facing Façade	C5260	2.2	2.7	2.9	Y
DT 43	E18	532759	103810	Eastern Road opposite Hospital	C5260	1.9	2.9	3.5	Y
DT 78	E21	536914	102446	High Street-Vicarage La, Rottingdean	B2123	0.8	2.6	2.7	Y
DT 79	E22	536968	102274	High Street Rottingdean East Side	B2123	1.7	2.6	3.1	Y
2010	E23	536966	102273	High Street Rottingdean West Side	B2123	0.4	2.6	2.6	Y

All East Areas Sites are within the 2013 AQMA with the exception of E17-13. The East Area ("E") circuit includes north and east of the city centre, Royal County Hospital and Rottingdean Village which has its own separate AQMA.

Table 5 Automatic Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Site Name	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2011	2012	2013	2014	2015
BH0	Background	Preston Park	N/A		16.9	16	16.7	16	14.8
BH6	Kerbside	Lewes Road			N/A	50	48.4	48.7	39
BH9	Roadside	Beaconsfield Road		N/A	36.3	35.9	31	Site Ceased	
BH10	Roadside Facade	North Street			N/A	<u>63</u>	59.7	56.4	52.5

Notes: Exceedences of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedence of the NO₂ 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 LAQM.TG (16) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

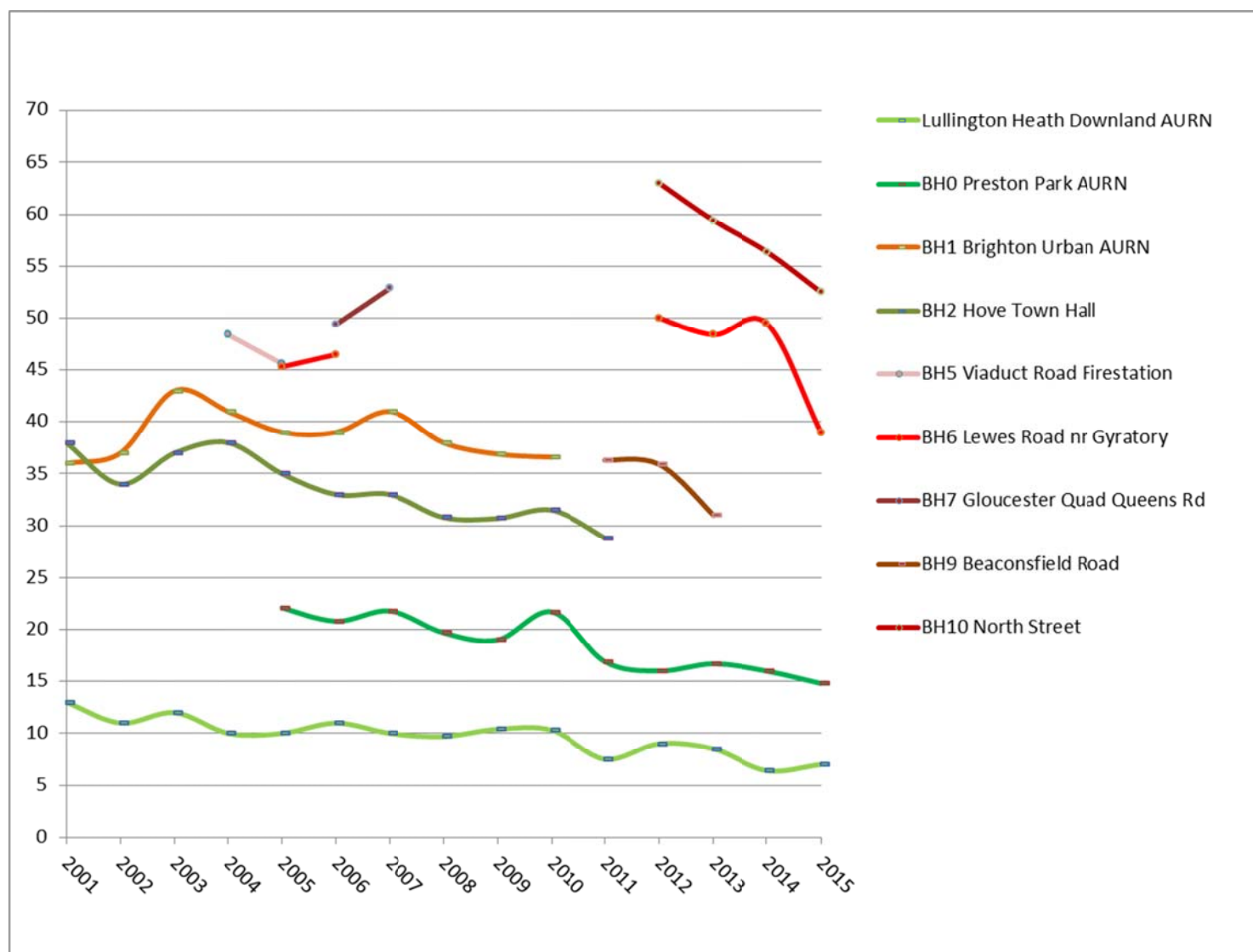


Figure 22 Annual Mean Nitrogen Dioxide $\mu\text{g}/\text{m}^3$ Automatic Analysers Since 2001

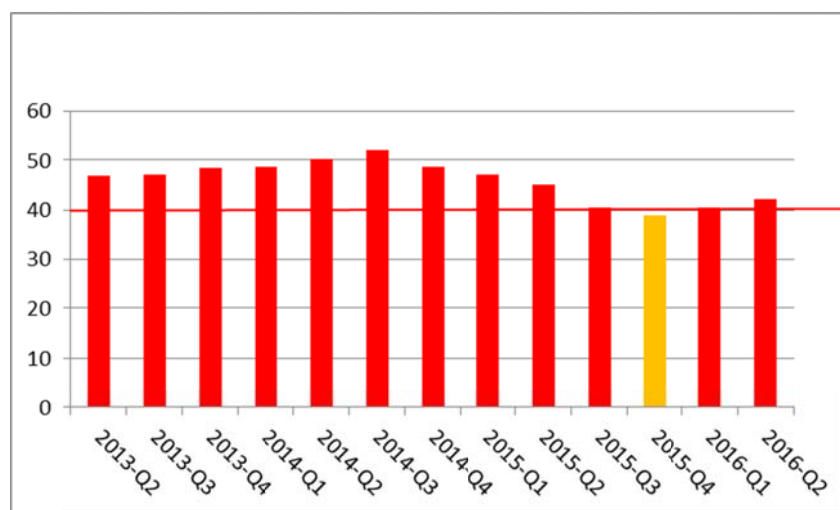


Figure 23 Lewes Road Quarterly Annual Rolling Mean Nitrogen Dioxide $\mu\text{g}/\text{m}^3$

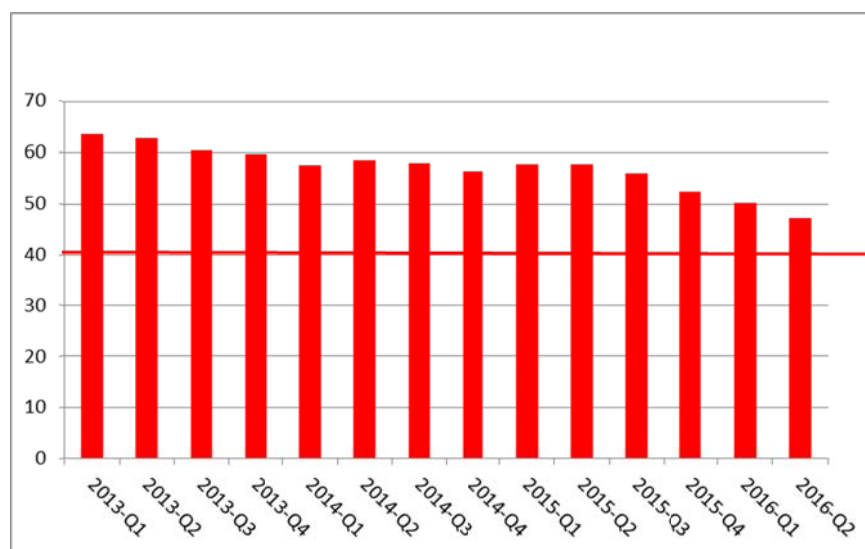


Figure 24 North Street Quarterly Annual Rolling Mean Nitrogen Dioxide $\mu\text{g}/\text{m}^3$

Table 6 1-Hourly Mean NO₂ Monitoring Results

Site ID	Site Name	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2011	2012	2013	2014	2015
BH6	Lewes Road	Kerbside	N/A	87		(6)	17	33	1
BH9	Beaconsfield Road	Roadside		N/A	5	1	Monitor moved to BH10		
BH10	North Street	Roadside Facade		86		(32)	11	8	13

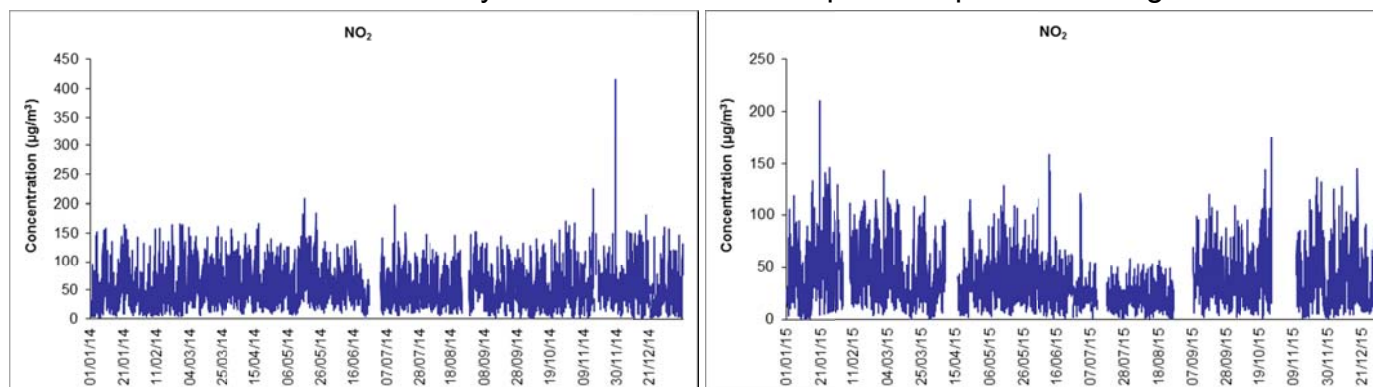
Notes: Exceedences of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

(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 90%, the 99.8th percentile of 1-hour means is provided in brackets.

On Lewes Road the Automatic Analyser BH6 showed fewer pollution peaks of nitrogen dioxide during 2015 compared to 2014.

**Figure 25** 2014 and 2015 hourly concentrations of NO₂ recorded by BH6 on Lewes Road (note different scales)

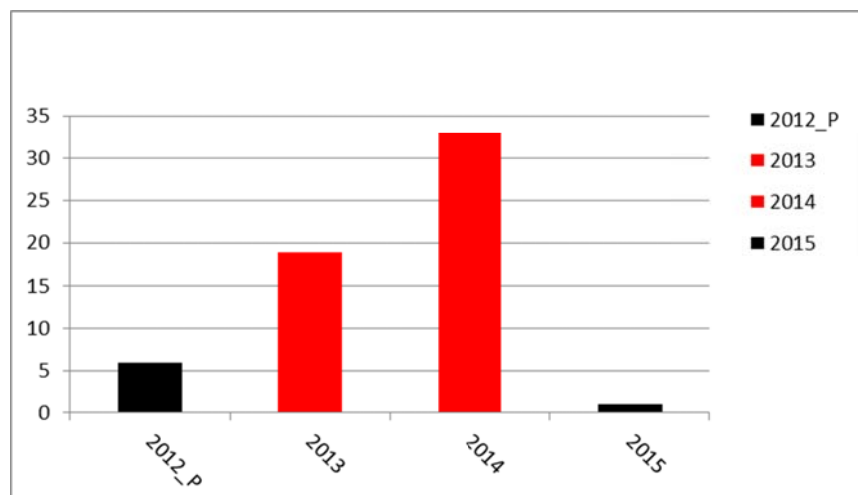


Figure 26 Lewes Road Number of Hours Each Year When Nitrogen Dioxide was Recorded $> 200 \mu\text{g}/\text{m}^3$

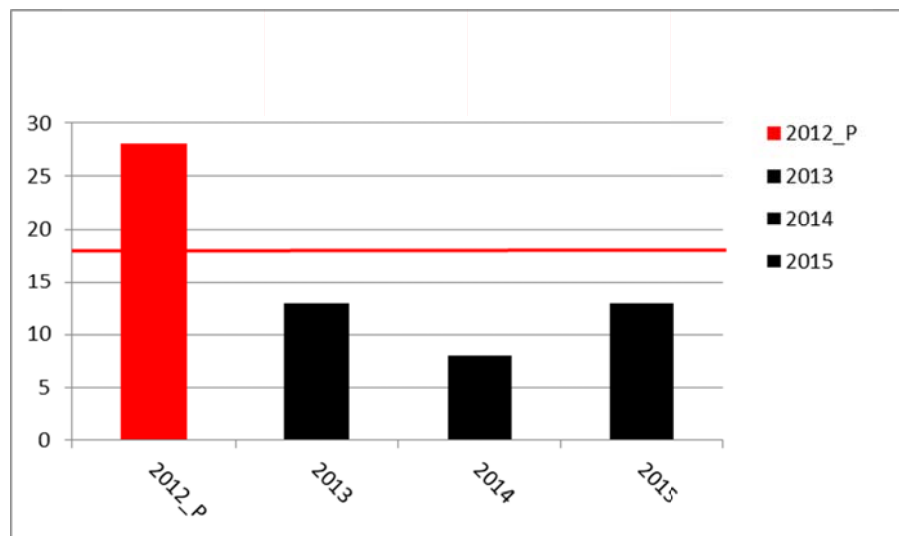


Figure 27 North Street Number of Hours Each Year When Nitrogen Dioxide was Recorded $> 200 \mu\text{g}/\text{m}^3$

Table 7 Annual Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2014(%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2011	2012	2013	2014	2015
BH6	Kerbside		N/A				22.3	PM _{2.5}
BH9	Roadside	N/A	N/A	22	27.7	Monitor moved to BH10		
BH10	Roadside Facade	N/A	83.6			26	26.1	PM _{2.5}

Notes: Exceedences of the PM₁₀ annual mean objective of 40µg/m³ 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) All means have been “annualised” as per Technical Guidance LAQM.TG (16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table 8 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
				2011	2012	2013	2014	2015 switch
BH6	Kerbside	N/A		Prior to Installation				PM _{2.5}
BH9	Roadside	N/A	N/A	N/A	15	Monitor moved to BH10		
BH10	Roadside Facade	N/A		N/A		3	9	PM _{2.5}

Notes: Exceedences of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 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 90%, the 90.4th percentile of 24-hour means is provided in brackets.

Table 9 Annual Mean PM_{2.5} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	PM _{2.5} Annual Mean Concentration (µg/m ³)				
				2011	2012	2013	2014	2015
BH0	Preston Park Background	N/A	88 (98% 2014)	12.1	10.9	11.2	9.6	9.3
BH6	Lewes Road Kerbside	83.5% from 9 Feb		N/A	BH6 formerly set for PM ₁₀			6.8
BH10	North Street Roadside Facade	N/A	84.1		BH10 formerly set for PM ₁₀			13

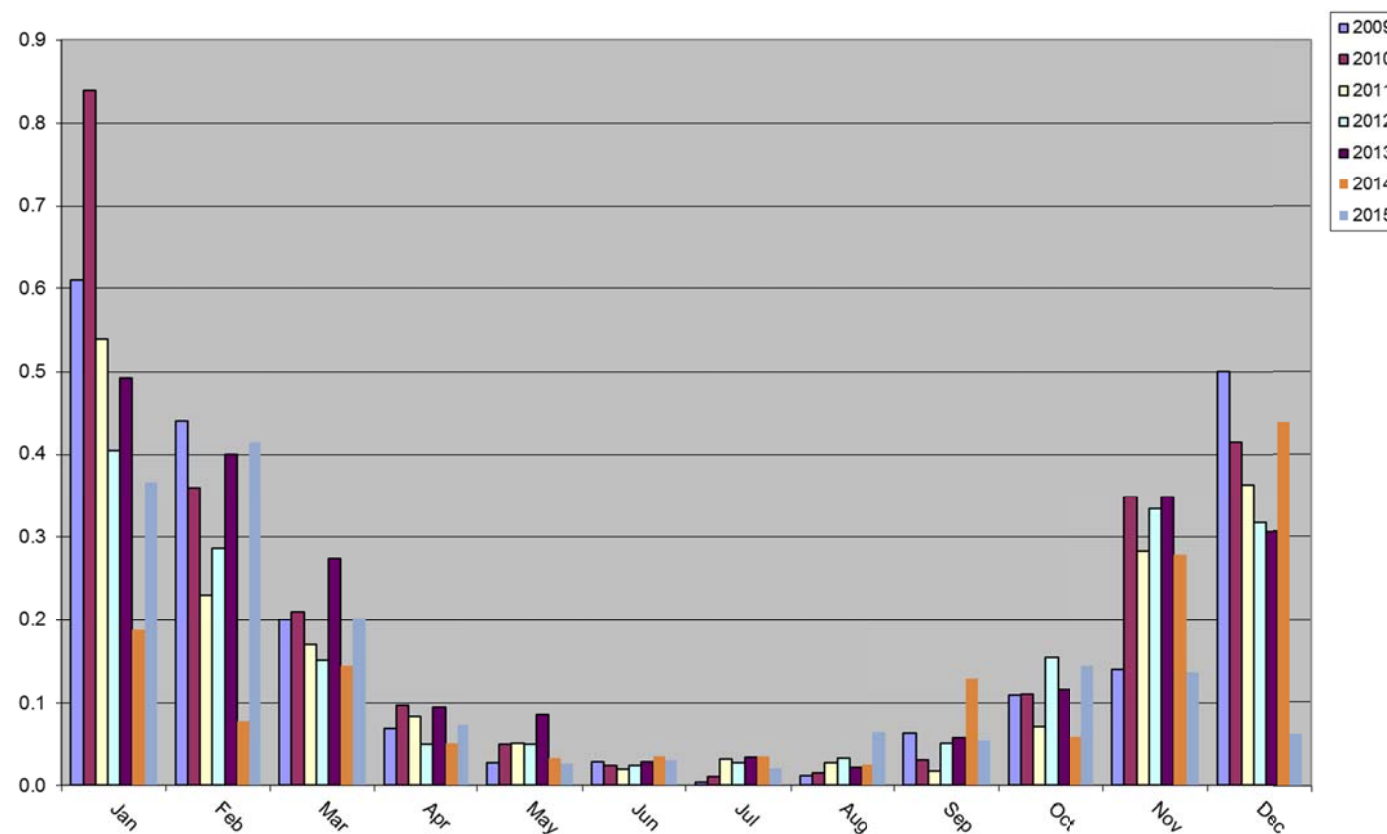
Notes: Exceedences of the PM_{2.5} exposure reduction objective = 11 µg/m³ are shown in **bold**.

(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%).

Table 10 Annual Mean PAH Benzo-A-Pyrene Leyton Road Hove

Monitor	2009	2010	2011	2012	2013	2014	2015
Leyton Road (LR) ng/m ³	0.18	0.21	0.16	0.16	0.19	0.12	0.13

**Figure 28** Monthly Concentrations of Benzo-A-Pyrene Leyton Road Hove

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table 11 NO₂ Monthly Diffusion Tube Results 2015 West Area

Site ID West Area	Bias Correction NO ₂ (µg/m ³) Time Weighted Annual Average											
	Jan	Feb	Mar	Apr	Jun	Jul	Sep	Oct	Nov	Dec	Annual Mean	
											Raw Average	Bias Adjusted *0.91
W01	59.8	45.5	47.6	39.3	43.3	36.0	56.3	49.4	38.6	39.2	45.5	41.3
W02	19.3	41.0		29.7	42.9	35.9	45.7	44.1	35.5	41.4	39.5	34.5
W03	48.0	52.0	49.6	37.6	39.9	51.1	40.8	42.8	45.1	50.6	45.8	42.2
W04	29.2	57.5	53.5	11.9	37.4	45.2	45.1	42.1	55.9	42.9	42.1	38.4
W05	61.6	61.8	55.1	42.3	44.0	44.7	51.2	55.8	49.8	45.3	51.2	46.3
W07-14	19.5	49.7	39.8	26.7	33.7	34.2	37.4	40.7	39.7	45.1	36.6	34.3
W08	44.4	40.8	40.9	33.6	36.4	37.9	36.3	38.5	43.3	53.6	40.6	38.0
W10	50.5	49.9	48.5	40.4	46.6	47.3	45.2	42.8	52.6	48.3	47.2	42.9
W12-12	42.8	39.1	36.6	33.0	33.5	34.3	26.8	31.0	38.8	40.1	35.6	32.7
W16	58.9	39.3	46.8	42.5	43.0	46.1	42.4	43.0	38.6		44.5	40.1
W17	55.7	46.6	51.7	33.8	45.6	40.2	45.1	46.7	40.8		45.1	41.5
W18	29.0	48.5	20.7	14.3	17.6	15.2	17.6	24.9	22.6	20.5	23.1	21.0
W19	50.5	48.4	48.1	27.7	43.2	39.7	41.2	47.1	50.0	42.3	43.8	39.7
W20-12	47.7	41.7			47.5						45.6	41.5
W21	57.1	47.0	44.8	28.2	30.8	41.4	37.3	44.2	32.5	41.6	40.5	37.2
W22	52.1	49.2	50.3	35.5	36.5	38.7	51.1		34.0	31.9	42.1	37.8

April results continue into May. Most of the month of August is missing. Sites indicating continued exceedance of the national limit for NO₂ are in bold.

Table 12 NO₂ Monthly Diffusion Tube Results 2015 Central Area

Site ID Central Area	Bias Correction NO ₂ (µg/m ³) Time Weighted Annual Average Central Area											
	Jan	Feb	Mar	May	Jun	Jul	Sep	Oct	Nov	Dec	Annual Mean	
											Raw Data	Bias Adjusted *0.91
C01	43.3	30.6	32.8	30.3	26.6	Sites compliant and ceased sampling					32.7	29.0
C02	38.4	34.4	34.5	36.8	29.5						34.7	31.7
C03	42.4	40.1	33.2	36.0	34.1	30.1	39.6	44.3	37.7	27.2	36.5	33.0
C03-15	First half of the year before site started					43.1		37.7	44.4	40.1	41.0	37.3
C04	53.7	49.1	55.3	61.7	53.5	47.3	45.9	58.0	70.0	55.3	55.0	50.1
C05-12	31.5	28.3				19.8	24.9	28.0	13.9		24.4	22.5
C08	43.7	34.7	31.5	29.1	29.1	27.6	35.1	42.1	27.1	24.5	32.4	29.4
C09			57.0	45.1	60.5	58.3	44.8	53.6	47.0	49.5	52.0	47.3
C10-12	58.6	55.0	50.5	40.1	54.5	48.1	42.0	64.9	48.8	45.3	49.7	47.1
C11	68.2	61.5	60.6	65.4	65.1	60.7	55.6	68.9	85.6	66.6	65.8	59.8
C11-12	104.8	76.8	86.8	120.7	105.2	129.1	85.0	101.9	105.5	100.8	101.7	91.9
C12	46.1	49.6	53.4	46.4	41.5	41.6	43.0	59.8	41.7	38.0	46.1	42.1
C12-13	45.9	41.5		56.7	40.4	25.7	38.3	49.7	47.0	39.4	42.7	39.2
C13-14	43.1	51.9	42.4	44.1	38.2	42.9	37.7	44.8	36.5	34.8	41.6	41.7
C14	43.4	37.9	44.6	32.6	33.6	25.5	38.2	43.8	29.3		36.5	33.6
C15	42.7	46.6	47.6	43.4	52.8	51.1	42.7	48.7	49.7	49.3	47.4	43.1
C16	29.3	53.2	48.3	48.7	57.1	51.4	39.0	52.7	49.5	53.0	48.2	43.8
C17-12	64.7	66.3	58.7	52.6	62.4	63.1	82.9	73.1	72.8	77.3	67.4	61.3
C18-14	75.4	84.5	72.1	79.5	90.0		65.9	78.5	110.0	97.8	83.7	75.7

Most of the month of August is missing. Sites with continued exceedance of the national limit for NO₂ in bold.

Site ID Central Area	Bias Correction NO ₂ (µg/m ³) Time Weighted Annual Average Central Area Part Two											
	Jan	Feb	Mar	May	Jun	Jul	Sep	Oct	Nov	Dec	Annual Mean	
											Raw Data	Bias Adjusted *0.91
C18	73.50	61.97	71.36	48.55	70.26	57.80	63.16	87.88	68.83	60.79	66.4	60.2
C19	49.46	52.05	51.47	37.14	45.52	40.25	50.08	53.99	48.54	45.09	47.4	43.2
C20	47.57	53.06	47.10	30.17	49.83	38.08	47.07	55.48	30.42	35.93	43.5	39.7
C21	54.50	71.27	57.77	53.46	67.51	67.88	54.32	59.85	55.11	58.26	60.0	54.6
C23	45.08	52.15	51.09	47.64	51.77	44.67	40.98	50.77	50.43	47.50	48.2	43.9
C24	51.71	51.85	52.40	41.22	53.70	44.86	55.28	55.90	49.28	47.66	50.4	45.9
C25	30.50	51.65	55.50	46.79	60.25	48.01	53.47	53.80	55.56	42.54	49.8	45.3
C27	42.72	40.85	50.58	38.80	40.39	35.31	41.17	44.08	40.18	36.92	41.1	37.6
C28	29.48	56.86	58.73	48.47	54.95	43.45	41.45	49.76	50.13	51.93	48.5	44.6
C29	43.44	32.41	40.54	35.29	38.05	24.89	35.62	43.47	23.35	17.78	33.5	30.4

Most of the month of August is missing. Sites with continued exceedance of the national limit for NO₂ in bold.

Table 13 NO₂ Monthly Diffusion Tube Results 2015 East Area

Site ID East, Central or West	NO ₂ (µg/m ³) Bias Correction Applied to the Time Weighted Annual Average												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Sep	Oct	Nov	Dec	Annual Mean	
												Raw Data	Bias Adjusted *0.91
E01	43.3	38.5	35.6	31.5		35.6	31.1	47.1	46.3	31.2	36.5	37.7	33.8
E02	42.9	48.2	39.2	37.3		43.6	39.0	37.1	45.8	46.5	47.3	42.7	39.0
E02-12	45.7			44.6		45.9	39.8	45.0		49.3	48.2	45.4	41.5
E06	43.8	42.2	37.5	40.4		37.1	31.2	31.4	41.5	34.3	47.8	38.7	35.6
E07-12	74.5	70.0	52.1		56.8	64.8	44.6	63.2				60.9	54.9
E08	48.3	90.4	51.8		54.8	63.9	53.7	62.7	61.9	79.1	60.1	62.7	57.1
E10	47.8	68.8	41.2		47.7	49.4	39.9	41.6	46.1	65.1		49.7	45.4
E12	51.7	60.4	47.1		37.5	53.5	48.9	49.4	53.8	40.1	51.4	49.4	45.2
E14	41.7		35.1		36.0	40.4	37.1		44.5	41.5		39.5	35.7
E15-12			44.9		38.3	48.0	38.0	48.8	49.5	38.4		43.7	39.7
E16	42.0	43.2	47.0	33.6		49.0	39.1	41.5	48.1	32.9	36.9	41.3	37.5
E16-15							45.5	43.8	54.7	39.5	49.4	46.6	42.7
E17	39.0	52.9	46.5	37.6		54.4	38.4	83.3	111.4	25.9	70.6	56.0	51.0
E17-13	31.7	24.7	25.0	19.3		20.3						24.2	24.1
E17-15							32.9	39.9	39.1	33.7	36.8	36.5	36.5
E18	43.3	44.3	38.6	31.0		40.4	32.8	44.8	41.9	46.5	31.6	39.5	35.4
E21	31.4	29.8	38.8	20.3		28.3	18.6	28.2	32.0	18.5	17.7	26.4	26.4
E22	44.7	40.4	40.1	29.2		39.7	32.0	39.5		23.6	26.6	35.1	31.6
E23	46.2	42.0	31.7	40.3		49.4	39.5	40.2	42.8	45.3	40.0	41.7	37.7
BH6 Triple	58.6	55.0	50.5	40.1	21.6		47.2	32.5	64.0	51.8	43.4	46.8	40.6

In some cases April results continue into May. Most of the month of August is missing. Sites with continued exceedance of the national limit for NO₂ in bold.

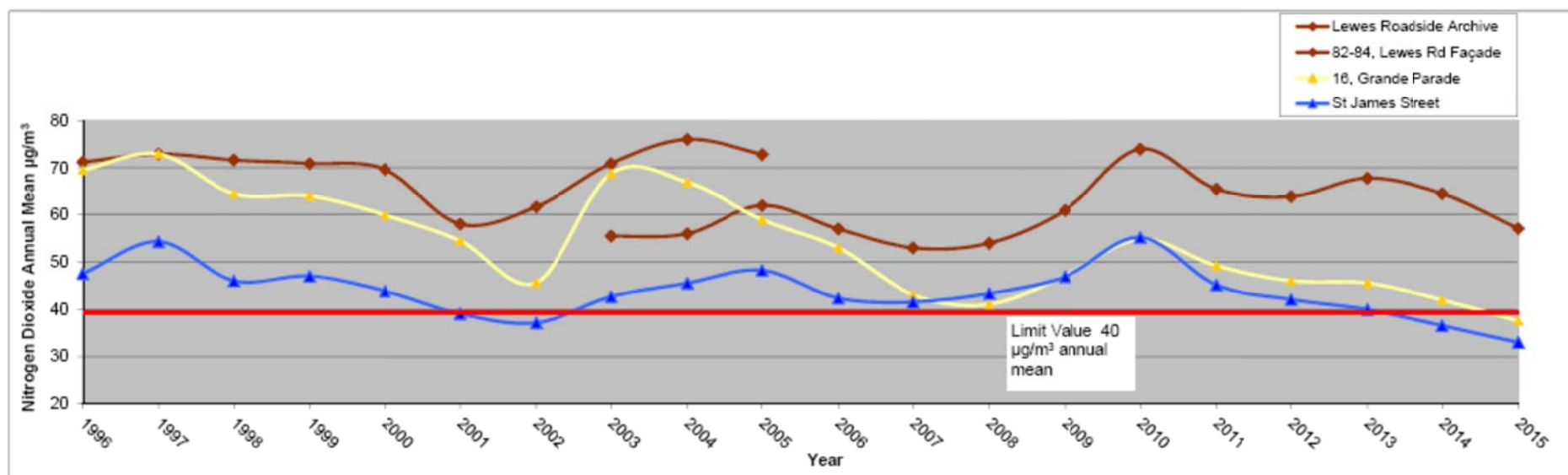


Figure 29 Long Term Trends of Nitrogen Dioxide Diffusions Tubes Annual Mean

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

The council does not anticipate any major new source of pollution in the area over the next year. However the city is developing and growing at a rate above the national average. Whilst private car use is low in the City Centre there are traffic pressures with new developments at major urban fringe sites most especially within a few kilometres of the Portslade and Rottingdean parts of existing AQMA's. Detailed air quality assessment will need to be carried out for major new development such as Preston Barracks and Toad Valley.

There are no plans to amend the AQMA during 2016. When full year monitoring is available for 2015 and 2016 it may be possible to revoke parts of the existing AQMA in 2017. It is anticipated that the total AQMA acreage would reduce. That said there is likely to be more than two AQMA's targeting zones adjacent to transport corridors and junctions that are priority for compliance and improvement. The 2015 Air Quality Action Plan (AQAP) and associated Community Insight Report and Equalities Impact Assessment can be found on the city councils webpages at <https://www.brighton-hove.gov.uk/content/environment/air-quality-and-pollution>

The action plan includes details on the results of dispersion modelling and source apportionment and quantifies which streets and transport corridors have the most dwellings at risk of exceeding the EU standard for nitrogen dioxide.

Bias adjustment of raw diffusion tube results utilises two automatic analysers (BH6 and BH10) that have co-located triplicate diffusion tubes. The bias correction factor is verified by the (National Physical Laboratory (NPL) each year. An orthogonal average is taken of two sites with the North Street value preferred for this bus route that is the (Low Emission Zone) LEZ.

Appendix D: Summary of Air Quality Objectives in England

Table 14 National Air Quality Standard

Pollutant	Air Quality Objective ²	
	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

Table 15 Air Quality Guidelines and Objectives

Pollutant	Air Quality Objective ³	
	Concentration	Measured as
Particulate Matter (PM _{2.5})	National level reduction target of 15% by 2020 11 µg/m ³	Annual mean
	World Health Organisation Guideline 10 µg/m ³	Annual mean

² The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

³ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
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
SO ₂	Sulphur Dioxide
Used in LAQM Reports	Description
AQ	Air Quality ambient or outdoor
ADMS	Atmospheric Dispersion Model System
AQAP	Air Quality Action Plan statutory requirement where an AQMA

has been declared

AQMA	Air Quality Management Area declared under the part IV of the Environment Act 1995
AQS	Air Quality Strategy for England
BAM	Bata Attenuation Monitor particulate monitoring method
BHCC	Brighton and Hove City Council unitary authority
BQPA	Bus Quality Partnership Agreements
BREEAM	Building Research Establishment Environment Assessment Methodology
CBTF	DfT's Clean Bus Transport Fund
CEMP	Construction Environment Management Plan
CIL	Community Infrastructure Levy
CRT	Continuous Regenerating Trap for tailpipe mitigation of particulate
CVTF	DfT's Clean Vehicle Transport Fund
DA	Development Areas
DECC	Department for Energy and Climate Change
Defra	Department for Environment Food and Rural Affairs
DfT	Department for Transport
DPF	Diesel Particulate Filter
EC	European Commission
EPR	Environmental Permitting Regulations
Euro Standards	European emissions standards set out for light and heavy vehicles
Flywheel	Flywheel regenerative breaking or KERS

GIS	Geographical Information Systems
HGV	Heavy Goods Vehicles
IPPC	Integrated Pollution Prevention Permits for industry
JAAP	Joint Area Action Plan that includes development area covering Adur and BHCC
JSNA	Joint Strategic Needs Assessment multidisciplinary health report
KERS	Kinetic Energy Recovery System
LA	Local Authority
LAT	Local Action Team
LAQM	Local Air Quality Management
LDF	Local Development Framework
LEP	Local Enterprise Partnership
LES	Low Emission Strategy
LEZ	Low Emission Zone
LSTF	Local Sustainable Transport Fund
LTP4	Local Transport Plan 4
mg/m ³	concentration milligrams per cubic meter
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen including NO and NO ₂
NPPF	National Planning Policy Framework
O ₃	Ozone near ground level
OLEV	Office of Low Emission Vehicles
PAH	Poly Aromatic Hydrocarbons

PEMS	Portable Emission Monitoring System
PM10	Particulate Matter less than ten microns
PM2.5	Particulate Matter less than two and a half microns
PM1	Particulate Matter less than one micron or nano-particulate
ppb	concentration parts per billion
ppm	concentration parts per million
RHI	Renewable Heat Incentive
S106	Section 106 Funding under Town and Country Planning Act 1990
SA	Special Areas
SAQP	The Sussex Air Quality Partnership sometimes referred to as Sussex Air
SCR	Selective Catalytic Reduction NOX tailpipe abatement
SCRT	Selective Catalytic Reduction Technology used in conjunction with CRT
TEA	Triethanolamine in water method for NOx diffusion tubes
TEOM	Tapered Element Oscillating Microbalance particulate monitoring method
TG(09)	LAQM Technical Guidance 2009
TRO	Traffic Regulation Order
USA	Updating Screening Assessment air quality report
µg/m3	Concentration in micrograms per cubic meter

References

A detailed list of references can be found in the 2015 Air Quality Action Plan that is found on the council's webpages at <https://www.brighton-hove.gov.uk/content/environment/air-quality-and-pollution/air-quality-management-city>