



Brighton & Hove City Council Air Quality Action Plan

Following revised declaration of Air Quality Management Area(s) 2013

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



Foreword

The issue of air pollution and the quality of the air that people breathe where they live is one of the city's principal challenges that demands continued action.

The World Health Organisation declared that diesel fumes are carcinogenic and states outdoor air pollution caused 3.7 million premature deaths worldwide in 2012¹. Public Health England has estimated whole population exposure to fine particulate matter across Brighton & Hove contributes 5 to 6% to all causes of annual mortality². More recent research suggests that the impact of Nitrogen Dioxide (NO₂) may also contribute close to 6% of mortality³ with a 33 % overlap with particles. In Brighton & Hove this is a strong influence on 175 deaths brought forward each year.

Invisible airborne pollution in the twenty-first century has been compared with smoking as it shares a strong influence on respiratory health, heart disease, wellbeing and life expectancy⁴. In some cases the influence of smoking and airborne pollution on health can cause cumulative effects which may be hard to distinguish. Evidence of how airborne pollution influences health has become increasingly robust⁵. As funding of public health services becomes much more challenging, prevention and avoidance is preferable to expensive treatment.

Active travel and healthy air quality in an urban environment where many thousands live and work takes on renewed importance. Tackling airborne pollution is a task that involves local authorities, central government, infrastructure planning, motor manufacturers, bus, taxi and haulage firms. Local people play a key part through the consumer choices and actions they take. Brighton & Hove is a dynamic and vibrant city with strong population growth and is the main part of the Sussex coastal conurbation, which also includes Worthing and Littlehampton.

Under part IV of Environment Act 1995⁶ the council has declared an Air Quality Management Area for non-compliance with the nitrogen dioxide legal limit⁷. This triggers a statutory requirement for the Local Authority to produce an Air Quality Action Plan (AQAP) that sets out a series of measures that aim to improve local air quality and comply with legally binding limits for nitrogen dioxide. Since its earliest inception in 2006 the Air Quality Action Plan has been aligned with successive versions of the Local Transport Plan⁸.

The Parliamentary Audit Committee on Air Quality⁹ has requested more action at a local level across the UK. In early 2015, Brighton & Hove's Air Quality Action Plan urgently requires new impetus and a set of vigorous measures that are determined to deliver improvement.

The EU and third parties such as Client Earth can take legal action against authorities that continue to exceed the law for outdoor air quality. The Council has mapped in detail which vehicle types contribute to unlawful nitrogen dioxide levels. Such evidence has helped the city win competitive grant funds from the Department for Transport for vehicle retrofits. Best available technologies are being incentivised in order to avoid exposure to harmful pollutants especially nitrogen dioxide and fine particles. Primary focus of this Air Quality

Action Plan is to eliminate nitrogen dioxide concentrations above limit values where people live. Policies to prioritise air quality will be justified by a detailed evidence based approach that can help attract further funding for implementing exemplar measures and strategies. Ambient and tailpipe monitoring can also be used to demonstrate improvements where this is achieved.

Executive Summary

Brighton & Hove City Council (BHCC) declared two Air Quality Management Areas (AQMAs) for unlawful exceedance of nitrogen dioxide on 30 August 2013. Both areas are entirely within the bounds of the unitary authority and predominately relate to local sources of pollution.

The city has had an Air Quality Management Area (AQMA) since 2004. The larger 2008-AQMA was mostly revoked. The latest declaration under part IV of Environment Act 1995 has triggered the statutory requirement for this Air Quality Action Plan (AQAP). Brighton & Hove's first AQAP was written in 2006 with a second edition and consultation in 2011. Since the earliest stages of Local Air Quality Management (LAQM) regime in the 1990s it has been acknowledged that air pollution in this city is dominated by emissions from road traffic. Over the past decade broader policy, investment and behavioural change has delivered some degree of change in transport and travel. Short urban journeys can be carried out by more sustainable active means such as a combination of walking, cycling and mass use of public transport.

Across Brighton & Hove approximately 6,000 residential dwellings adjacent to 25km of road length are at risk¹⁰ of exceeding the legal limit for nitrogen dioxide. The majority are found adjacent to identified sections of main roads, namely the A23, A2073-A270, A2010, A259 and the B2066 public transport corridor.

The action plan is to target the most polluting traffic emissions that happen in high density retail and residential areas that have limited land and space. The plan builds on a series of advanced measures that have been implemented since the city councils last Air Quality Action Plan. These include one of the UK's first bus Low Emission Zones, retrofits for buses and minibuses and review of taxi licencing policy. For 2015, electromotive infrastructure is in place to reduce reliance on the internal combustion engine for urban transport. The city has one of the busiest cycle lanes in England, the highest use of buses in the UK outside of London and the lowest car ownership in the UK outside of London (38% overall and >60% for the AQMA).

While making evidence based suggestions for improvements in air quality this action plan outlines how principals are interlinked with other areas of policy, most especially health and welfare, climate change, transport and road safety. The new Local Transport Plan 4 seeks to assess various issues and identify where a comprehensive approach could address a number of strategy objectives in the same places. Given that funds for intervention are limited geographical information is presented here to help justify priority locations for improvement. Similar to Defra's flood defence policy the best value for money is to identify residential areas at risk and provide environmental protection where the most people live.

Natural Law and Dedication

Any consensus of natural law relates to human nature (individual and communal) from which we can deduce consenting binding rules and ethical behaviour. The opposite would be to purposefully ignore or avoid a set of principles to the detriment of the populace. Policies must deliver substantial improvement in localised pollution levels in order to comply with credible definitions of sustainability. If not, the problem is passed on to future generations.

This action plan is dedicated to those people that suffer from respiratory illness and poor lung function which can compromise work and social opportunities throughout life.

Acknowledgements

Special thanks to:

Environmental Protection Team at Brighton & Hove City Council for their remit in collecting and changing air monitoring samples throughout the city for many years.

Thanks to Transport and Planning and Departments for their comments on this document.

Paul Nicholls for all his work to set up the Traffic Regulation Order required for Brighton & Hove's bus Low emission zone, which is one of the first of its kind in the UK.

Jon Anderson and colleagues at local engineering firm Ricardo. In 2014 Jon's team carried out some excellent work to better understand real time tailpipe emissions on the number seven bus route that passes through Brighton & Hove's air quality management area. Findings from this work can help quantify the effectiveness of retrofits and new vehicle purchases and how these vehicles perform for emissions in the new Air Quality Management Area and are nationally important.

Martin Harris, Director of the Brighton & Hove bus Company for his collaboration and professional advice on a range of initiatives to explore cleaner, more efficient operation of the 24-hour bus fleet.

Westminster City Council for delivering the UK's first Air Quality Management Area and in many ways taking the lead on advanced air quality action planning.

The London Borough of Walthamstow for all their pioneering work to improve NOx emissions from buses in Putney High Street and their dynamic monitoring evidence that has pushed for change.

Contents

Natural Law and Dedication.....	5
1 Introduction	13
1.1 The Air Quality Management Area (AQMA).....	13
1.1.1 History of Brighton & Hove's Air Quality Action Plan	14
1.1.2 Air Quality Action Plan Progress	15
2 Health Impacts	15
2.1 Health Effects of Nitrogen Dioxide	16
2.2 The Committee on the Medical Effects of Air Pollutants (COMEAP)	16
2.3 Health Directorate in Local Authorities.....	17
3 Policy and Legal Framework	17
3.1 National Strategy	17
3.2 Urban Access Regulations	18
3.3 Exhaust Emissions and MOT	18
3.4 Vehicle Excise Duty and Fuel Duty.....	19
3.5 Euro Six Emission Standard	19
3.6 Vehicle and Operator Services Agency	20
3.7 Parliamentary Audit Committee on Air Quality.....	20
3.8 Local and Regional Strategies and Mechanisms	20
3.8.1 The Local Transport Plan (LTP).....	20
3.8.2 The Sussex Air Quality Partnership	21
3.8.3 Planning Policy.....	21
3.8.4 Construction Traffic	23
3.8.5 Brighton & Lewes Biosphere and One Planet Concept.....	23
3.8.6 By Laws	25
3.8.7 Fixed Penalty Notices	25
3.8.8 Stationary Idling	25
4 Evidence	26
4.1 Traffic Data	26
4.2 Air Monitoring.....	28
4.3 Spatial Modelling	28
4.4 Roads above NO ₂ Limits.....	29
4.5 Interconnected Areas of Air Pollution.....	29
5 Strategy.....	30
5.1 Goals	30

5.2	Related Policy	30
5.2.1	Performance Indicators	31
5.2.2	Health and Wellbeing Strategy	31
5.2.3	Road Safety	31
5.2.4	Informal Park and Ride and Air Quality	32
5.2.5	Air Quality and Carbon Reduction	32
5.2.6	Brighton & Hove's Electricity Generation	33
5.2.7	Renewable Energy for Buildings and Transport	34
5.2.8	Policies that Promote Biomass Burning	34
5.2.9	Trees and Planting	34
5.3	Action Plan	35
6	Formal Equalities Impact Discussion.....	36
6.1.1	Car Use Differences	37
7	Addressing Contribution from Road Transport	38
7.1	Bus Transport Corridors	39
7.1.1	B2066 Castle Square-North Street-Lower Dyke Road-Churchill Square- Western Road	39
7.1.2	A23 Northbound Marlborough Place and London Road.....	41
7.1.3	A2010 Queens Road-Main Station-Surrey Street-Terminus Road-Buckingham Place and Bath Street	42
7.2	Mixed Transport Corridors	43
7.2.1	A270 (east of A23) Lewes Road: Elm Grove Junction to Vogue Gyratory and Lewes Road-Coombe Terrace	43
7.2.2	A23 Southbound Beaconsfield Road-Viaduct Road-Ditchling Road-St Peters and Grand Parade to Pavilion Parade.....	45
7.2.3	A259 Wellington Road to Kingsway	46
7.2.4	B2194 Boundary Road Level Crossing to New Church Road Junction.....	46
7.2.5	B2193 Trafalgar Road and Church Road, Portslade.....	47
7.2.6	B2118 St James Street	47
7.2.7	B2118 Rottingdean High Street from Marine Drive to Vicarage Lane	48
7.2.8	B2119 Trafalgar Street-Frederick Place.....	49
7.3	AQMA Streets with high NO ₂ and low contribution from buses.....	50
7.3.1	A270 (west of A23) Old Shoreham Road-New England Road plus Cheapside and New England Street	50
7.3.2	C-Road Edward Street and Eastern Road	50
7.3.3	A2023 Sackville Road Old North End	51

7.3.4	Hollingdean Road.....	51
7.4	Bus Low Emission Zone (LEZ)	52
7.5	Discussion about Low Emission Zone (LEZ) update	52
7.6	Funded Projects.....	53
7.7	Road Signage and Information Technology.....	53
7.8	Targeting Nitrogen Dioxide by Location.....	53
7.8.1	Streets with the highest ambient concentrations of Nitrogen Dioxide.....	54
7.8.2	Areas with high NO ₂ relevant to pedestrian exposure	55
7.8.3	Transport corridors with highest tally of dwellings at risk of exceeding	55
7.8.4	Streets with moderate emission rates to a restricted volumetric space.....	57
7.9	Taxi Licence Policy	60
7.9.1	Lower Emission rates favoured instead of vehicle age	60
7.9.2	Taxi Rank Policy	60
7.9.3	Taxi Anti Idling Strategy	61
7.9.4	Proposed Taxi Licence Conditions.....	61
7.9.5	Clean Vehicle Transport Fund Retrofits Tailpipe Tests for taxis.....	61
7.10	Fuel Strategy and Exhaust Treatment	62
7.11	Railways and Air Quality	62
8	Addressing Contribution from Non-Transport Sources.....	64
8.1	Development and Buildings	64
8.2	Hierarchy for Energy Provision on AQMA developments	65
8.2.1	AQMA Non Combustion Solutions	66
8.2.2	Combustion Preference Order for the AQMA.....	66
8.2.3	Summary of AQMA Fixed Combustion Plant Policy.....	67
8.2.4	Policy on Avoidance of Waste Burning	67
9	Community Involvement with Air Quality	68
9.1	Local Action Teams (LAT)	68
9.1.1	St James Street LAT	68
9.1.2	Rottingdean Parish Council.....	68
9.1.3	South Portslade Community Meeting.....	69
9.1.4	Terminus Road Queens Road North Street	69
9.1.5	North Laine.....	69
9.1.6	Preston Circus Community Meeting.....	69
9.1.7	Lower Old Shoreham Road New England Road	69
9.1.8	Lewes Road	69

9.1.9	A23 Southbound: Beaconsfield Road Viaduct Road-Viaduct Terrace- Ditchling Road-St Peters-Grand Parade-Pavilion Parade-Old Steine	70
9.1.10	Eastern Road and Edward Street.....	70
10	Educational Remit.....	70
11	Summary.....	70
11.1	Buses.....	71
11.2	Heavy Goods Vehicles	71
11.3	Diesel Cars	71
11.4	Taxis.....	71
11.5	Recommendations.....	72
12	Results from Formal Consultation on Air Quality Action Plan	72
12.1	Defra Review of the BHCC draft AQAP March 2015	73
12.2	Friends of the Earth Brighton & Hove	74
12.3	Bricycles, the Brighton & Hove Cycling Campaign	78
12.4	Brighton & Hove Food Partnership	81
12.5	West Sussex County Council	81
12.6	Lewes Road for Clean Air Community Group.....	82
12.7	Local Resident Comments (order received)	83
12.8	Summary Response to Consultation Comments	84
13	Appendix (separate pdf).....	108
13.1	Emission Assessment.....	108
13.2	Model Verification	108
13.3	Model Map Results with annotated road links	108
13.4	Traffic Source Apportionment	108
13.5	Photographs in the AQMA.....	108
14	References and Endnotes.....	108

List of Figures

Figure 1	Brighton & Hove and Portslade Air Quality Management Area.....	14
Figure 2	Rottingdean Air Quality Management Area	14
Figure 3	The Brighton and Lewes Biosphere.....	24
Figure 4	Brighton & Hove Distribution of Nitrogen Dioxide Recent Years.....	28

List of Tables

Table 4-1	Traffic Data for Key Road Links through the Air Quality Management Area	27
Table 7-1	Highest Nitrogen Dioxide in Brighton & Hove (Façade) Ordered by Transport Corridor.....	54

Table 7-2 AQMA Transport Corridors Sorted by the Count of Residential Dwelling at Risk of Exceeding Nitrogen Dioxide ($36 \mu\text{g}/\text{m}^3 \text{NO}_2$ annual mean)	56
Table 7-3 Hierarchy of AQMA Streets: Emission / Available volumetric Street Space.....	57
Table 7-4 Roadside Nitrogen Dioxide Minus Background Nitrogen Dioxide	59
Table 12-1 Air Quality Action Plan Summary Table (updated from 2014 Progress Report)	86

LAQM Glossary

Abbreviation	Explanation
$\mu\text{g}/\text{m}^3$	Concentration in micrograms per cubic meter
AAWT	Annual Average Weekday Traffic
ADMS	Atmospheric Dispersion Model System
AQ	Air Quality (ambient or outdoor)
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 and devolved administrations
A-HGV	Articulated Heavy Good Vehicles (see graph labels in the appendix)
ATC	Automatic Traffic Counts
BAM	Beta Attenuation Monitor particulate monitoring method
BHCC	Brighton & Hove City Council unitary authority
BQPA	Bus Quality Partnership Agreements
BREEAM	Building Research Establishment Environment Assessment Methodology
CBTF	Clean Bus Transport Fund (DfT)
CCTV	Close Circuit Television
CEMP	Construction Environment Management Plan
CO_2	Carbon Dioxide greenhouse gas
CH_4	Methane greenhouse gas and transport fuel
CIL	Community Infrastructure Levy
CRT	Continuous Regenerating Trap for tailpipe mitigation of particulate
CSH	Code for Sustainable Homes
CVTF	Clean Vehicle Transport Fund (DfT)
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
EFT	Emissions Factor Toolkit
EGR	Exhaust Gas Recirculation
EIA	Environmental Impact Assessment
EPR	Environmental Permitting Regulations
EU	European Union or EC European Commission
Euro	European vehicle tailpipe emissions standards set out for light

Standards	and heavy vehicles
Flywheel	Flywheel regenerative breaking or KERS
GIS	Geographical Information Systems
Greenhouse gas	Gas in the atmosphere that can absorb outgoing radiation
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
LAQM	Local Air Quality Management
LAT	Local Action Team
LDF	Local Development Framework
LDV	Light Duty Vehicle (van or pick up)
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
MOT	Ministry of Transport test for vehicles since 1991
NB	Northbound Carriageway
N ₂ O	Nitrous Oxide greenhouse gas
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen including NO and NO ₂
NPPF	National Planning Policy Framework
NSIP	National Significant Infrastructure Project
O ₃	Ozone near ground level
OLEV	Office of Low Emission Vehicles
OME	Original Manufacture Equipment (especially vehicles)
PAH	Poly Aromatic Hydrocarbons
PEMS	Portable Emission Monitoring System
PM ₁	Particulate Matter less than one micron or nano-particulate
PM ₁₀	Particulate Matter less than ten microns
PM _{2.5}	Particulate Matter less than two and a half microns
ppb	concentration parts per billion
ppm	concentration parts per million
R-HGV	Rigid Heavy Good Vehicle (more common than articulated)
RHI	Renewable Heat Incentive
ROC	Renewable Obligation Certificates
S106	Section 106 Funding under Town and Country Planning Act 1990
SA	Special Areas
SB	Southbound Carriageway
SAQP	The Sussex Air Quality Partnership sometimes referred to as Sussex Air

SCR	Selective Catalytic Reduction NO _x tailpipe abatement
SCRT	Selective Catalytic Reduction Technology used in conjunction with CRT
TEA	Triethanolamine in water method for NO ₂ diffusion tubes
TEOM	Tapered Element Oscillating Microbalance particulate monitoring method
TG(09)	LAQM Technical Guidance 2009
TRO	Traffic Regulation Order
ULSD	Ultralow Sulphur Diesel (10ppm since Dec-2007)
USA	Updating Screening Assessment air quality report
VED	Vehicle Excise Duty
VOSA	Vehicle Operator Services Agency
WAV	Wheelchair Accessible Vehicles

1 Introduction

Brighton & Hove is a vibrant centre for entertainment with a strong and diverse restaurant scene, an active nightlife economy and a burgeoning digital sector. The city has a successful track record with outdoor event management. Tourism attracts ten million visitors a year. Brighton & Hove's Air Quality Management Area has one of the highest population densities in the UK at close to ten thousand people per square kilometre (km²).

The Universities of Sussex and Brighton continue to grow and invest and develop in the city. Brighton & Hove is the southern pin in coast to capital Local Enterprise Partnership and has eight train stations. Bus use has doubled between 1994 and 2014 and commercial viable routes frequent the retail hub every few minutes.

For centuries coastal Sussex was sparsely populated by small farming and fishing villages. 175 years since the arrival of the railway urban growth has caught up with Britain's principal industrial areas.

The Brighton & Hove - Worthing - Littlehampton conurbation continues to show population growth above the national average.

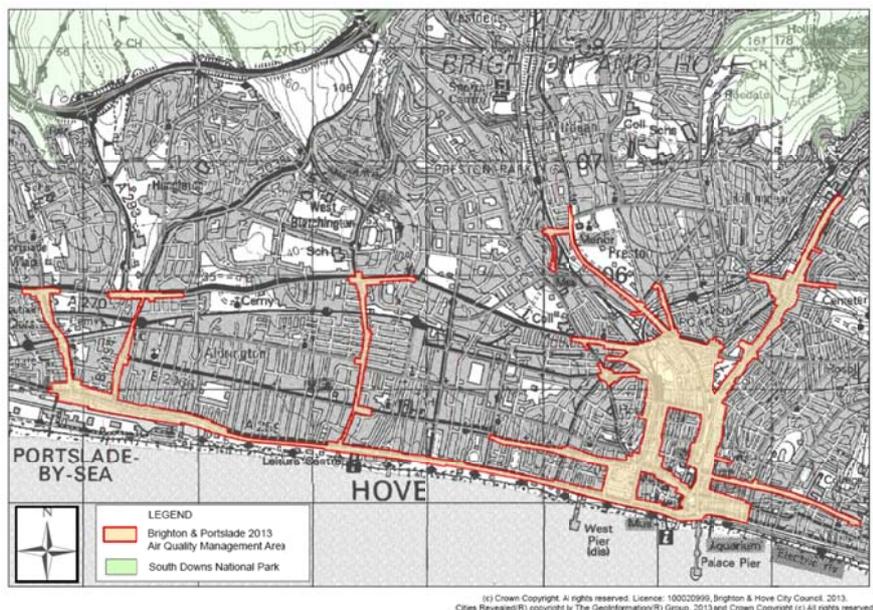
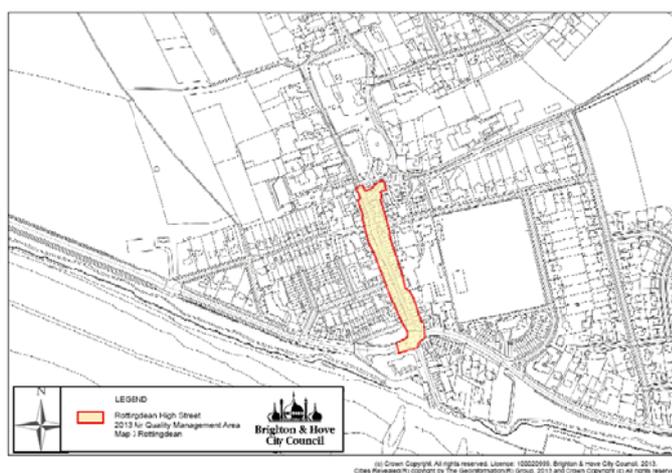
Brighton & Hove is likely to reach 300,000 around or shortly after 2020 and the continuous built-up area will surpass half a million. This new urbanisation has become an increasingly important part of England's economy.

The Greater Brighton City Deal signed with government in 2014 is to unlock £170 million pounds of funds for vital projects across the city region. The aim is create 8,500 local jobs and fulfil the city's potential as a higher performing economy.

Brighton & Hove area makes up part of the South Downs National Park. This is the UK's most recent national park designation (2010). Across the majority of the administrative area, air quality is very good and many families have moved to the Downs and Coast within the Brighton & Lewes Biosphere reserve for a better quality of environment. Since 2000 it has been established beyond any doubt that poor local air quality that exceeds European and English legally binding standards is due to road traffic. Concentrations of Nitrogen Dioxide (NO₂) vary substantially ten metres (thirty feet) back from narrow or busy roads. That said many residential and retail areas reside within a few metres (one to fifteen feet) of confined stopping-starting transport corridors. This is recognised as a serious issue for environmental health, most especially due to respiratory exposure to a mixture of airborne pollutants in gaseous and particulate phases.

1.1 The Air Quality Management Area (AQMA)

The centre of Brighton & Hove, parts of Portslade and Rottingdean are declared as an AQMA under part IV of the Environment Act 1995. The declaration is explicitly for non-compliance with short and long term nitrogen dioxide concentrations set out in the air quality strategy for England. [Figure 1](#) and [Figure 2](#) show the extent of the AQMA declared in 2013.

Figure 1 Brighton & Hove and Portslade Air Quality Management Area**Figure 2 Rottingdean Air Quality Management Area**

The legally binding concentrations set for annual and hourly periods are deemed to be acceptable in terms of what is known about the direct health effects of each pollutant¹¹. The annual average standard that is: $40 \mu\text{g}/\text{m}^3$ (forty micrograms per cubic meter), cannot be exceeded for both NO_2 and PM_{10} . The hourly standard for NO_2 is $200 \mu\text{g}/\text{m}^3$ and cannot be exceeded more than eighteen times in a calendar year. The 24-hour average of $50 \mu\text{g}/\text{m}^3$ PM_{10} (Particulate Matter less than ten microns) cannot be exceeded more than 35 days in the year. While the Local Authority's statutory duties are complied with for PM_{10} standards, further work is required to assess against new $\text{PM}_{2.5}$ objectives (Particulate Matter less than 2.5 microns)¹⁶.

1.1.1 History of Brighton & Hove's Air Quality Action Plan

The city has had an Air Quality Management Area (AQMA) since 2004. The AQMA was most recently modified in August 2013. At that time 75% of the area (700 hectares) was revoked. Improvement in nitrogen dioxide concentrations were recorded by continuous analysers over a decade at Hove Town Hall and for three years at Beaconsfield Road

(north of the railway viaduct). This most recent AQMA¹² declaration under part IV of Environment Act 1995 has triggered statutory requirement for this action plan.

Brighton & Hove's first Air Quality Action Plan was written in 2006 with a second edition available for consultation in 2011. Since the earliest stages of Local Air Quality Management (LAQM 1990s) it has been acknowledged that air pollution in this city is dominated by emissions from road traffic. In recent years central government has praised the LAQM regime for determining where pollutants exceed the standards, but has criticised it for not improving local pollution enough. From the beginning, the Air Quality Action Plan has been linked with the Local Transport Plan (LTP). The AQAP presents results from monitoring and modelling that presents evidence of where nitrogen dioxide is most severe and this can be used to guide transport priorities and projects.

1.1.2 Air Quality Action Plan Progress

Since the last action plan was edited there has been considerable progress in implementation of local measures to improve air quality. The bus low emission zone has been implemented with a Traffic Regulation Condition (TRC) in 2015. Almost one million pounds has been won from the Department for Transport (DfT) for bus and minibus taxi retrofits. Local engineering firm Ricardo has carried out on board testing of local buses to assess real time emission rates along the number 7 bus route. Press and TV have been increasingly interested in the actions the city council is taking to improve local air quality and public awareness of health and environmental issues are on the increase. The revised strategy builds on past LTP initiatives to promote more sustainable travel choices. The new Air Quality Action Plan takes account of new understanding of the local traffic dynamic including tallies and the ratios of bus, freight, taxi, van, diesel car and petrol car traffic. Also considered in detail is the spatial distribution of exhaust pipe emissions relative to confined spaces and ambient concentrations.

2 Health Impacts

Recent research shows that airborne pollution has direct impacts on human health⁵. Poor air quality can reduce quality of life, causing health problems especially in vulnerable people such as neo-natal infants, young children and adults with sedentary lifestyles, the elderly or those with existing conditions. Exposure to pollution during pregnancy can slow lung development and contribute to low birth weight¹³. The evidence shows linkages between dose and exposure to air pollution and effects on circulatory and respiratory health such as COPD (chronic obstructive pulmonary disease), asthma, reduced lung function, bronchitis, pneumonia, hypertension and lung cancer. New research from the University of London suggests nitrogen dioxide has independent health effects from particles and linkages with diabetes, heart disease, stroke and reduced lung growth in children. Professor Frank Kelly, lead scientist on air quality recently said "Breathing and eating keep us alive; we would not eat contaminated food we know is bad for us, why breathe contaminated air that is also bad for us?"¹⁴

Modern sanitation was a major breakthrough for environmental health as it massively reduced the risk of exposure to cholera, typhoid and e-coli. A similar societal shift now needs to happen in urban areas to separate combustion emissions being discharged to

the actual environment where thousands of people, live, sleep, work, and travel. Repeated exposure to very fine microscopic particles that penetrate deep into the respiratory tract and enter the blood stream can cause myriad health problems and serious risk of death.

That said local monitoring shows nitrogen dioxide is now the most plentiful pollutant (harmful to health) in the local environment. Diesel particulate traps can produce extra NO₂. NO₂ emissions can be eight times higher than fine particles. In the ambient roadside environment NO₂ can be many more times concentrated than Particulate Matter (PM_{2.5})¹⁵. Pollution in the gas phase is more likely to ingress into vehicles and buildings where it will be inhaled. Mitigation of particles to the detriment of nitrogen dioxide is not a solution moving forward. Since pollutants in the gas and particulate phases are often emitted from the same sources and mix within urban streets it is this mixture of pollutants that is most likely to impact on health.

International evidence suggests population life expectancy is shorter in areas with higher pollution. The Air Quality management area is a health deprivation hotspot and further details on how this compares with whole city and England averages are given in section 6.

2.1 Health Effects of Nitrogen Dioxide

Nitrogen dioxide is a respiratory irritant associated with both acute (short-term) and chronic (long-term) effects on human health. Repetitive exposure can inhibit lung tissue growth and repair increasing the risk of poor respiratory health later in life. Some of the research evidence suggests chronic exposure can make the respiratory tract more susceptible to disease including allergens. Children under six (especially infants born early) and people with existing respiratory illnesses such as asthma and bronchitis are more vulnerable to repeated inhalation of nitrogen dioxide. Nitrogen Dioxide (NO₂) and Nitric Oxide (NO) are both Oxides of Nitrogen (NO_x). In the atmosphere oxides of nitrogen also lead to the formation of other pollutants such as ground level ozone and nitrates and particulate matter.

All combustion processes in air produce NO_x emissions. Heat during combustion breaks the binary bonds of ambient Oxygen molecules (O₂) releasing energy and allowing freed Oxygen atoms to oxidise plentiful atmospheric Nitrogen. 25 to 55% of NO_x emissions from vehicles are readily formed as nitrogen dioxide prior to discharge from the tailpipe. This exhaust gas is referred to as primary NO₂. The remaining Nitric Oxide will convert to nitrogen dioxide, in the atmosphere mainly as a result of reaction with ozone in the presence of sunlight. It is nitrogen dioxide that is associated with adverse effects upon human health.

In theory NO_x emissions can be mitigated by after-burning devices or recirculation of exhaust gasses.

2.2 The Committee on the Medical Effects of Air Pollutants (COMEAP)

The committee on the Medical Effects of Air Pollutants (COMEAP)⁵ is a group of independent experts that provides guidance to government. COMEAP advises on the health impacts associated with exposure to air pollution such as; shortening of life span,

worsening of respiratory disease (COPD, asthma and bronchitis), acute symptoms (such as wheezing, coughing and respiratory infections) and increased risk of cancers.

2.3 Health Directorate in Local Authorities

Elements of the National Health Service have now transferred to the City Council. This has helped integrate wider determinants of health into City Council planning, reporting and delivery. Public Health Outcome Framework compiled by the Department of Public Health includes an indicator for air quality and local authorities are expected to plot progress moving forward. The framework includes a benchmark tool which compares the fraction of mortality attributed to long term fine particulate exposure for each local authority. The framework suggests that between 5 and 6% of mortality in Brighton & Hove is attributable to long term exposure to PM_{2.5}; a slightly higher level compared with the national average. However the framework is not married up with the findings of Local Air Quality Management regime (LAQM Environment Act 1995) including the detailed mapping of pollutant concentrations over the local authority area.

Over the past two years Brighton & Hove has included a section on air quality in the Joint Strategic Needs Assessment (JSNA, Health and Social Care Act 2012) and the Annual Report of Public Health. The JSNA integrates multidisciplinary working to deliver priorities to improve health and wellbeing outcomes for local communities. The aims are to promote greater inter departmental collaboration between local authority services to help insure depleted resources are targeted where they will achieve the most benefit. The air quality remit within the Environmental Protection Team is now part of the Directorate of Public Health and City Council staff jointly work with those from the NHS.

3 Policy and Legal Framework

3.1 National Strategy

Details of the English Air Quality Strategy (AQS) are set out in the previous local Air Quality Management Report i.e. the 2014 Progress Report¹⁵. The national AQS is partly based on European Directives to control levels harmful to human health. EU Directive 2008/50/EC on ambient air quality simplified and consolidated the previous directives.

The EU air quality directive became English law under Part IV of the Environment Act 1995 which required publication of the AQS and established LAQM. Where the AQS standards for pollutants are not being met the local authority has statutory duty to declare an Air Quality Management Area (AQMA). Eighteen months after declaration of a new AQMA the authority should deliver an Air Quality Action Plan (AQAP) setting out how air quality will be improved especially for the area(s) and pollutant(s) identified.

Air quality standards have been set with regard to the public health impacts of exposure to pollutants. In 2010, annual and hourly objectives for nitrogen dioxide in ambient air became legally binding standards. Since that time, many towns and cities across the UK and Europe continue to exceed the same standard. This action plan presents in detail where nitrogen dioxide compliance is an issue within the local authority area and

apportions contributing emission sources. At the same time the council has a statutory requirement to have a Local Transport Plan (LTP).

A comprehensive set of policy measures is presented for how improvement can be achieved with the aim of compliance with nitrogen dioxide at $< 40 \mu\text{g}/\text{m}^3$ throughout the city as soon as practically possible. Failure to meet the legally binding standard after 2015 could lead to the government / local authority facing legal action from various parties. In that scenario environmental health risk becomes a business and legal risk. It is therefore increasingly important that the local authority does all it can to reduce nitrogen dioxide concentrations that are more than twice the legal standard in some areas. At the same time consideration is given to the levels of fine particulate matter $\text{PM}_{2.5}$ at roadside and at background locations relative to the 2020 objective¹⁶.

3.2 Urban Access Regulations

Historical cities, towns and villages can struggle with liveability, congestion, air polluting traffic noise and accessibility. In the worst case scenario this is not attractive to residents, business or tourists. Local people want to improve the environment where they live. There are many ways to tackle these issues, including reduction in the number of short car journeys, promotion of walking and cycling, public transport priority, car share, car clubs and taxis, best planning practice, low emission vehicles, coordination of traffic light phases and parking charges that are proportional to urban density and demand.

Cities in many countries now charge for vehicles to enter a designated area¹⁷. Low Emission Zones (LEZs) only allow vehicles that pass determined standards into an area and the euro emission standards strive to improve with time¹⁸. Physical restriction schemes limit vehicles by height or weight and where routes have limited load bearing or low bridges avoidance routings are signposted and known to navigations systems and the haulage industry. The key access regulations limit road traffic to short stay loading or access. As example new transport scheme limits vehicle access to Brighton's Old Town¹⁹ and the city has one of the UK's first bus Low Emission Zones²⁰. Locally compliance with air quality standards in an air quality management area is paramount.

3.3 Exhaust Emissions and MOT

The Road Vehicles (Construction and Use) regulations govern the standards to which new motor vehicles must be manufactured, including standards for exhaust emissions and particulate traps. From 2014 MOTs check to see if the Diesel Particulate Filter (DPF) canister is present. This is applicable where the vehicle's original manufacture emission certificate relies on an effectively working filter²¹. It can be an offence to tamper or remove the DPF. A number of companies offer removal of DPF leaving an empty case in situ on the exhaust line. Such illegal actions may have compromised the effectiveness of the London Low Emissions Zone (LEZ) to mitigate fine particulate. That said the government requires a review of its policy in this area because DPF without insulated selective catalytic reduction is likely to be worse for urban emissions for nitrogen dioxide from diesel vehicles.

Vehicle exhaust tests have been included in the MOT since 1991. At that time the Ministry of Transport test was driven by road safety considerations and was nothing to do with air

quality. In practice the simple (not very stringent) test can be passed legally by a garage, but out and about in the real world the vehicle can continue to contribute to pollution (visible or invisible). The Vehicle & Operator Services Agency (VOSA) carries out roadside tests on heavy vehicles and can ban further use of a smoking vehicle until it has been adjusted or repaired. However, only the police have the powers to stop a vehicle on the road if it is producing so much smoke as to be a hazard to other drivers. Historically this power relates to road safety; to insure no fire risk and reasonable visibility for all road users. This power does not directly relate the airborne pollution impact on road users or those living adjacent to the road.

3.4 Vehicle Excise Duty and Fuel Duty

Diesel fuel used for transport has better Miles per Gallon (MPG) and lower carbon dioxide (CO₂) emissions compared to petrol. For this reason it has been actively encouraged by government through company car tax breaks and Vehicle Excise Duty (VED). Due to the sometime discrepancy between forecourt prices of diesel and petrol fuel savings are unlikely to be realised except for the highest mileage vehicles. Diesel vehicles make up the vast majority of high mileage vehicles and therefore the most frequent road users. From 2011 the UK sale of diesel cars outstripped the sale of petrol cars for the first time. Fuel consumption by diesel cars and vans in Brighton & Hove has surpassed that of petrol cars and vans. We estimate that >60% of frequent private car and van usage is diesel; a substantial increase since 2005. On most roads links in the AQMA; HGV, bus and car diesel fuel usage dominates and petrol vehicles are the minority. Emissions of oxides of nitrogen and fine particles from diesel engines have been considerably higher than for an equivalent petrol car. The refining of diesel to extract sulphur from crude oil is an energy intensive process. In reality it has been difficult to quantify the carbon benefits of a modal shift to diesel fuel. MPs have publicly acknowledged that marketing diesel engines as environmentally friendly was the wrong policy and this has not helped local authorities meet their air quality targets¹⁴. This action plan welcomes a review of vehicle excise bandings to take account of oxides of nitrogen as a matter of urgency. This would help and encourage the public to make informed choices when buying vehicles. In the past five years fuel duty for motorists has declined in real time as the cost of rail fares has increased substantially. The action plan recommends that fuel duty is linked more closely with roadside environmental impact and tax breaks and incentives are encouraged for new and efficient petrol and hybrid.

3.5 Euro Six Emission Standard

The EU expects great improvements with NO and NO₂ emissions with the new euro-6 diesel standard that applies to all new vehicles from 2014¹⁶. It is not impossible to produce diesel vehicles with low emissions of oxides of nitrogen. However, since the 1990s ambient monitoring and tailpipe testing have taught us not to expect silver bullets from new euro emission standards. The majority of vehicles on the road are likely to remain pre-euro six diesels well into the 2020s. In some places, emissions from euro five diesels are significant contributors to high levels of ambient nitrogen dioxide. Delivery of truly low NO_x diesel engines and exhausts at 5 mph is likely to be difficult in practice. The challenge arises because many AQMAs have changeable stop, start, traffic environments. These are exactly the places where it is difficult to optimise diesel tailpipe exhaust line temperatures

and the effectiveness of abatement equipment to stop both NO and NO₂. In essence this is the reason why roadside NO₂ levels continue at concentrations above the legal standard (40 µg/m³). NO_x vehicle fleet tailpipe emissions (NO and NO₂) need to reduce by three-quarters in order to see a much more modest reduction in outdoor concentrations of NO₂. Vehicle retrofits have sought to insure optimisation of exhaust pipe temperatures on local drive cycles and it is important that original manufacture equipment has actions in place to do the same.

3.6 Vehicle and Operator Services Agency

Smoky buses, coaches and lorries can be reported to the VOSA (0870 606 0440). Following a complaint the operator is notified and requested to clean up their vehicle. There is currently no mechanism for reporting privately owned cars and vans.

3.7 Parliamentary Audit Committee on Air Quality

A number of times in recent years the House of Commons Parliamentary Audit Committee has met and published reports and updates on air quality in the UK⁹. The reports have included evidence which estimated the number of UK deaths attributed to air pollution at a national level. Local Authorities have been urged to do more to tackle poor air quality in their areas. The Localism Act reflects Government's desire to see a more local focus and responsibility for air quality. This makes sense given that most nitrogen dioxide AQMAs have strong associations with emissions from local transport that are typically linked to one or two transport corridors or a network of connected town centre streets.

3.8 Local and Regional Strategies and Mechanisms

3.8.1 The Local Transport Plan (LTP)

LTP4 (2015) acknowledges that air quality is a strategic issue that can be addressed through investment and behavioural change with cross over to the transport plans of East and West Sussex. This AQAP can reflect the new strategy and assist in identifying and developing possible interventions. Traffic and dispersion modelling can also assist in testing solutions. Existing policy also guides priorities. LTP4 includes a number of high level goals that reflect the broad range of outputs that the government expects local transport to support and deliver when investing capital grant funding. These are:

- Grow the Economy
- Reduce Carbon
- Increase Safety & Security
- Provide Equality, Mobility & Accessibility
- Improve Health & Well-being
- Enhance the Public Realm
- Encourage Respect & Responsibility

The goals are consistent with earlier inceptions of LTP and are supported by more detailed, transport objectives consistent with local strategies that have been reviewed and/or approved by the council. LTP has helped to assist quality bus partnership, better

bus corridors, the green bus fund, smart transport ticketing and improvements to the urban realm for city parks and concourses, pedestrians and cyclists.

Data and statistics such as the city's regularly updated address gazetteer (more recent than the last census) traffic and pedestrian counts and the city's annual Joint Strategic Needs Assessment can help guide priorities. Road traffic emission assessment, dispersion modelling, air monitoring and source apportionment will become key evidence streams moving forward. The AQAP recommends that evidence submitted can help support a mandate for the transport authority to implement intervention measures. In some cases temporary trialled traffic diversions may save time and costs and assist understanding and acceptance of how the AQMA bottlenecks can be eliminated.

Compliance with air quality law is a criterion that is distinguishable from carbon reduction and is more specific than a general health and wellbeing strategy. It is recommended that recent information such as the detailed appraisals presented in this report guide future government transport priorities. We urge the Department for Transport supported by Defra and others to update their overarching transport goals so that air quality assessment and improvement is a paramount requirement for transport schemes in AQMAs.

Where transport schemes seek to alter the primary transport corridor(s) in an AQMA a detailed air quality assessment shall offer guidance to proposed changes with the express aim of reducing concentrations of the declared pollutant. It will not be sufficient to demonstrate no adverse impact. Predicted improvements in severity and extent of pollution will need to be quantified scientifically. Transport schemes are often devised to address a number of inter-related wider issues rather than a single problem. Final decisions can therefore reflect a balancing of outcomes against initial objectives.

3.8.2 The Sussex Air Quality Partnership

The Sussex Air Quality Partnership (SAQP)²² comprises all the Local Authorities in Sussex, The University of Brighton & Hove, the University of Sussex and the Environment Agency. The group can be a forum to discuss the impact of developments across local authority boundaries. Recently the bus company have participated in meeting and discussions about Air Quality Action Plan measures. The group has organised initiatives such as the Sussex Low Emission Strategy, Air Alert a new network of rapid electromotive charging points and the Sussex Air Quality and Emissions Mitigation Guidance²². The future funding of the group is to be decided.

3.8.3 Planning Policy

Air quality is a material consideration for the planning process under the National Planning Policy Framework (NPPF). The Submission City Plan Part One²³ sets out the overall visions and objectives for spatial planning and new development in Brighton & Hove to 2030. The following strategic objectives are relevant to the AQAP:

- SO11 Principles of healthy urban planning and ensures pollution is minimised and actively seek improvements in air quality. The objective aims to provide an integrated, safe and sustainable transport system to improve air quality, reduce congestion, reduce noise and promote active transport

- SO22: Promote and Provide sustainable transport across the city apply the principles of health urban planning... Ensure pollution is minimised and actively seek improvements in water, land and air quality and reduce noise pollution

The City Plan Part 1 identifies a series of Development Areas (DA) and Special Areas (SA), the following are concurrent with the AQMA as follows:

- **DA1 Brighton Centre and Churchill Square Area** – an identified priority for the area is to improve local air quality
- **DA3 Lewes Road Area** – an identified priority for the area is to improve local air quality
- **DA4 New Quarter England and London Road Area** – an identified priority for the area is to improve local air quality
- **DA5 Eastern Road and Edward Street Area** – an identified priority for the area is to improve local air quality
- **DA6 Hove Station Area** - paragraph 3.70 of the supporting text reference air quality issues at the junction of Sackville Road and Old Shoreham Road.
- **DA8 Shoreham Harbour Area** – reference in the relevant area priorities to the need to improve air quality
- **SA1 The Seafrost** – an identified priority in the policy is to improve air quality along A259
- **SA2 Central Brighton** – recognises in the policy the need to improve air quality (see paragraph 2.115 also).
- **SA3 Valley Gardens** – recognises in the strategy the need to improve air quality

The following city wide policies address air quality issues:

- **CP8 Sustainable Buildings** - k) all new development are required to demonstrate how they reduce air, land and water pollution. Policy also encourages higher standards of energy efficiency and reduction in greenhouse gas emissions
- **CP9 Sustainable Transport** - sets out the priorities and measures to manage maintain and improve travel and movement. Paragraph 4.97 recognises that addressing air quality issues caused by road transport is a key priority.
- **CP13 Public Streets and Spaces** - includes a reference to tree planting in the policy although this does not directly reference air quality
- **CP18 Healthy City** - promotes the role of planning in supporting healthier lifestyles and reducing health inequalities and air quality is identified in paragraph 4.196 as a determinant of health. Health impact assessments or ensuring developments maximise positive impacts on health would require issue of air quality to be addressed by developers.

Policy **SU9 Pollution and Nuisance Control**; the adopted Brighton & Hove Local Plan sets out the detailed development management policy regarding air quality. Development that may be liable to cause pollution and or nuisance to land, air or water will only be permitted where:

- Human health and safety, amenity, and the ecological well-being of the natural and built environment is not put at risk
- It does not reduce the planning authority's ability to meet the Government's air quality targets
- It does not negatively impact upon the existing pollution and nuisance situation

All proposed developments that have a potential to cause pollution and neighbourhood nuisance, will be required to incorporate measures to minimise the pollution and nuisance and may invoke the need for an Environmental Impact Assessment (EIA). Where appropriate, planning conditions will be imposed and / or a planning obligation sought in order to secure the necessary requirements. Planning permission will only be granted for development on a site adjacent to an existing pollution / nuisance generating use and / or within an air quality 'area of exceedance' or potential 'hot spot' where:

- The effect on the proposed development, its occupiers and users will not be detrimental; including where a development may introduce future residence to an area of known poor air quality
- The proposed development will not make the pollution and / or nuisance situation worse and where practicable, helps to alleviate the existing problem(s) by avoiding adverse change

3.8.4 Construction Traffic

In addition to operational impacts of new development an assessment or commentary is required in order to minimise the impact of construction traffic via Construction Environment Management Plans (CEMP). In most cases there are few routing options to and from construction sites or consolidation centres. Avoidance of the AQMA whilst preferable may be unrealistic. Construction traffic must minimise its impacts on residents (emissions, noise and vibration). Agreed route plans must have regard to roadside nitrogen dioxide concentrations where people live; the AQMA roadside dwelling counts in the area exceeding the Air Quality Strategy and the available volumetric spaces listed in this report. In some cases A-roads may not be the best environmental option.

From 2015 major construction sites in or adjacent to the AQMA have building periods ranging from one summer to ten years. In line with the aims of the Considerate Constructor's Scheme (CCS)²⁴ and the office of the low emission vehicles it is recommended that funds are explored for initiatives for lower emission HGV. This could enable cleaner vehicles shuttling to construction sites or consolidation centres potentially implemented via; assisted purchase of new trucks, hybrid, ethanol or vegetable fuel or funded retrofits to at least euro-6 standard.

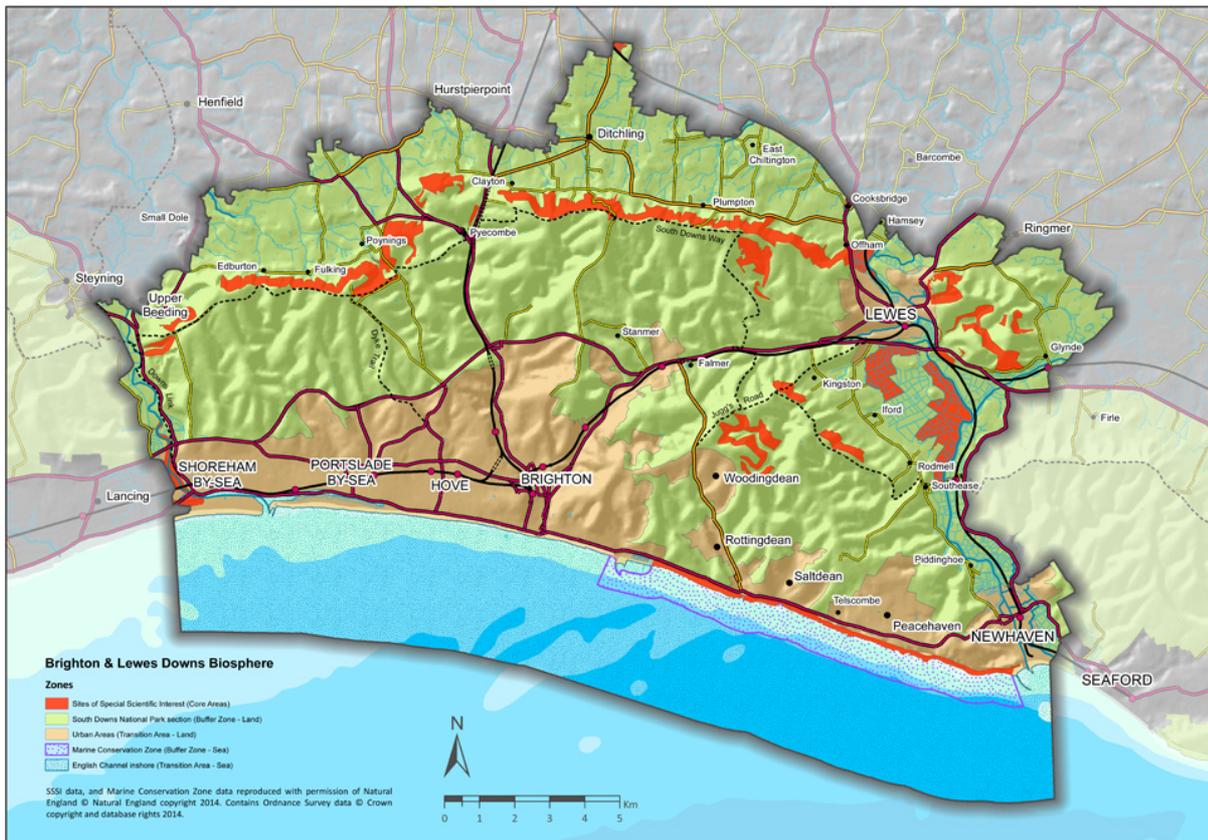
3.8.5 Brighton & Lewes Biosphere and One Planet Concept

Brighton & Hove has been designated a One Planet City²⁵. The city's Sustainability Action Plan received accreditation from sustainable development charity Bioregional for its plans to enable residents to live well within a fairer share of the earth's resources. One planet's ethos encourages low carbon forms of transport to reduce and avoid

emissions and the need to travel for example home working and flexible commuter times.

The Biosphere Reserve is a “green lung” for the city and includes protected habitats for wildlife and for people as part of a work and recreational life balance. The area of the biosphere with its designated natural sites and diverse habitats is presented in Figure 3.

Figure 3 The Brighton and Lewes Biosphere



The Brighton and Lewes Biosphere aims to create a future where it’s easy, attractive and affordable for all of us to lead happy and healthy lives, using a fair share of the earth’s resources with access to open environments and nature for leisure, recreation, physical activity and a space for respite and better mental health.

Brighton & Hove City Council is working towards shaping ‘One Planet Living’ to boost the local economy while becoming more resistant to price hikes in energy, fuel and food, and foster a more equal and healthy city.

The Air Quality Action Plan compliments One Planet Living and shares harmonious objectives for waste reduction, energy efficiency and renewable energy. However statements in the Air Quality Action Plan go further, as follows:

- Low carbon vehicles deployed to the Air Quality Management Area must prioritise ultralow emissions of oxides of nitrogen and fine particulate matter
- Any parking exemption for low carbon-taxed vehicles must consider local emissions of oxides of nitrogen and particulate

- Low emission zones require best available techniques for emission standards for oxides of nitrogen and fine particles
- Anti-idling vehicle policy
- Detailed emission, dispersion modelling and space assessments to determine priorities for emission reduction along identified AQMA transport corridors
- Action plan measures prioritised by transport corridor outlined in section 7.
- The BREEAM code for sustainable homes recommends low NO_x emissions from boilers
- The government has withdrawn the Code for Sustainable Homes (CSH) and will be dealing with some aspects of the code through the Building Regulations
- The Air Quality Action Plan seeks to go further avoiding combustion processes in the AQMA and aims for ultralow NO_x emissions from boilers on new developments
- Commercial solid fuel burning including biomass is not an appropriate solution in high density areas of the city especially the AQMA and the Smoke Control Areas (SCA declared under the Clean Air Act 1968)

3.8.6 By Laws

Some local authorities have adopted specific by-laws to control sources of air pollution and nuisance. However, these can be hard to enforce as surveillance is often difficult and the culprit hard to track down. Often the nuisance has ceased by the time an official can get to the scene. Brighton & Hove has no such duty in place. Oxides of nitrogen emitted by road traffic are invisible and can be odourless.

3.8.7 Fixed Penalty Notices

Where an Air Quality Management Area (AQMA) has been declared, local authorities in England and Wales can apply for powers to carry out roadside emissions testing under the Road Traffic (Vehicle Emissions) (Fixed Penalty) (England) Regulations 2002.

Authorised and adequately trained persons can then carry out an emissions test on a vehicle being driven through or about to pass through, an AQMA and if an offence has been committed a fixed penalty of £60 can be issued. A driver can also be required to submit their vehicle to a test and to produce a test certificate. If the fixed penalty is not paid within the given timeframe it can rise to £90. The council has not enforced this regulation to date and would prefer to seek more substantial funds from the department of transport and the office of low emission vehicles to test public service vehicles such as buses, taxis, emergency services, and also retail haulage and construction traffic.

3.8.8 Stationary Idling

Fixed penalty notices of £20 can also be issued by an authorised local authority officer in England, Wales and Scotland to motorists who leave their engines running unnecessarily (e.g. waiting outside school/station), having asked them to switch them off. This rises to £40 if it is not paid within the given timeframe. Engine idling is an offence most especially outside flats and houses in the AQMA. The council would prefer to reasonably ask coach

and taxi drivers to switch off their engines rather than issue a fine. If this continues to be an issue the government may wish to consider a deterrent that is proportional to the offence which can be quite serious in some cases. Reasonable exemptions may have to consider cab heating in the coldest conditions. By their nature, taxi ranks move forward as clients arrive; marshalled ranks could usher clients to the next available taxis so they don't have to keep engines on prior to departure.

4 Evidence

The action plan builds on a series of Defra funded grants that have helped support the council to investigate air quality in its area. The following lines of enquiry provide robust evidence in support of a multidisciplinary series of measures to improve air quality:

- Ambient monitoring at roadside and background locations in and around the AQMA over two decades
- Vehicle emissions analysis using the latest emission factor toolkit to produce a comprehensive emission inventory
- Dispersion modelling and mapping of pollutants
- Source apportionment to determine which vehicle categories contribute most to NO₂ concentrations above legally binding limits
- Portable Emission Monitoring System (PEMS) to determine real tailpipe emission of buses and taxis in the local area

The key areas of focus are to determine:

- The emission rates that lead to higher levels of ambient NO₂ close to roads
- Identify when and where dispersion of vehicle emission is likely to be inhibited
- Establish the number of dwellings that exceed the NO₂ limit value in different streets and transport corridors that are listed under section 6.
- Comment on the severity of NO₂ exceedance and the amount of improvement required to work towards compliance
- Determine a series of measures (current and proposed) that will deliver the required reduction in ambient NO₂

4.1 Traffic Data

The Environmental Protection Team has prepared traffic data for emission and dispersion model assessment. The traffic data total is expressed as Annual Average Weekday Traffic (AAWT 24hr) and is representative of a typical or average weekday. Most assessed locations use results from weight sensitive carriageway counters averaged over a whole calendar year (2011-2013). Where these are not available manual 12-hour counts have been factored to 24-hour equivalent. A summary of the most important road links for the AQMA is given in Table 4.1.

Table 4-1 Traffic Data for Key Road Links through the Air Quality Management Area

Road Link	Mbike	BUS	LGV	All Cars	All HGV	AAWT
Kingsway A259	725	245	4315	32243	730	38258
Old Shoreham Road, Portslade A270	244	318	1578	26476	989	29605
Pavilion Parade A23 2ways	519	2011	1289	24189	961	28969
Marine Drive A259	244	325	6642	20229	694	28134
Preston Road nr Preston Drive A23	94	111	887	23178	789	25059
Lewes Road A2070	250	837	1394	20518	579	23578
Lewes Rd A2073	389	1035	3181	17697	776	23078
Wellington Road A259	161	328	1329	18303	916	21037
Edward Street-Eastern Road C-Road	405	466	1036	14760	333	17000
Hollingdean Road C-Road	75	53	955	15442	321	16846
New England Road A270	208	44	969	14905	287	16413
Beaconsfield Road A23 Southbound	167	149	750	13672	537	15275
Trafalgar Rd B2139	191	280	2200	10910	861	14442
Rottingdean High Street B2123	83	116	814	12943	306	14262
Preston Road A23 Northbound	352	220	681	12332	488	14073
Grand Parade A23 Southbound	224	233	638	11089	463	12647
The Drove-South Road C-Road	235	239	630	10799	421	12324
Queens Road A2010	123	721	811	9346	182	11183
Terminus Road A2010	131	403	650	9689	251	11124
Marlborough Place A23 Northbound	271	1090	612	7234	164	9371
Western Road B2066	215	1233	429	5819	418	8114
Cheapside A270	158	292	383	6063	124	7020
Station Road B2194	57	686	1121	4179	367	6410
North Street B2066	92	2344	982	2289	344	6051
Trafalger Street B2199	37	74	579	1886	21	2597
St James Street B2118	54	347	218	1458	39	2116

For simplicity selected road links and vehicle categories are included. In practice eight vehicle categories have been assessed. The car counts have been sub split into; diesel cars, taxis and petrol cars. The Heavy Goods Vehicles (HGV) have been divided into rigid and articulated trucks. This is important for local air quality assessment as the various vehicle categories have very different emission rates.

National and local data indicates a rapid increase in motor traffic between 1920 and 1939 and again 1950 to a peak around 2007/8. Since that time there is evidence that on some local roads annual average cars movements have shown slight declines.

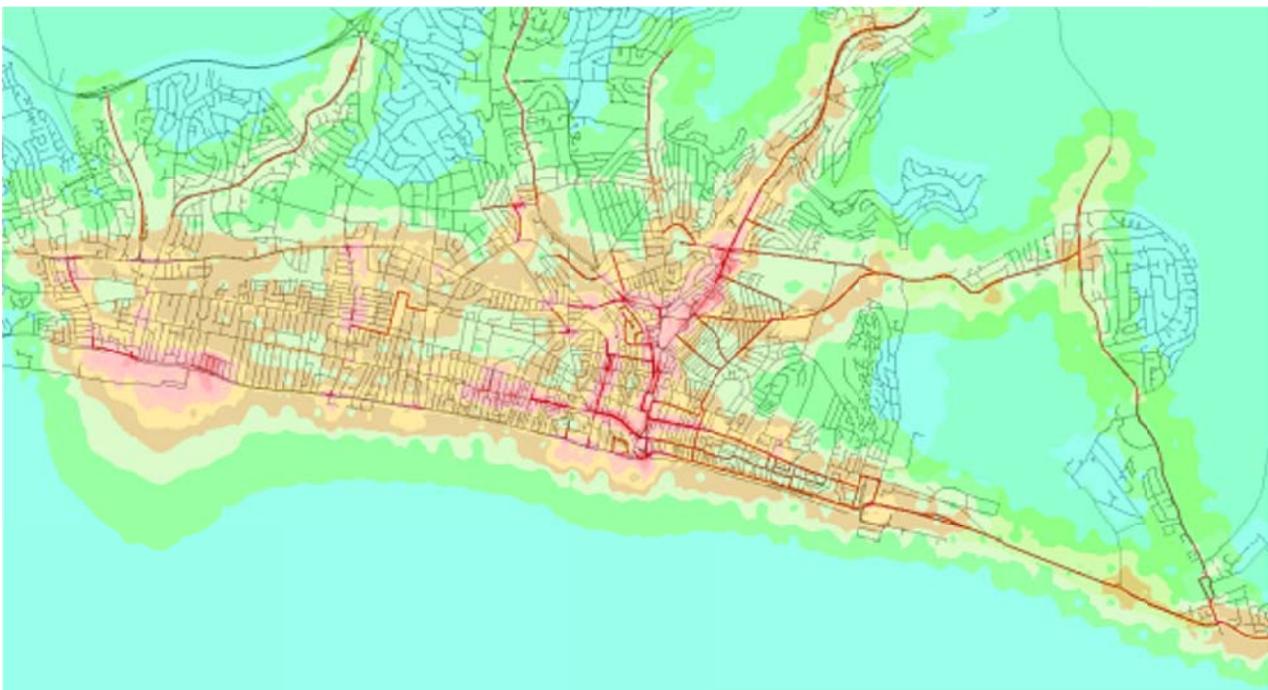
4.2 Air Monitoring

Details of the air monitoring carried out in Brighton & Hove are set out in previous LAQM reports. Archive and active monitors cover some one hundred sites across the city. Long term data over twenty years is invaluable in helping us to understand the distribution of past and current pollutant concentrations. PM₁₀ monitors show compliance with all standards and monitors now focus on PM_{2.5} due to strong linkages with the new health framework. Nitrogen dioxide results have showed an improvement around the fringe of the current AQMA justifying substantial revocation of the former AQMA in 2013. Stubborn exceedance of nitrogen dioxide continues along identified transport corridors within the currently declared area. Long term monitoring of nitrogen dioxide strongly suggests concentrations have been consistent for several years (2007 to 2013) with the exception of 2010 which had higher concentrations. This was probably because of the coincidence of successive cold winters during January and December of that calendar year. It is normal for a calendar year to have one or zero cold still periods that may influence regional nitrogen dioxide. The annual monitoring results help to verify maps of nitrogen dioxide.

4.3 Spatial Modelling

In support of the council's statutory duties (under LAQM) pollutants have been mapped in and around two separate AQMAs declared in 2013, results of the further review and assessment are integrated into this action plan. Further details on assessment methodologies are given in the last detailed assessment⁷. Automatic Traffic Counts (ATC) has been used to derive emission calculations for 350 local road links from the latest version of the Emission Factor Toolkit²⁶. The emission rates are used to spatially predict pollutant concentrations using the Atmospheric Dispersion Model System ADMS-Urban²⁷. This enables the council to assess air pollution throughout the city and not only where there is monitoring as depicted in [Figure 4](#).

Figure 4 Brighton & Hove Distribution of Nitrogen Dioxide Recent Years



The highest concentrations of pollution over the past decade occur along recognised transport corridors that usually have slow stop-start traffic flow (at <10 kph) and a high proportion of diesel vehicles, combined with restricted volumetric space between building flanking the street. The action plan assesses these distinguished areas in detail. The majority of these linear transport corridors are linked together as one AQMA as opposed to a series of separate pollution hotspots exceeding the nitrogen dioxide standards. Further details, higher resolution maps and explanations of the concentrations are presented in the appendix.

4.4 Roads above NO₂ Limits

Defra's national models of air quality showed good agreement with Brighton & Hove's further assessment of air quality published in 2010 in the sense that both studies stated that for some (but not all routes) through the AQMA, buses were the dominant contributors to ambient nitrogen dioxide. For the purposes of the Air Quality Action Plan (AQAP) the AQMA can be divided up into three distinguished categories as follows:

Transport corridors where nitrogen dioxide exceedance is due to:

- 1) Emissions from buses along public transport corridors
- 2) Emissions from mixed traffic; Heavy Goods Vehicles (HGV), diesel cars, vans and taxis with substantial contributions from buses. This is the case where general traffic road links have scheduled bus routes included
- 3) Emission from general traffic; HGV, diesel cars, vans and taxis. Buses contribute less than a 15% to ambient NO₂. This scenario tends to happen where there are few or no scheduled bus routes and a limited number of coach services frequenting the road link

The contribution to outdoor nitrogen dioxide from different vehicle categories varies considerably within the local AQMA. For this reason it is not very helpful to present mass emissions rates, but instead to distinguish the variable ratios associated with each transport corridor identified in the AQMA. While non-traffic sources do contribute a few micrograms locally, these sources certainly are not enough alone to cause an exceedance of the air quality strategy standards (legally binding limits). Therefore the local action must focus on where local transport emissions occur spatially in order to meet its primary objective to comply with the NO₂ standard as soon as practically possible.

4.5 Interconnected Areas of Air Pollution

This action plan will consider in further detail the following linear areas of NO₂ exceedance:

- **B2066 Both Ways:** Castle Square-East Street-North Street-Lower Dyke Road-Churchill Square-Western Road and Church Road Hove with slope on North Street
- **A2010 Both Ways:** Queens Road-Surrey Street and Terminus Road on to Buckingham Place and Bath Street including slope and hill climb on Terminus Road
- **B2119 One Way Uphill:** Trafalgar Street-Frederick Place
- **A23 Northbound:** Old Steine-Pavilion Parade-Marlborough Place-Gloucester Place-York Place-London Road-Preston Circus-Preston Road

- **A23 Southbound:** Beaconsfield Road-Viaduct Road-Ditchling Road- St Peters Place and Grand Parade
- **A23 both ways:** Adjacent to junction of Preston Road and Preston Drove
- **C Road:** Under the railway: The Drove and Millers Road with slope and hill climb
- **C Road:** Lower Edward Street and Eastern Road near the hospital
- **B2118 One Way Uphill:** St James Street
- **B2123 Both Way in AQMA:** Rottingdean High Street: to Vicarage Lane
- **A270 Both Ways:** New England Road- Chatham Place-Lower Old Shoreham Road- - **A270 Partly One Way Uphill:** New England Street and Cheapside
- **A270 Both Ways:** Lewes Road: Elm Grove Junction to Vogue Gyatory and Lewes Road-Coombe Terrace
- **C- Road Both Ways:** Hollingdean Road: between railway bridge and Lewes Road
- **A2023 Both Ways:** Sackville Road, Hove south of Old Shoreham Road junction
- **B2194 Both Ways:** Boundary Road near Portslade Station level crossing
- **A270 Both Ways:** Old Shoreham Road, Hangleton
- **A259 Both Ways:** Wellington Road and Kingsway, Portslade
- **B2193 Trafalgar Road Both Ways:** Old Shoreham Road to Church Road, Portslade

All areas exceeding the nitrogen dioxide standard are interconnected with the exception of Rottingdean High Street. Since 2013 Rottingdean has been a separate village AQMA in its own right. The tally of UK AQMAs or pollution hotspots should not be taken as an indication of the severity or extent of air pollution. The number of residential dwellings in the zones and the actual concentrations of pollutants recorded in the designated areas vary considerably across the country and locally within Brighton & Hove.

5 Strategy

5.1 Goals

The main aim of the renewed Air Quality Action Plan (AQAP) is to achieve compliance with the 40 $\mu\text{g}/\text{m}^3$ level for nitrogen dioxide where people live. Indiscriminate reductions in mass emission rates are not likely to deliver this key goal. A targeted approach will tackle the most polluting ground level sources where road traffic emissions happen within narrow streets where volumetric space and wind flow is restricted amongst the building canopy. Priority transport corridors for intervention are listed summarised in the tables in section 7. Whilst the strategy emphasises the importance of emission from transport, buildings, plant combustion, development control, and education are also considered as non-transport factors in the AQAP.

5.2 Related Policy

The Air Quality Action Plan must be balanced with other council aims and objectives. Most notably these include; transport, business, travel plans, development planning, electricity generation, climate change, and road safety. If the action plan is to be successful it is important that this report identifies where other areas of policy have positive agreement and where there may be potential conflicts of interest. This section

outlines how air quality is a key performance indicator for the city council. For the AQMA reduction in nitrogen dioxide is paramount.

5.2.1 Performance Indicators

The nitrogen dioxide objective became a legally binding standard in 2010. From 2015 for business, legal and health reasons compliance with the limit is urgent. Progressive actions achieved in recent years such as the Low Emission Zone, vehicle retrofits and electromotive infrastructure need to continue. Air quality indicators are now written into the council's key performance indicators which will be scrutinised by management teams, elected members and the chief executive. Since 2012 results from the continuous analysers on North Street and Lewes Road have provided representative data for the cities performance indicators. This evidence has allowed AQMA improvement to be flagged up as one of the city's key performance targets.

5.2.2 Health and Wellbeing Strategy

The joint health and wellbeing strategy is to set out a longer term vision for health²⁸. The Joint Strategic Needs Assessment identifies evidence based priorities and critical needs for the population. Through the Health and Wellbeing Act (2012) reform there are opportunities to improve the health and wellbeing strategy by integrating with the wider determinants of health, especially transport, noise, air quality, housing and education. Implementation sits with expectations to implement improvements at a local level in accordance with the localism bill.

5.2.3 Road Safety

Excellent progress has been made nationally and locally since the 1960s in making Britain's roads much safer with substantial long term reductions in fatalities due to road traffic accidents. In Brighton & Hove, some casualties continue to happen in the city centre and some AQMA streets have relatively high incidence of collisions between vehicles, pedestrians and cyclists.

There is an opportunity for air quality and road safety to be improved in the same places. Accident avoidance is important to keep traffic flowing and fewer incidents will cause less blockages and congestion which helps with emissions avoidance on occasions throughout the year. Road safety has encouraged a number of traffic calming measures and in many places priority is given to pedestrians to help encourage more sustainable modes of travel such as walk to school. The Air Quality Action Plan supports local transport plans to encourage active travel such as walking and cycling. The council's air quality assessments recognise that modern petrol motorbikes have low emissions and a very small contribution to local pollution and are therefore preferred to cars. However, measures to encourage motorbikes may not be favoured for road safety reasons.

The Air Quality Action Plan (AQAP) recommends that wherever possible smooth traffic flow is maintained and not disrupted. This means a strong preference for pedestrian crossings that do not stop traffic, hinder smooth flow or create road blockages. The aim should be to minimise vehicle queue durations that risk delay. The AQAP would like to recommend an increase in walk to work and school and safe road crossings as follows:

- Pedestrian crossing synchronised with traffic lights at junctions where vehicles stop already at red light phases at intersection
- Less preference for road crossings that cause additional stopping of traffic
- Avoid pelican crossings that stop vehicles after the pedestrians have crossed already
- Preference for pavement piers, wider concourses and mid carriageway refuge islands for crossings where this does not compromise bus and HGV passing widths
- Preference for foot bridges and upper concourses above the traffic or subway under roads implemented as part of new development funded infrastructure or used to manage crowds at events for example the Brighton Marathon
- Urban streets and areas that are for pedestrians that are open for deliveries, key bus and taxi services but not general traffic
- Pedestrian concourses that flow seamlessly into public parks and planted areas minimising safety concerns between pedestrians and traffic
- Avoidance of acute speed bumps which disrupt vehicular momentum, cause break suspension and tire wear, revving and acceleration, diminish miles per gallon, and increase emissions

5.2.4 Informal Park and Ride and Air Quality

The submission City Plan Part 1, in policy **CP9 Sustainable Transport** part A.b seeks to promote and facilitate better use of large car parks on the periphery of the city and transfer journeys onto existing and improved bus and rail services through partnership working with public transport providers, businesses/landowners and adjoining authorities. Currently a limited park and ride facility is available at the Withdean Stadium site, which intercepts some of the A23 car traffic before it reaches Brighton & Hove's AQMA. Travelling southbound on the A23 from London and Gatwick, the Brighton & Hove AQMA starts on Preston Road to the south of Withdean Stadium.

The Brighton & Hove Racecourse is used as a park and ride site for events such as those held at the AMEX stadium. During events, the racecourse parking facility is likely to relieve general traffic and bus routes on the Lewes Road corridor which is part of the AQMA up to Natal Road. Withdean (A23), the racecourse, AMEX stadium and University car park sites have the advantage of being outside of the AQMA. Cars parked outside the AQMA could help to reduce the amount of traffic that enters the city centre transport corridors where road space is limited and nitrogen dioxide limits have been exceeded for decades. There are several high capacity bus routes and the railway that connect with Central Brighton & Hove's main terminus. People could leave their car outside the AQMA and cycle or walk the last two miles to the city centre.

5.2.5 Air Quality and Carbon Reduction

The city council has a Climate Change Action Plan²⁹ and there is considerable cross over with the Air Quality Action Plan, especially around general emission reduction policies. The Climate Change Action Plan aims to reduce the city's greenhouse gas emissions from buildings and transport in accordance with the UN Framework Convention on Climate Change. Short wave solar radiation passes through the atmosphere to warm the planet's surface. Outgoing radiation with relatively longer wavelengths is more likely to be

absorbed by greenhouse gases such as Carbon Dioxide (CO₂), methane (CH₄), Nitrous Oxide (N₂O). This man made change to the planet's heat budget is influencing local and global climate, the water vapour carrying capacity of the atmosphere thermal expansion of the oceans and sea level rise. The City Plan and One Planet Living aim to address both local air quality and city carbon emissions.

Carbon reduction strategies are an issue for the northern hemisphere and the atmosphere in its entirety. Carbon emissions contribute from any place where there are releases from fires or controlled combustion processes. A company's greenhouse gas emissions can be offset to a carbon sink such as a forest in any part of the world. Some air pollutants prejudicial to human health travel long distances and can have international impacts. However the health scope discussed in this plan are immediate to the local urban area, identified as junctions transport corridors and individual streets.

The issue of poor air quality for many people is literally on their doorstep. In Brighton & Hove all nitrogen dioxide exceeding the standard happens within nine metres of the road carriageway. The solutions discussed in this action plan are weighted heavily towards high local consequences. This makes the AQAP very relevant and applicable to local and neighbourhood plans.

Carbon dioxide (CO₂), oxides of nitrogen (NO_x) and fine particles (PM_{2.5}) share the same sources and avoiding use of combustion engines will avoid emissions of all three. However, it is important to recognise that for pollutants prejudicial to health, control of proximity, position and height of the emission release is essential. Effective dispersion from a flu or exhaust pipe can substantially minimise ambient concentrations where people spend time and this has consequential health impacts. The scope of this AQAP includes analyses of where NO_x and particulate emissions happen in confined spaces in close proximity to residential dwellings. This resolution is distinctive from a broader carbon reduction strategy. If traffic is required to go further to avoid a bottleneck this may be beneficial for air quality and travel time but could be adverse for fuel consumption depending on the severity of congestion avoided.

5.2.6 Brighton & Hove's Electricity Generation

As stated consistently throughout the Local Air Quality Management (LAQM) processes (since the late 1990s), air pollution in the Brighton & Hove area is dominated by emissions from road traffic. Part of the reason is that unlike most European population centres of a similar size, the conurbation does not have a series of large combustion processes or a heavy manufacturing industry with emissions to air. With the exception of Shoreham Power Station the conurbation does not have major power generation. In fact the region is a net importer of electricity from the international grid with its interconnector across the Channel to France and the Netherlands. This presents a business opportunity for an increase in local clean energy provision to meet new demand from domestic and commercial premises including new developments. A switch in power provision is also important for local transport that is heavily reliant on diesel to move millions of passengers. It continues to be a challenge to provide truly low emission diesels in the slowest urban drive conditions. This is the reason for nitrogen dioxide continuing to exceed the legal limit and the declaration of a renewed AQMA in 2013.

5.2.7 Renewable Energy for Buildings and Transport

The Air Quality Action Plan welcomes thousands of local non combustion renewable micro-generation arrays such as solar panels, heat pump technologies that have no operating emissions to air. The Rampion offshore Sussex windfarm³⁰ is a Nationally Significant Infrastructure Project (NSIP). This will be the largest infrastructure investment in Sussex since the railways. The windfarm will provide cleanly generated electricity to the grid at a location where the future population is projected to increase at a faster rate than the national average. The windfarm will be the first major offshore windfarm in view of a UK city. Local public and private transport and housing will have the opportunity to draw on this new resource. Such an arrangement could dramatically reduce the need for trans-regional electricity transmission and long distance fuel distribution. Ahead of scheduled build of the windfarm electromotive infrastructure including rapid vehicle charging points is now available regionally and locally³¹. The Edgeley Green Power Stations³² is proposed just outside of Brighton & Hove City Council. The number of local electric and hybrid vehicles in use has increased considerably since 2012 and nationally sales have surged in the past year³³.

5.2.8 Policies that Promote Biomass Burning

The following policies can incentivise biomass burning including wood pellets and logs:

- Building Regulations Part L
- Building Environmental Assessment Methods (such as BREEAM, CSH, Homes Quality Mark)
- Renewable Obligation Certificates
- Renewable Heat Incentive RHI³⁴
- Planning policies that encourage micro-generation on development sites
- Brighton & Hove's One Planet Living Target encourages 15% of the city's energy to be generated from renewable technologies by April 2010 page 11)

Wood burning has its place as a renewable source of heat and power. Carbon released to the atmosphere when burned has typically been drawn out of the atmosphere over recent decades making up cellulose as trees grow. This gives biomass burning carbon neutral credentials on human timescales. When burned wood based fuels have lower emissions than some oils and coal. However logs and pellets give off much higher releases of oxides of nitrogen and particulate compared with natural gas. Further information on solid fuel burning in the AQMA is given in section 8.2.

5.2.9 Trees and Planting

Trees should not be seen as an alternative solution to reducing emissions from traffic. Trees, shrubs and greenery woven into the built environment can improve the urban realm and living neighbourhoods and biodiversity. Tree and other planting is required to be incorporated into development schemes in a manner that is integral to their design and will contribute to enhancing the city's green network and the city's Biosphere Reserve objectives (CP13 Public Streets and Spaces in the Submission City Plan part 1, CP10 Biodiversity). Priorities for biodiversity and public realm improvements are indicated in the City Plan Part 1 - Development Area policies and the Nature Conservation and Development SPD provides guidance to ensure the plant species used to create new

nature conservation features are appropriate to Brighton & Hove and Hove, the local context and the development.

Certain species of trees can be effective scavengers of both gaseous and particulate matter. The surface area of shoots and foliage can provide a natural substrate for fine particles to settle out of air and in time wash off in the rain. Flaking bark has the potential to fix atmospheric nitrogen.

Where space is available large spreading trees such as the London Plane³⁵ which can survive the harsh urban environments is a good choice. Branches obstructing highways can be pruned to facilitate free flow of traffic so it should not be necessary to restrict planting choice to the few fastigiated varieties with confined crowns.

Brighton & Hove has many examples of Elm tree varieties (25,000 Elms) and most have bristly leaves which would be effective at capturing fine particulates from the atmosphere. There have been broadcast examples of faster growing species such as Silver Birch placed near to a property alongside a busy street reduced particulates considerably.

The council should investigate the potential for a programme of tree planting along key transport corridors within the AQMA with a variety of hairy leaved trees as studies state they collect airborne particulates and help as a sink to local airborne oxides of nitrogen. An action to take forward is to explore grant opportunities to allow for the introduction of trees to the harshest and busiest parts of the AQMA. The most expensive aspect of this is the re-routing of underground pipes and cables and creating the right size planting pit.

5.3 Action Plan

In addition to related policy areas Section 7 of the air quality action plan identifies priorities for air quality improvement. These locations should be targeted for reductions in NO and NO₂ emissions from road transport most especially those vehicle categories that contribute the most to ambient NO₂ along each transport corridor. This can be achieved through initiatives with alternative fuels, retrofits, optimised emission abatement and performance, hybrid dual fuel options and new vehicle purchases. Funds from the department for transport, the office of low emission vehicles and the European Commission could help to achieve these objectives. Improved flow of traffic can reduce emissions and some areas of the city centre AQMA have restricted access for example open to buses, taxis and loading. In addition in some cases transport schemes and urban real improvements can increase the distance between vehicle exhausts, residences and the building canopy. For much of the year this can improve effective dispersion of emissions and the entrainment of fresher ambient air.

6 Formal Equalities Impact Discussion

An Equalities Impact Assessment supported by a community's insight report accompanies this report. As a key council policy document the Air Quality Action Plan (AQAP) needs to insure that it does not disadvantage any section or group of people. The Air Quality Management Area is cosmopolitan and is more ethnically diverse than both the city and England's averages. Arabic is the second most spoken language amongst those that live in the city. Brighton & Hove has a higher proportion of gay, lesbian and transgender people compared with the UK average. The student population continues to show strong growth and anecdotal evidence suggests many former students originally from elsewhere choose to stay after graduation. People of various ages live in the city as a matter of choice. For many people the "young party lifestyle" continues well into middle age.

Air pollution disproportionately affects vulnerable members of the population. Those with sedentary lifestyles are more prone to heart disease and respiratory illness. Active people with good lung function that participate in regular cardio-vascular exercise are less vulnerable to inhaled pollution. It is often assumed that poor air quality happens in deprived areas however our studies in the local area show a more complex dynamic. Living in a metropolitan entertainment district whilst not for everybody can be a highly desirable choice for adults of various ages. It can be attractive for businesses such as pubs, shops and markets to be located at prime economic sites such as road intersections with access to incoming trade. Poor air quality is constantly detected in the vicinity of road junction and if the buildings are in a bad state of repair, ingress of gaseous pollutants to the indoor environment is more likely. Adjacent to urban streets, housing, maintenance, fenestration and building ventilation can be of a poor standard and may not be fit for purpose. If the urban realm and air quality were better, investment could be attracted and it is likely that care of homes and building standards would improve. Rents and property prices in the city centre and Rottingdean are very high and well above average for the UK and Europe. In Central Brighton & Hove (as with much of London) the economic rent of land in the AQMA is very high. Prime rental sites have economic reasons to be located adjacent to roads and junctions with access to passing trade, transport and entertainment venues. Building enclosure close to stop-start traffic inhibits dispersion of emissions.

Adults can be more at risk to the effects of air pollution if they suffer from other conditions most especially health problems related to smoking and drug use (above the national average in Brighton & Hove³⁶). The body can suffer cumulative affects when trying to cope with other pressures on health and wellbeing such as sexually transmitted diseases, alcohol and loss of sleep due to noise (the council receives approximately 3,000 complaints every year due to neighbourhood noise). In addition, traffic noise is a constant at the same residential locations within the Brighton & Hove AQMA that are effected by air pollution.

In reality, poor air quality impacts on a varied demographic which lives in both public and private sector housing and includes; vulnerable or sick adults, young children, those with sedentary lifestyles the elderly and some in care. Findings of Community Insight study for the Brighton & Hove and Portslade Air Quality Management Area are as follows:

- **The area has one of the highest population densities in England i.e. 100 people per hectare: (even though approximately half of the area comprises road carriageway, concourses and traffic gyratory)**
- **Population of the area is 9,000 with many residential dwellings adjacent to transport corridors including bus and taxi routes**
- **The AQMA has 34% overcrowded housing a much higher proportion than for the whole City and England**
- **Net migration into the AQMA with a sharp increase in population to the area from 2012/13**
- **Excellent public transport links with high visitor numbers and through traffic**
- **Higher than average property prices and rents**
- **High percentage of residents of working age and a lower than average proportion of pensioners and children**
- **People in the AQMA have achieved above average educational attainment and 72.4% of adults are economically active which is above the city average**
- **62% of households in the AQMA do not own a car which is exceptional for England**
- **Lower than average obesity (possibly linked with higher than average active movement, walking and cycling)**
- **The highest rates of residential turnover are amongst young adults**
- **Old people and infants are more vulnerable to airborne pollution and are more likely to settle in the AQMA for a number of years and are therefore more likely to be exposed to nitrogen dioxide over longer durations**
- **Better than average diets (excellent access to food choice)**
- **Higher incidence of smoking and binge drinking compared to BHCC and England averages**
- **Higher proportion of deaths due to lung cancer, circulatory disease and stroke compared to BHCC and England averages**
- **Higher likelihood of hospital admission for all causes including; chronic obstructive pulmonary disease and stroke**
- **Community Insight shows the AQMA is a health deprivation hotspot**
- **Male life expectancy two years lower than for the whole city and three years less than the average for England**
- **Lower proportion of deaths expected for respiratory diseases may relate to young adult population profile in the AQMA**
- **The AQMA is Ethnically diverse with a higher than average percentage Black and Minority Ethnic (BME) Population**

6.1.1 Car Use Differences

The action plan deals with a series of streets that are mostly located in the city centre where private car ownership is one of the lowest in the UK; in the Brighton & Hove AQMA 62% of households do not own a car which is exceptional in England and compares to 38% average for the whole city which is the lowest in the UK outside of London. Some streets are only open to buses, taxis and deliveries and most private cars in the inner area belong to visitors rather than those living in the immediate vicinity. Buses and minibuses are a more efficient way of moving larger numbers of people in a high density area. The AQMA has 100 people per hectare.

In contrast, Rottingdean village AQMA to the East has high private car ownership and car counts from neighbouring Peacehaven (East Sussex) are high in proportion to its population. Portslade has a mixed traffic set including cars from West Sussex and haulage routes that pass from Shoreham Port along Wellington Road and Trafalgar Road inland. The area is relatively industrial compared with the rest of the city. The Air Quality Action Plan assessment reflects the differences between city areas and transport corridors. These distinctions are set out in further details for each key street in the AQMA and described in section 7 with related presentations in the appendix.

7 Addressing Contribution from Road Transport

As mentioned in the introductory sections, the nitrogen dioxide contribution from different vehicle categories (notably buses, heavy good vehicles, taxis, vans and diesel cars) varies considerably between transport corridors. Petrol cars and motorbikes are minority contributors to roadside nitrogen dioxide in the AQMA and are not the main reason for exceedance of the AQS standard. Electrical vehicles have no emissions from a tailpipe. As they do not contribute to nitrogen dioxide their use is promoted as a measure in the Air Quality Action Plan. Active travel options such as walking and cycling as well as helping with regular exercise and wellbeing can help to reduce the number of cars on the road, freeing up central road space for trade for example; builders, deliveries and taxis. The city's population and residential density is increasing and as the economy and construction activity recovers, so will demand for the limited road space near the historical city centre.

Recommendations are being put forward for AQMA transport corridors. In some case measures have been implemented in other cases funded work is ongoing or recommended subject to award of further funds. Further improvement in bus emission performance is required. Traffic flow improvements are needed. In some cases the air quality action plan recommends feasibility studies looking into vehicle restrictions in accordance with vehicle access regulations. The air quality action plan will be considered at the Transport Partnership and the Environment, Transport and Sustainability Committee scheduled for autumn 2015.

7.1 Bus Transport Corridors

7.1.1 B2066 Castle Square-North Street-Lower Dyke Road-Churchill Square-Western Road

Summary of Air Quality investigations for the Designated Transport Corridor B2066 (part of the AQMA) Prior to the bus LEZ and Traffic Regulation Condition (TRC) that started in January 2015:

• Highest Bus counts on the route daily peak	>100 an hour
• Traffic a day along North Street (buses 2450)	6050 a day
• North Street monitored nitrogen dioxide at facade	80 $\mu\text{g}/\text{m}^3$
• North Street monitored nitrogen dioxide pavement (2012 & 2013)	114 $\mu\text{g}/\text{m}^3$
• Background nitrogen dioxide Pavilion Park (~100 metres back)	26 $\mu\text{g}/\text{m}^3$
• Road Length at risk of exceeding nitrogen dioxide standard	2.3 km
• Area at risk of > 36 $\mu\text{g}/\text{m}^3$ NO ₂ annual average	13.6 hectares
• Total address count [Feb 2015] likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	1734
• Residential dwelling count [Feb 2015] likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	834
• Highest PM ₁₀ annual average in recent years	27 $\mu\text{g}/\text{m}^3$
• Distance vehicular emissions to building line	5.3 metres
• Steepest road gradient 100 metres east of Clock Tower Junction	1:14
• Street canyon flanked by five storey buildings: typical width	23 metres
• NO ₂ contribution from buses to the Western Road	Half
• NO ₂ contribution from traffic to the North Street environment:	62% buses
	14% HGV
	9% Taxi
	6% Vans
	6% Diesel Cars
	3% Petrol Cars

On the B2066 Church Road, Hove (same transport corridor west of the bus LEZ) NO₂ contributions from traffic are: 29% buses, 23% HGV, 16% Diesel Cars 13% Taxis, 10% vans, 10% petrol cars. That said, 3km to the west of North Street roadside NO₂ is 50% as concentrated.

Practically all of Brighton & Hove's scheduled bus movements (close to 97%) pass along North Street or Churchill Square which is one of the busiest bus transport corridors in the UK. Bus use in the city has doubled in the past twenty years (to > 45 million per annum)³⁷. More passengers are transported on buses in Brighton & Hove each year than use Gatwick Airport (38 million per annum)³⁸. Per head of population Brighton & Hove has the highest bus usage of anywhere in the UK outside of London. During peak hours 100 high capacity buses (~90 seats each) pass up or down North Street with many of these continuing along Western Road to Church Road, Hove. Almost all of the buses have double decks. LAQM evidence has shown that the North Street pavement to the east of the Clock Tower junction has the highest nitrogen dioxide concentrations in Sussex¹⁵. In contrast, monitoring in Pavilion Park suggests background air quality (100-150 metres from this road) is good and compliant with all standards for nitrogen dioxide. The recorded difference between background and roadside concentrations is unusual and we can say

with a high level of confidence that local emission of oxide of nitrogen dominate along this transport corridor for a distance of 2km. The area of exceeding nitrogen dioxide connects with; Queens Road (north), Pavilion Parade (north east) and St James Street (east). Western Road around Palmeira Square (to the west) is compliant with the nitrogen dioxide standards. Localised hotspots (outside of the bus LEZ) have been monitored and modelled close to Church Road and The Drive junction and also between Church Road, Hove and Sackville Road.

Emission analysis with Defra's toolkit factors and the national atmospheric emissions inventory strongly suggests that oxide of nitrogen emissions along the corridor are dominated by local buses with much smaller contributions from goods vehicles and taxis. It is therefore priority to insure the very best emission standards for the 350 or so frequently circulating public service vehicles that pass along the same route hundreds of times a week.

A number of advanced action plan measures are in progress to reduce NO_x emissions from buses and taxis. Funds won from the department of transport (DfT) have helped to retrofit fifty double deck buses with an additional twenty-five taxi minibuses identified for selective catalytic reduction during 2015. The primary aim of these retrofits is common with that of the action plan i.e. deliver priority reductions in ambient nitrogen dioxide. The B2066 public transport corridor comprised one of the UK's first Low Emission Zones. Further details are given in section 7.4. In addition to setting up the bus LEZ with a Traffic Regulation Condition (TRC), existing initiatives in the North Street corridor include:

- Marshals manage bus flow through the corridor in order to minimise frequency and duration of bus congestion,
- Use of telemetry and CCTV to identify and manage blockages along the public transport corridor
- Engine idling to be kept to less than one minute
- Exhaust lines insulated to allow catalysts to dose with add blue mix more effectively
- Improve east-west flow through the Clock Tower Junction by optimising the phasing of the traffic lights at the key junction
- Encourage the most efficient drive styles in order to minimise fuel consumption and emissions of CO₂, NO, NO₂ and PM_{2.5}
- Phasing out of euro three & four vehicles with exemptions for infrequent services

From 2015 the highest emission buses frequenting the LEZ corridor are likely to be euro-5 (the emissions standard for new buses and trucks since 2008)¹⁸. The council must explore funding opportunities that consider measures that can assess and improve NO_x emission from euro-5 buses given the local routes that the vehicles perform regularly.

The council would like to seek funding to explore the possibility of using telemetry and tracking systems to optimise bus emission performance through the AQMA. In other words the vehicles are primed for low emission performance when entering the most polluted road sections. For the majority of non-hybrid vehicles this would insure optimisation of selective catalytic reduction and good dosing of ad blue solution to reduce NO_x when travelling through the AQMA. For hybrid diesel-electric vehicles it is

recommended the vehicle switches to electrical mode for the most polluted road sections. Another area of research is to develop a methodology to avoid emissions from standing hill starts that we see on North Street.

North Street, Brighton & Hove has similar bus and taxi pollution issues to Oxford Street Westminster and Putney High Street in the London Borough of Walthamstow. Given the levels of nitrogen dioxide where thousands of people live and work every day the City Council would like to designate the corridor as top tier exemplar national priority for air quality improvement.

It needs to be made explicit to the Department of Transport, the Office of Low Emission Vehicles, Defra and the Department of Energy and Climate Change that the B2066 public transport corridor is the very highest priority for reduction of nitrogen dioxide. The council will present evidence supported funding opportunities accordingly. Nitrogen dioxide and PM_{2.5} monitoring results on North Street are reported as key city performance indicators and will be escalated to the chief executive's office.

7.1.2 A23 Northbound Marlborough Place and London Road

Includes parts of Old Steine and continuous along: Pavilion Parade-Marlborough Place-Gloucester Place-York Place-London Road-Preston Circus and Preston Road (south of Preston Park) and a small hotspot close the junction of Preston Road and Preston Drove.

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA) Prior to Valley Gardens Transport Scheme

• Marlborough Place A23 NB total Traffic (buses 1090 a day)	9,400
• Typical monitored nitrogen dioxide at London Road facade	69 µg/m ³
• Road Length of nitrogen dioxide at risk of exceeding	2.9km
• Area likely to be > 36 µg/m ³ NO ₂ as annual average	13 hectares
• Total address count Feb 2015 likely to be > 36 µg/m ³ NO ₂	1066
• Residential dwelling count Feb-2015 likely to be > 36 µg/m ³ NO ₂	651
• NO ₂ contribution from traffic to London Road / Marlborough Pl	46% bus 17% HGV 15% Diesel Cars 10% taxis 6% vans 6% petrol cars

This is the main road from the sea front northbound towards London. Nitrogen dioxide improvement could be achieved by further improvements to bus and taxi emissions and increasing the distance between the building façade and the road carriageway. Tree planting would also help improve the environment in the vicinity of the A23.

Proposed measures for this transport corridor that has been part of the AQMA since 2004:

- Continued improvement in Bus and taxi emissions

- Valley Gardens Transport Scheme
- Explore more stringent standards for taxi licencing and the bus LEZ (most buses that pass through the LEZ also route along the A23)
- Consider HGV routing especially construction traffic from 2015
- Explore funds for HGV retrofits and assisted purchases
- Taxi and motorbikes allowed to use bus lanes, consideration of electric vehicles for an initial incentive period
- Insure low carbon vehicle parking dispensation does not encourage vehicles with emissions of NO_x
- Explore development and other funds for mixed tree planting

7.1.3 A2010 Queens Road-Main Station-Surrey Street-Terminus Road-Buckingham Place and Bath Street

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA):

• Typical traffic counts per day along Queens Road (bus 700)	11,200 a day
• Typical monitored nitrogen dioxide Queens Road facade	56 µg/m ³
• Road Length of nitrogen dioxide at risk of exceeding	1.5km
• Area likely to be > 36 µg/m ³ NO ₂ as annual average	6.3 hectares
• Total address count Feb 2015 likely to be > 36 µg/m ³ NO ₂	1022
• Residential dwelling count Feb-2015 likely to be > 36 µg/m ³ NO ₂	534
• Steepest Road Gradient over 200 metres up Terminus Road	1:14
• NO ₂ contribution from traffic to the Queens Road environment:	32% buses
	21% taxis
	21% HGV
	11% Diesel Cars
	11% vans
	4% petrol cars

Terminus Road -Queens Road run North-South between Brighton & Hove's main station and the Clock Tower junction with North Street (on the way to the sea front). The route (A2010) carries high numbers of buses and taxis mixed with general traffic closely flanked by 19th century buildings. Bus and taxi movements frequent the main railway station to pick up and drop off passengers.

Monitoring of nitrogen dioxide at three locations in the area shows concentrations consistently in excess of 50 µg/m³ during the past decade. The street has a variety of land uses with commercial and residential split 50:50 within this part of the AQMA. Flats and houses without front gardens are located directly on the pavement a few metres from the road carriageway. The road has high footfall and is a key pedestrian connection between the main station and North Street's retail hub. Also part of the A2010 route there is a smaller nitrogen dioxide hotspot around the Seven Dials roundabout that includes Bath Street, Buckingham Place and Dyke Road (immediately to the south of the roundabout).

Widening of pedestrian concourses south of the main station on Queens Road will help to increase the distance between tailpipe emissions and the commercial-residential building line. It will also provide added capacity for pedestrians. That said pavements are not wide enough north of the Clock Tower Junction. There can be a conflict between pedestrians crossing and traffic at the top end of North Road-Queens Road. The private car park at the top of North Road attracts traffic through the corridor which has limited capacity for general traffic. It is recommended that LTP continue to explore ways of reducing general traffic entering the Queens Road corridor as part of a broader strategy. Proposed changes to the light phasing of the Clock Tower junction are likely to restrict the amount of traffic able to pass along the A2010 route. It is recommended that the LEZ is extended to Queens Road and Terminus Road where bus emissions are important and it has been part of the AQMA since 2008. The location of the main station taxi rank is to be decided. If Terminus Road was made one way traffic emissions would be considerably less with a downhill direction.

7.2 Mixed Transport Corridors

7.2.1 A270 (east of A23) Lewes Road: Elm Grove Junction to Vogue Gyratory and Lewes Road-Coombe Terrace

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA)

• Total Traffic Count (of which 1050 are buses)	23,000 a day
• Typical monitored nitrogen dioxide at Lewes Road-Elm Grove	68 $\mu\text{g}/\text{m}^3$
• Road Length of nitrogen dioxide at risk of exceeding (up to A23)	2km
• Area likely to be > 36 $\mu\text{g}/\text{m}^3$ NO_2 as annual average	12.6 hectares
• Total address count Feb 2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO_2	967
• Residential dwelling count Feb-2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO_2	709
• NO_2 contribution from traffic to Lewes Road-Elm Grove	29% buses 21% HGV 20% Diesel Cars 14% taxis 11% vans 5% petrol cars

Lewes Road between Natal Road and The Level requires urgent improvement in ambient nitrogen dioxide most especially around the Elm Grove and Vogue Gyratory Junctions. The street has an increasing density of private and student accommodation above typically above retails on the ground floor. Some parts of the section have ground floor living space a few metres from the road carriageway.

- Continued improvement to the bus fleet to reduce real emission of oxides of nitrogen
- Traffic light phasing to allow better flow of traffic along Lewes Road linked with project to improve the flow of buses and cars through the Elm Grove junction
- Taxi and motorbikes allowed to use bus lanes, consideration of electric vehicles initially for an incentive period

- Universities to consider how their parking provision might be able to help reduce the number of journeys made through the AQMA
- Encouraging use of bus and train routes
- Uckfield to Lewes train connection supported by government to target a reduction in car commuting along the Lewes Road corridor into Central Brighton & Hove
- Provide new taxi ranks several metres clear of buildings at the Preston Barracks development site and stipulate that new walls and buildings do not enclose the street or create an new street canyon opposite Coombe Terrace, Lewes Road

7.2.2 A23 Southbound Beaconsfield Road-Viaduct Road-Ditchling Road-St Peters and Grand Parade to Pavilion Parade

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA) Prior to Valley Gardens Transport Scheme

• Total Traffic Counts (southbound only of which HGV ~500)	14,000
• Typical monitored nitrogen dioxide at Viaduct Terrace facade	66 $\mu\text{g}/\text{m}^3$
• Road Length of nitrogen dioxide at risk of exceeding	2.4km
• Area likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂ as annual average	12.1 hectares
• Total address count Feb 2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	1468
• Residential dwelling count Feb-2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	1017
• NO ₂ contribution from traffic to the Grand Parade environment:	28% HGV 22% buses 22% Diesel Cars 13% taxis 9% vans 6% petrol cars

Given the number of dwellings adjacent to the A23 and the importance of both heavy duty vehicles and cars this is the most important AQMA transport corridor for nitrogen dioxide improvement. The main contributors to ambient NO₂ along this transport corridor are heavy goods vehicles with significant contributions from all vehicle categories with the exception of motorbikes and electromotive. The Priority section is: Preston Circus-Viaduct Terrace-Grand Parade Pavilion Parade and Edward Street.

Action suggestions:

- Establish which HGVs are the most frequent along the corridor
- Explore funding for advanced Euro-6 standard or hybrid for frequent HGV using the corridor
- Explore funding for low emission HGV; alternative fuels such as retrofits and new purchases
- Review changes to the Valley Gardens transport scheme to minimise impact of oxides of nitrogen from general traffic, especially the impact of the A23 both ways adjacent to the Grand Parade façade
- Encourage new developments adjacent to Grand Parade to modify the design and layout of development to increase separation distances from sources of air pollution
- Air intakes on new developments from the top and rear of the premises furthest from the A23 road carriageway

7.2.3 A259 Wellington Road to Kingsway

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA)

• Total Traffic Counts (HGV 900)	21,000 a day
• Typical monitored nitrogen dioxide Wellington Road facade	49 $\mu\text{g}/\text{m}^3$
• Road Length of nitrogen dioxide at risk of exceeding	2.85km
• Area likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂ as annual average	21.5 hectares
• Total address count Feb 2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	769
• Residential dwelling count Feb-2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	509
• NO ₂ contribution from road traffic to Wellington Road :	32% HGV 23% Diesel Cars 16% buses 13% taxis 10% vans 6% petrol cars

General traffic has reduced slightly along the link. Action suggestion: Explore the possibility of an LEZ and real-time testing of HGV. Liaise with the harbour authority to establish which HGV vehicles are frequent users of the A259- B2193 haulage route and explore funding for retrofits.

7.2.4 B2194 Boundary Road Level Crossing to New Church Road Junction

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA)

• Bus counts Station Road Portslade	680 a day
• Typical monitored nitrogen dioxide at Boundary Road facade	38 $\mu\text{g}/\text{m}^3$
• Worse case modelled at Whistle Stop Public House	~50 $\mu\text{g}/\text{m}^3$
• Road Length of nitrogen dioxide at risk of exceeding	1040m
• Area likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂ as annual average	5 hectares
• Total address count Feb 2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	462
• Residential dwelling count Feb-2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	245
• NO ₂ contribution from road traffic to Boundary Road:	38% buses 25% HGV 13% Diesel Cars 10% taxis 10% vans 5% petrol cars

It is expected that the area will benefit from bus retrofits and stock replacement 2014/15 with new euro-6 and hybrid buses coming on stream during 2015. Action suggestion: Explore the possibility of time sign countdowns for Portslade railway crossing to inform road users how long they have to wait for trains. The measure aims to encourage engines switch off and gives road users the choice to seek alternative routes rather than queuing

and engine idling for ten minutes or more. Also suggest that pedestrian crossings are synchronised with railway crossings barriers in order to minimise congestion and queuing duration. Bus improvements scheduled to substantially reduce NO_x emissions as multiple bus routes circulate along Boundary Road. Seek possibility of electric charging points at the station.

7.2.5 B2193 Trafalgar Road and Church Road, Portslade

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA)

- Bus counts Insignificant
- Typical monitored nitrogen dioxide Trafalgar Road facade 53 µg/m³
- Road Length of nitrogen dioxide at risk of exceeding 995m
- Area likely to be > 36 µg/m³ NO₂ as annual average 3 hectares
- Total address count Feb 2015 likely to be > 36 µg/m³ NO₂ 188
- Residential dwelling count Feb-2015 likely to be > 36 µg/m³ NO₂ 148
- Emission from Preston Circus (A23) contribute to lower New England Road
- NO₂ contribution from traffic to Trafalgar Road:
 - 36% HGV
 - 19% Diesel Cars
 - 17% Buses
 - 13% Vans
 - 8% Taxi
 - 6% Petrol Cars

Look into funding opportunities for an LEZ for HGV. Liaise with the harbour authority to establish which HGV vehicles are frequent users of the A259- B2193 haulage route and explore funding for emission improvements. The Edgley Green power station proposes to fund ambient air monitoring in the area.

7.2.6 B2118 St James Street

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA):

- Bus counts 25 an hour or 350 a day
- Typical monitored nitrogen dioxide at facade 46 µg/m³
- Road Length likely to exceed nitrogen dioxide exceed standard 460m
- Area likely to be > 36 µg/m³ NO₂ as annual average 1.5 hectares
- Total address count Feb 2015 likely to be > 36 µg/m³ NO₂ 317
- Residential dwelling count Feb-2015 likely to be > 36 µg/m³ NO₂ 181
- Steepest Road Gradient over 100 metres east of the Old Steine 1:20
- Street canyon flanked by four storey buildings typically 11 metres wide
- Emissions from vehicles using the Old Steine (A23) are significant for the west end of St James Street and would continue to contribute if St James Street was restricted to traffic
- NO₂ contribution from traffic to the St James Street environment:
 - 29% buses
 - 21% HGV
 - 18% Diesel Cars
 - 14% Taxis
 - 11% vans
 - 7% petrol cars

St James Street has relatively low counts of traffic within a confined historical street space (dating back to about 1800). The street canyon or enclosure between opposing four storey buildings is narrow. Population density is especially high. There are hundreds of flats and maisonettes at first and second storey above retail on the ground floor. Defra's emission factor toolkit suggests that emissions from buses are the single largest contributors to nitrogen dioxide in the street over and above background levels. That said cumulative emissions from other vehicle categories; goods vehicles, diesel cars and taxis are significant. The single carriageway has been one way eastbound for many years. Traffic emissions arise from vehicles climbing up hill and buses docking at bus stops that can cause frequent brief blockages of traffic flow along the single lane. If the traffic flow was downhill instead of up emission would not cause an exceedance of the standard in the street. A modest sustained improvement in ambient nitrogen dioxide could eliminate more than one hundred dwellings from the area of exceedance. Further information on community discussion with local action teams (LAT) is given in section 9.1.1.

7.2.7 B2118 Rottingdean High Street from Marine Drive to Vicarage Lane

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA)

• Total Traffic a day	14,300
• Typical monitored nitrogen dioxide at Rottingdean High St facade	49 $\mu\text{g}/\text{m}^3$
• Road Length of nitrogen dioxide at risk of exceeding	210m
• Area likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂ as annual average	0.6 hectares
• Total address count Feb 2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	82
• Residential dwelling count Feb-2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	45
• Distance main road centre line to retail-residential building line	2.7 metres
• Emission from Preston Circus (A23) contribute to lower New England Road	
• NO ₂ contribution from traffic to Rottingdean High Street:	
	34% Diesel Cars
	18% HGV
	13% Buses
	13% Taxis
	11% Vans
	11% Petrol Cars

Rottingdean High Street has inappropriate levels of traffic (>10,000 vehicles a day) within an especially confined space. The main road carriageway kerb is no more than eighteen inches from flint cottages. The contribution of cars & vans to ambient nitrogen dioxide (60%) is more substantial than anywhere else in the city council's area.

It is recommended that re-routing of general traffic is considered with modelling or trials. Determine the effectiveness of weight restrictions on the High Street. Consideration of Keep Clear zones near the narrowest section of the High Street.

Discussions can be had via the Sussex Air Group, Lewes District Council and East Sussex County Council about the reliance on private cars for transport in the Peacehaven area and the impact this has on the Rottingdean AQMA within Brighton & Hove City Council.

Action to provide more transport choice; explore funding of communal rapid electrical charging for vehicles in order to encourage electric and hybrid vehicles. Encourage the wider community to reduce the number of car journeys they take along the High Street.

7.2.8 B2119 Trafalgar Street-Frederick Place

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA)

• Traffic Counts a day	2,600
• Typical monitored nitrogen dioxide at Frederick Place (near B2119)	52 $\mu\text{g}/\text{m}^3$
• Road Length of nitrogen dioxide at risk of exceeding	350m
• Area likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂ as annual average	0.6 hectares
• Total address count Feb 2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	68
• Residential dwelling count Feb-2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	22
• Emission from Queens Road and main station contribute to Frederick Place	
• NO ₂ contribution from traffic to the B2119 part of North Laine:	
	27% Buses
	24% Taxis
	21% HGV
	15% Diesel Cars
	9% Vans
	6% Petrol Cars

Some of the impact on Fredrick Place relates to emissions from traffic on Queens Road. Improvement in emissions from buses and taxis should reduce ambient concentrations in the area. It is recommended that larger trucks are restricted as with the Old Town or South Laine. Consider the possibility of freight consolidation centres serviced by ultralow emissions vans to deliver within 3km of the city centre.

7.3 AQMA Streets with high NO₂ and low contribution from buses

7.3.1 A270 (west of A23) Old Shoreham Road-New England Road plus Cheapside and New England Street

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA) Prior to Valley Gardens Transport Scheme

• Total Traffic Count (HGV 290)	16,400
• Typical monitored nitrogen dioxide at New England Road facade	58 µg/m ³
• Road Length of nitrogen dioxide at risk of exceeding	4.25km
• Area likely to be > 36 µg/m ³ NO ₂ as annual average	16.1 hectares
• Total address count Feb 2015 likely to be > 36 µg/m ³ NO ₂	826
• Residential dwelling count Feb-2015 likely to be > 36 µg/m ³ NO ₂	616
• Emission from Preston Circus (A23) contribute to lower New England Road*	
• NO ₂ contribution from traffic to New England Road:	32% Diesel Cars
	24% HGV
	17% taxis
	10% Petrol cars
	10% buses*
	7% vans

Discussion about: high frequency of queuing and congestion on New England Road, measures to encourage general traffic to avoid lower Old Shoreham Road and New England Road. Consider no left turn onto A23 northbound and alternative directional signage. Identify if car parks attract traffic along the most congested road link. The Drove and New England bridging points under the railway have either high durations of traffic queuing or short hill climb accelerations and are enduring air quality hotspots. Consider long-term transport strategy for east west connection across the London-Brighton & Hove railway.

7.3.2 C-Road Edward Street and Eastern Road

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA) Prior to Valley Gardens Transport Scheme

• Average daily traffic for the Edward Street-Eastern Road (HGV 333)	17,000
• Monitored nitrogen dioxide at Eastern Road facade	46 µg/m ³
• Road Length of nitrogen dioxide at risk of exceeding	910m
• Area likely to be > 36 µg/m ³ NO ₂ as annual average	4.4 hectares
• Total address count Feb 2015 likely to be > 36 µg/m ³ NO ₂	297
• Residential dwelling count Feb-2015 likely to be > 36 µg/m ³ NO ₂	197
• NO ₂ contribution from traffic to Eastern Road:	32% HGV
	23% Diesel Cars
	13% Buses
	10% Taxis
	10% Vans
	9% Petrol Cars

Consider future HGV impacts and plans to mitigate these. Potential LEZ for frequenting HGV includes A23 and Edward Street. Plans tied in with those for A23 southbound especially Grand Parade.

7.3.3 A2023 Sackville Road Old North End

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA)

• Total Traffic Counts Sackville Road	>20,000
• Typical monitored nitrogen dioxide at Sackville Road North End	49 $\mu\text{g}/\text{m}^3$
• Road Length of nitrogen dioxide at risk of exceeding	970m
• Area likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂ as annual average	2.6 hectares
• Total address count Feb 2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	174
• Residential dwelling count Feb-2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	112
• NO ₂ contribution from traffic Sackville Road North End:	
	26% HGV
	23% Diesel Cars
	15% taxis
	15% vans
	12% buses
	9% petrol cars

Discussions are required about: functionality of Sackville Road-Old Shoreham Road Junction including seeking opportunities when new development arise adjacent and considering future landscaping around the junction. Compliance with nitrogen dioxide standards has been recorded further south along Sackville Road.

7.3.4 Hollingdean Road

Summary of Air Quality investigations for the Designated Transport Corridor (part of the AQMA)

• Total Traffic Counts Hollingdean Road (of which HGV 320)	16,850
• Typical monitored nitrogen dioxide at Hollingdean Road facade	49 $\mu\text{g}/\text{m}^3$
• Road Length of nitrogen dioxide at risk of exceeding	290m
• Area likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂ as annual average	1.1 hectares
• Total address count Feb 2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	87
• Residential dwelling count Feb-2015 likely to be > 36 $\mu\text{g}/\text{m}^3$ NO ₂	70
• *Emission from Lewes Road (A270) contribute to Hollingdean Road	
• NO ₂ contribution from traffic to Hollingdean Road:	
	32% HGV
	23% Diesel Car
	13% Taxis
	13% Buses*
	10% Vans
	10% Petrol Car

Recommend that funding is sought for tests and improvements for HGV frequenting Hollingdean Road. Council fleets have been quick to invest in euro-6. Push for hybrid vehicles or alternative fuels especially public service vehicles.

7.4 Bus Low Emission Zone (LEZ)

Brighton & Hove bus LEZ came in effect with a Traffic Regulation Condition (TRC) in January 2015. The zone covers the North Street-Western Road public transport corridor described in section 7.1.1. At inception the LEZ required that all frequent bus services entering the zone meet euro five emissions standard or better. Enforcement is via prior agreement with the bus companies and will be monitoring using existing CCTV.

By 2015/16 the local bus fleet will include a significant number of euro-6 high capacity vehicles. Testing of diesel electric hybrids on local routes through the AQMA shows substantial fuel and NO_x emission savings.

Improvements to the local bus fleet have been achieved through the following:

- Multi million pound investment by several bus companies to modernise their fleets including scheduled purchases of euro six double deck buses for 2014/15
- The Green Bus Fund supported 13 diesel electric hybrid vehicles
- In 2014 the Clean Bus Transport Fund supported the retrofit of fifty euro three buses to almost euro six standard

7.5 Discussion about Low Emission Zone (LEZ) update

In the first instance the bus LEZ is for euro five emission standard, available since 2008. The bus companies continue to work towards lower emissions of oxides of nitrogen. Main operators employ hybrid or euro six vehicles on the most frequent services. Some bespoke work is required to engineer best available emission performance for the AQMA and closer working with the original manufactures is high desirable. Due to economy of scale and the substantial size of bus operations further innovative work can be trialled locally. It is recommended that the council seek funding to improve NO_x emissions from existing euro-5 vehicles and explore realistic schedules for a euro-6 hybrid or ultralow emission LEZ.

The following construction projects close to the A23 and Edward Road-Eastern Road axis are likely between 2016 and 2021

- Redevelopment of the Royal County Hospital
- Circus Street Major Development
- American Express Major Demolition and Building Replacement
- Valley Gardens Transport Scheme
- Brighton & Hove Centre and consolidation of Churchill Square Retail Hub

The action plan would like to recommend a fund assisted strategy for low emissions from construction traffic in this area of the AQMA. The action plan recommends that council committee explore options and government funds for reducing the cumulative impact of longer term construction projects. This is most especially applicable for HGV movements and oxide of nitrogen emissions along the A23, Lewes Road and Edward Street-Eastern Road transport corridors. The movement of construction traffic along these corridors without substantially modernised emissions standards is likely to seriously compromise near road compliance with nitrogen dioxide at the same time as influencing local concentrations of fine particles.

7.6 Funded Projects

The city council will explore new funding opportunities with Department of Transport and the Office of Low Emission Vehicles. This will be an ongoing strategy of the AQAP between 2015 and 2020. By 2018/19 it is expected that most frequent public service fleets will be euro-6 and hybrid. A significant number of older vehicles will be retrofitted to at least euro-6 standard. By 2020 there will be much less dependence on diesel for city transport.

Transport projects are to explore how traffic light sequences might improve flow at AQMA intersections especially for; Viaduct Terrace-Ditchling Road, Lewes Road-Elm Grove, Grand Parade, London Road, North Street Clock Tower.

Further Portable Emission Monitoring System (PEMS) testing can be used to test real time emissions. Local firm Ricardo-AEA engineering has carried out a series of tests to determine the tailpipe emissions from heavy vehicles along the number 7 bus route. The route travels from the Marina to the cities western suburbs via the retail centre and crosses through the nitrogen dioxide area of exceedance for about 1200 metres of its regular journey. Interesting findings of the work show that NO_x emissions:

- Peak around North Street uphill which shows good agreement with ambient monitoring in the area
- Are much higher on hill climbs and standing hill starts
- Are low for Electric mode (on hybrid vehicles) that activates on downhill sections
- Are higher for euro four and five compared with retrofitted euro three, euro-6 and diesel electric hybrid vehicles

7.7 Road Signage and Information Technology

Unlike some cities the Brighton & Hove's AQMA covers a small fraction of the total land area (220 hectares = 2.7%). It may be possible in some places to explore how road signage might direct traffic away from the air quality management area to alternative routes that have wider proportions, buildings set back from the carriageway, front gardens and better flowing access to the national road network. The action plan welcomes strategies that minimise general traffic to AQMA streets where space is restricted. LTP has a series of measures in place to avoid short distance city centre car journeys.

Explore options to submit digital maps of the AQMA and its component streets to mobile phone applications and satellite navigation systems so people can make informed and educated decisions about:

- Their mode of travel
- The route they take
- The number of journeys they make through the polluted or congested area

7.8 Targeting Nitrogen Dioxide by Location

Section 7 sets out the severity and extent of nitrogen exceedance within the AQMA. Local transport measures such as alteration of traffic flow must insure pollution is not displaced from one location to another. Allocation of funding for intervention measures can to some extent work in a similar way to UK flood defence policy in that spending

priority will be allocated where dwellings and people can be protected from the risk factor (in this case airborne pollution). Also for consideration is the degree to which local traffic emissions increase pollutants above background concentrations and the contribution traffic bottlenecks can have on local pollution. The evidence that may justify targeted action of limited funds is balanced is through the consideration of:

Severity	- measured concentration of NO ₂ at roadside	units: µg/m ³
Extent hectares	- area at risk of exceeding NO ₂ standard	units:
Length	- length of road at risk of exceeding NO ₂ standard	units: km
Dwelling Count	- residential dwellings count 90% or > standard = number of dwellings	
Emission	- emission rate from all road traffic using the local road link: g/NOx/sec	
Emission/Space	-traffic emission divided by the volumetric space in the street [calculated as distance from exhausts to building line ² *height=m ³]	

Concentration above Background: The Roadside NO₂ concentration with local background subtracted

The council is working towards reducing the severity and extent of pollution and must have regard to the number of dwellings affected. It is a council target to reduce the area and number of people affected. That said the most cost effective strategy is to identify where modest reductions in emissions could substantially improve air quality. This is most likely for confined street environments with high population density. That said residential-retail strips run adjacent to the main transport corridors to and from the city centre especially the A23 and A270.

7.8.1 Streets with the highest ambient concentrations of Nitrogen Dioxide

Following many years of outdoor monitoring combined with emission assessment and dispersion modelling evidence, we can state with a high degree of confidence where nitrogen dioxide is most concentrated. Combined monitoring and modelling evidence is summarised as follows:

Table 7-1 Highest Nitrogen Dioxide in Brighton & Hove (Façade) Ordered by Transport Corridor

Rank	Road Name	Street Area	Four Year Average NO ₂ µg/m ³ 2010 to 2013
1	B2066	North Street-Western Road	80 (114)
2	A23 Northbound	London Road near Oxford Street	69
3	A2073 and A270	Lewes Road near Vogue Gyratory and Elm Grove Junction	68
4	A23 Southbound	Viaduct Terrace	66

5	A23 Northbound	Marlborough Place to York Place	61
6	A270	New England Road-Lower Old Shoreham Road	58
7	A2010	Terminus Road-Queens Road	56
8	B2139	Trafalgar Road, Portslade	53
9	B2199	Frederick Place near Queens Rd	50
10	A259	Wellington Road	49
11	B2123	Rottingdean High Street	49
12	A2023	Sackville Road north end	49
13	A23 Both Ways	Preston Road near Preston Drove	49
14	C-Road	The Drove	49
15	C-Road	Hollingdean Road	49
16	C-Road	Eastern Road near Hospital	46
17	B2118	St James Street near Old Steine	46
18	A2010	Buckingham Place Seven Dials	45

Table Note: Quoted levels are for the highest monitored NO₂ along the transport corridor listed. (114 µg/m³ as a two year average) is monitored on North Street above the pavement where there are high pedestrian counts, but no permanent residence. Nitrogen dioxide exceedance has not been monitored on Boundary Road, Portslade in recent years. This has been modelled for the pub closest to the railway level crossing.

7.8.2 Areas with high NO₂ relevant to pedestrian exposure

The following street areas have high pedestrian footfall and repeated evidence of NO₂ > or close to 60 µg/m³ as an annual average:

- North Street, Western Road B2066
- London Road A23 northbound
- Viaduct Terrace A23 southbound
- Marlborough Place A23 northbound
- New England Road A270 both ways

Nitrogen dioxide at 60 µg/m³ level for long term durations risks non-compliance with the hourly average nitrogen dioxide standard equal to 200 µg/m³ (not to be exceeded more than eighteen times in a calendar year). Relevant receptors at these higher concentrations include people that might be present in the area for brief durations such as an hour or thirty minutes. Therefore protection is required for visitors, pedestrians and shoppers. Where the 40 µg/m³ annual average is exceeded, environmental protection is required for all residential dwellings where people are likely to be present for half a year or more.

7.8.3 Transport corridors with highest tally of dwellings at risk of exceeding

Using detailed traffic data, Defra's emission factor toolkit and dispersion modelling, Environmental Protection at Brighton & Hove have mapped nitrogen dioxide in around the

AQMA (see appendix). Using Geographical Information Systems (GIS) the length and area at risk of exceeding the limit can be quantified (in km and hectares) and the number of addresses and residential dwellings counted using mapping functionality. The following results are presented in Table 7-2.

Table 7-2 AQMA Transport Corridors Sorted by the Count of Residential Dwelling at Risk of Exceeding Nitrogen Dioxide ($36 \mu\text{g}/\text{m}^3 \text{NO}_2$ annual mean)

Rank	Road Name	Continuous Road Link	Road Length km	Area hectares	Address Count	Residential Dwellings Count
1	A23 southbound	Beaconsfield - Viaduct Rd- Ditchling Rd- Grand Pde- Pavilion Pde	3.0	14.2	1468	1017
2	B2066	Castle Sq- North Street- Western Road LEZ and Church Rd, Hove	2.4	13.6	1734	834
3	A2073- A270 Eastside	Lewes Road at Elm Grove- Vogue Gyratory- Coombe Terrace	2.0	12.6	967	709
4	A23 northbound	Pavilion- Marlborough PI- York PI- London Rd- Preston Rd	2.5	11.5	1066	651
5	A270- Westside	East Old Shoreham Road- New England Rd	4.3	16.1	826	616
6	A2010	Terminus rd- Surrey Street- Queens Rd	1.5	6.3	1022	534
7	A259	Wellington Rd- Kingsway	2.9	21.5	769	509
8	B2194	Boundary Road	1.0	5.0	462	245
9	C-Road	Edward Street and Eastern Road	0.9	4.4	297	197
10	B2118 eastbound	St James Street	0.5	1.5	317	181
11	B2139	Trafalgar Rd and Church	1.0	3.0	188	148

		Rd, Portslade				
12	A2023	Sackville Road	1.0	2.6	174	112
13	C-Road	The Drove and Millers Road	0.5	1.5	130	102
14	C-Road	Hollingdean Road	0.3	1.1	87	70
15	B2123	Rottingdean High Street	0.2	0.6	82	45
16	B2199	Trafalgar Street-Frederick Place	0.4	0.6	68	22

7.8.4 Streets with moderate emission rates to a restricted volumetric space

The first two hierarchical tables consider peak severity and overall extent of higher levels of nitrogen dioxide along the various transport corridors within the 2013-AQMAs. This information can be used to guide AQAP priorities for intervention such as low emission zones and traffic restrictions. However if we look at the actual NO_x tailpipe emission rates (not ambient concentrations) and divide these by the volumetric space available in each street a different picture emerges. It is possible to see where local changes could make substantial differences and where the current emission rates from road traffic are entirely inappropriate for the street space available. Emphasis on an alternative complimentary hierarchy to guide prioritisation is given in the following table:

Table 7-3 Hierarchy of AQMA Streets: Emission / Available volumetric Street Space

Rank	Road Name	Location	NO _x emission rates for the Road Link g/km/second	Volumetric Space m ³	Hourly Emission/Space m ³
1	B2123	Rottingdean High Street	0.16	51	11.3
2	A2010	Terminus Road-Queens Rd	0.28	104	9.7
3	A2073	Lewes Road	0.49	188	9.4
4	A270	New England Road	0.19	77	8.9
5	B2066	LEZ Castle Sq-North Street	0.51	225	8.2
6	A23	London Road nr Oxford St	0.43	192	8.1
7	A259	Wellington Road, Portslade	0.35	155	8.0
8	C-Road	Eastern Road	0.32	177	6.5
9	A23	Marlborough Place	0.31	177	6.3
10	B2139	Trafalgar Road, Portslade	0.30	173	6.2

11	C-Link	Hollingdean Road	0.2	126	5.7
12	A23	Grand Parade	0.22	145	5.5
13	B2118	St James Street	0.1	68	5.3
14	A23	Viaduct Terrace	0.19	132	5.2
15	A2023	Sackville Road North End	0.41	288	5.1
16	C-Road	Edward Street near Hospital	0.27	227	4.3
17	B2139	Church Road, Portslade	0.24	211	4.1
18	C-Link	The Drove to Millers Road	0.12	116	3.7
19	A270	New England Street	0.18	188	3.5
20	A23	Preston Road by Preston Dr	0.34	368	3.3
21	A259	Viceroy House Junction	0.45	729	2.2
22	B2066	Church Road, Hove	0.24	392	2.2
23	B2199	Trafalgar Street-Frederick Pl	0.07	116	2.2
24	B2194	Boundary Road	0.22	368	2.2
25	B2066	Church Rd, Hove	0.33	640	1.9
26	A259	Kings Road	0.46	900	1.8
27	A270	Old Shoreham Road, Hove	0.42	1080	1.4
28	A2010	Buckingham Place Dials	0.19	512	1.3
29	C-Link	Wharf Road, Portslade	0.18	600	1.1

Table Note: Available volumetric space is calculated by squaring the distance measured between the building line and the nearest road carriageway emission centre line multiplied by approximate height of the enclosed space. Emissions for Marlborough Place and Grand Parade are prior to the Valley Gardens transport scheme.

Dividing the volumetric street space by the roads emission rate (derived from the Defra emission factor toolkit) for all traffic on the specified link gives a guide of how enclosed or confined NO_x emissions are at the key NO₂ monitored locations. Such a targeted approach is likely to be more cost effective and faster to implement than general emission reduction strategies that could take some years to work in practice.

In the final hierarchical table, background NO₂ is subtracted from roadside NO₂. This gives an indication of where localised transport emissions are dominant and add considerably to the prevailing background levels that have been monitored over the years at park and suburban locations. The number of monitors (about 100 including archives) should not be counted as separate issues in their own right. More than one monitor along the same transport corridor can be indicative of the same or similar issues further along. Near junctions, emission contributions to a monitor are likely to be significant from more than one road link or transport corridor and this should be taken into account when prioritising improvement measures.

Table 7-4 Roadside Nitrogen Dioxide Minus Background Nitrogen Dioxide

Rank	Road Name	Continuous Road Link	Nitrogen Dioxide $\mu\text{g}/\text{m}^3$		
			Roadside	Background	Difference
1	B2066	LEZ North Street	80	26	54
2	A270	Lewes Road	68	22	46
3	A23	London Road- Preston Road	69	26	43
4	A23	Viaduct Terrace	66	25	41
5	B2123	Rottingdean High Street	49	13	36
6	A23	Marlborough Place	61	26	35
7	A270	New England Road	58	25	33
8	A2010	Terminus Road	56	25	31
9	A23	Preston Road by Preston Dr	49	18	31
10	A23	Grand Parade	55	24	31
11	A23	The Drove near railway	49	19	30
12	B2139	Trafalgar Road, Portslade	53	23	30
13	A2023	Sackville Road North End	49	23	26
14	C- Road	Hollingdean Road	49	24	25
15	A259	Wellington Road	49	25	24
16	B2199	Trafalgar Street- Frederick Pl	50	27	23
17	B2118	St James Street	46	23	23
18	A259	Kings Road	45	22	23
19	C- Road	Eastern Road by Hospital	46	23	23
20	A2010	Buckingham Place	45	24	21
21	C- Road	Edward Street	46	26	20
22	B2066	Church Road nr The Drive	41	23	18
23	A259	Viceroy House Junction	39	22	17
24	B2066	Church Rd nr Sackville Rd	39	23	16
25	A270	Old Shoreham Road, Hove	39	23	16
26	B2139	Church Road, Portslade	39	24	15
27	A270	New England Street	39	25	14
28	B2194	Boundary Road	38	24	14

Table Note: Nitrogen Dioxide readings taken from bias corrected and calibrated diffusion tube results as a four year average. Where recent monitoring is not available archive and modelled results have been used.

7.9 Taxi Licence Policy

Taxis and private hire vehicles play a vital role in the city, helping to tackle congestion and improving accessibility particularly for older people and those with disabilities (the Brighton & Hove fleet now has a higher and increasing proportion of Wheelchair Accessible Vehicles (WAVs) due to licensing policy changes. Taxis are important in terms of personal safety, particularly for children and women, especially since mandatory CCTV was fitting as a licence condition.

7.9.1 Lower Emission rates favoured instead of vehicle age

The taxi forum has also discussed proposals to change vehicle age limits to the requirement of Euro six standards. In 2014 there were real concerns regarding the costs to proprietors. Officers and trade representatives carefully considered the issue of vehicle standards twice in consecutive taxi forum meetings. There are benefits in moving from age limits to emission standards and hybrid options which are more scientific and evidence based, which is also comparable with the clean bus technology fund that has helped establish the low emission zone.

However, public policy must be predicated on a partnership approach. The licensing authority works with local taxi businesses as stakeholders to make sure regulation is clear, proportionate and effective, and to insure the concerns of business are heard and there is appropriate opportunity to influence policy. At this time the local industry reports experiencing fundamental uncertainty: political, with proximity of local and general elections, economic, with challenging trading conditions and regulatory, with both the Law Commission's proposals and the deregulation bill clauses potentially increasing the differences and standards between the two tiers: taxis and private hire. Licensing and air quality officers are researching opportunities with the Office for Low Emission Vehicles (OLEV), the cross government, industry-endorsed policy and funding body promoting ultralow emission vehicles. There is a potential for supporting ultralow emission taxis; OLEV has pledged funding opportunities for local authorities. The innovative work already undertaken by the transport planning authority for a low emission zone and the high standards of taxi fleet the trade and licensing authority has developed is likely to place the city at an advantage. Government is expected to publish criteria in the autumn. Collaboration between the taxi trade and Council could be the basis of bidding for funds for both vehicles and supporting infrastructure.

7.9.2 Taxi Rank Policy

Principles for appointing and revoking ranks have been set out with a traffic regulation order at Environment, Transport and Sustainability Committee. This is to always have regard to the proximity of taxi ranks adjacent to permanent residential dwellings in areas of poor air quality ($36-40 \mu\text{g}/\text{m}^3$ annual mean NO_2) when designating new rank spaces, and to assess potential for residential annoyance or nuisance with consideration of the prevailing roadside air quality and noise. The location of taxi ranks can have a harmful impact on residential amenity in terms of noise, fumes and air quality. It is therefore proposed that work is undertaken with officers in the Planning Department to promote the consideration of the impact of the proximity of existing taxi ranks on proposals for new residential units in terms of residential amenity.

This work will also look at opportunities for providing new taxi ranks as part of larger developments close to retail, commercial, catering, nightlife and transport links, whilst avoiding rank provision adjacent to residential dwellings (within several metres – dependent on local noise and air pollution levels). The aim is not to lose existing rank spaces in areas of high demand and seek new opportunities to increase rank numbers in

keeping with city population and economic growth. For major strategic developments work will be undertaken with planners to consider scope for new rank spaces as a condition of the major developments Funding to further support alternative refuelling infrastructure would complement ongoing initiatives between Sussex Air and Electromotive in across the South East.

7.9.3 Taxi Anti Idling Strategy

On 6 March 2014 Committee supported the investigation of proposals that would assist with the lowering of emissions from licensed vehicles such as “Cut Engine. Cut Pollution” signs at taxi ranks and amendments to vehicle licence requirements to be based on emission and not age. The cost of these signs has come from the hackney carriage budget. Stickers based on the same design as the taxi rank sign should become part of the required livery for hackney carriage and private hire vehicles. It is hoped that this will get the message to members of the public to cut their engine when not moving. A rotating carousel with low level seasonal heating would eliminate the need for any active engines at the busiest taxi ranks.

7.9.4 Proposed Taxi Licence Conditions

The following Licence Conditions have been proposed at licensing Committee:

- Relax licence conditions for passenger seat width
- Diversify licence conditions for the maximum number of passengers per cab: 1, 2, 3, 4, 6 & 8
- Licence conditions to allow for lighter vehicles that carry fewer passengers
- opening a niche market opportunity (cars that weigh less are more suited to narrow streets, slow speeds, electric and petrol)
- Taxi design brief: less weight, smaller engine, higher ratio of passenger & luggage space relative to bonnet
- Auto engine cut off advisable on all new cars
- “Cut engine. Cut pollution” signs at selected ranks
- Licence conditions to be based on emission and not age (in practice only the larger taxi minibuses will be more than five years old so this may have to consider exemptions in balance with wheelchair accessibility requirements)
- Local condition requires taxis to pass an oxide of nitrogen test, like the existing MOT certificate for hydrocarbons and carbon monoxide (consistent with existing US policy and EU directive being considered).
- Consider fleet test.
- Propose traffic regulation order engine idling and Road Traffic (Vehicle Emissions) (Fixed Penalty) (England) Regulations 2002 becomes condition of taxi licence[1] (potential exemptions for certain temperatures).

The aim is to provide evidence regarding which licensed taxis in practice have the lowest NO_x and fine particulate emissions on local drive routes.

7.9.5 Clean Vehicle Transport Fund Retrofits Tailpipe Tests for taxis

NO_x sensors are being used to assess retrofitted minibus taxis funded by the clean vehicle transport scheme (CVTF Department for Transport). Twenty five minibus taxis are being retrofitted with compact selective catalytic reduction and ammonia slip. The scope is to be likely expanded to consider options for more detailed tailpipe tests that use Portable

Emission Monitoring Systems (PEMS) testing in order to assess actual NO and NO₂ emissions on local drive cycles.

7.10 Fuel Strategy and Exhaust Treatment

To pass simple emission tests modern diesel engines rely on exhaust gas after treatment in order to mitigate soot and other emissions. Typically these are Exhaust Gas Recirculation (EGR), Diesel Particulate Filters (DPF) or Continuous Regenerating Traps (CRT). For low NO_x emissions CRT is used in conjunction with Selective Catalytic Reduction (SCR) that has been retrofitted to older buses and minibuses in Brighton & Hove. CRTs used without SCR are likely to generate additional NO and NO₂ and be significant contributors to local NO_x. The CRT-SCR combination will only work with Ultra Low Sulphur Diesel (ULSD) at optimum temperatures. Since Dec-2007³⁹, the sulphur content of fuel has been 10ppm (parts per million) a substantial reduction in sulphur content of 500ppm since the 1990s. The UK has no plans to further modify the specification of ULSD apart from an increase in the proportion of bio-liquids. Vehicles will perform better after an engine oil change and exhaust line clean during services.

The energy demand required to refine a high specification product such as ULSD will depend on the sulphur content of crude supply. For example sour crude oil at >0.42% sulphur content will require substantially more energy to refine than sweet crudes such as Brent Blend at around 0.24% sulphur. Continued supply of the most desirable sweet crude is finite. Refining of more common sour crudes from unconventional sources will increase refining costs, well to wheel energy demand and CO₂ emissions.

Local efforts are being made through a variety of funded infrastructure projects to reduce transport and construction dependency on diesel in the AQMA especially through electric, petrol hybrid, Liquefied Natural Gas (LNG methane) and Compressed Natural Gas (CNG methane).

7.11 Railways and Air Quality

Brighton main station is one of the busiest rail hubs for passenger numbers along the South Coast. However there is scope for an increase in services on weekends, at night around 12:30 AM and for match day events. Restoration of the Uckfield to Lewes line could save car commuting into Brighton's Lewes Road AQMA corridor.

Nitrogen dioxide in the Brighton & Hove AQMA is dominated by road traffic with minor contributions from light industry, commercial and domestic heating, shipping and railways. Emissions and break wear from railways are thought to be most significant around Terminus Road and possibly The Drove near Preston Park station. Approximately 90% of the locomotives travelling through Brighton & Hove stations are electrified. At this time there remains a significant minority of diesel locomotives that pass through West Sussex into Brighton & Hove. The AQAP supports proposals to electrify western railways (that travel from Wales via Westbury and Bath)⁴⁰. When this modernisation is complete is expected that 100% of scheduled locomotives entering the Brighton & Hove AQMA will be electric. If as a result of spending reviews electrification of rail lines is delayed, the council proposes to write to the Minister for Transport setting out the air quality benefits for the urban area.

Brighton & Hove City Council Air Quality Action Plan supports and agrees with London Borough initiatives to communicate with government ministers to make the case for stronger control of the environmental effects of rail services through existing mechanisms. Department of Transport and Defra should put in place requirements to insure operators are required to reduce excessive air, noise and light pollution from rail activities. It is appropriate that decisions regarding assessment of new rail franchises should be taken at a national level as long as environmental considerations are an explicit and significant part of the assessment. The current franchising process does not give satisfactory consideration to impacts on health and the environment.

8 Addressing Contribution from Non-Transport Sources

While the council acknowledges that local transport emissions are the dominant contribution to nitrogen dioxide in the AQMA, every effort needs to be made to avoid oxides of nitrogen from other sources in the vicinity of the AQMA. One such priority is to avoid boiler emissions directly into the problem street spaces identified in section 7. Flu terminations should have clearance above highest roof apex. Horizontal emission releases from domestic gas boilers to the street should be avoided. The Air Quality Action Plan strongly recommends a policy to avoid fixed plant combustion processes in and adjacent to the AQMA. Events and major construction projects should avoid diesel generators and seek plugged in places. For example the Brighton & Hove Pavilion seasonal open air ice rink switched from using diesel generators to its own electricity provision which helped save costs and emissions. The council has received a number of complaints in the AQMA for ad hoc diesel generators and use of these in the area is an offence that contravenes the objectives and policies of the Air Quality Action Plan.

8.1 Development and Buildings

From 2015 it will not be sufficient for developments to demonstrate insignificant impact on local air quality where nitrogen dioxide continues to exceed legal limit values. For major developments and demolitions around the revised smaller 2013 AQMA air quality will be a key consideration of the planning process. Developers will need to propose mini schemes and measures to improve air quality and reduce exposure of future residents to airborne pollution. Further guidelines are set out in the 2013 Sussex Air Quality and Emissions Mitigation Guidance²².

In some cases it may not be necessary to carry out a detailed air quality assessment. This will depend on the amount of new traffic that is likely to be attracted or generated by the new development, the combined influence of other developments and any fixed combustion plant proposed at the site. The influence of demolition and construction may need to be assessed.

The local planning authority will require the developer to demonstrate that they have taken air quality issues into account. The type of measures proposed to reduce air quality impacts will depend on the nature and scale of the proposed development and should be proportionate to the likely impact. The local planning authority will work with applicants to consider appropriate mitigation so as to ensure the new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations (where the relevant tests are met) will be used to secure mitigation.

Examples of mitigation include:

- the design and layout of development to increase separation distances from sources of air pollution;
- using green infrastructure, in particular trees, to absorb dust and other pollutants;
- means of ventilation;
- promoting infrastructure to promote modes of transport with low impact on air quality;
- controlling dust and emissions from construction, operation and demolition;

National Planning Policy Guidance indicates that where mitigation cannot be made on site developers could be asked to contribute funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development. Any agreed offsetting measures will be secured through planning conditions and/or Section 106 planning obligations.

For many smaller developments in the AQMA such as flats above retail the primary consideration with regard to air quality is to avoid new dose and exposure to the known area of NO₂ exceedance. The action plan aims to reduce the number of dwellings that are above the 40 µg/m³ limit and 90% of the limit that is 36µg/m³. In recent years the council has received hundreds of applications for change of use that are seeking planning permission for residences adjacent to roads in the AQMA where these concentrations are exceeded. The following strategies should be considered for change of use applications:

- Internal arrangement to position non-habitable rooms (bedroom and living rooms) on polluted façades.
- Avoid features encouraging residents to spend significant periods of time in polluted external environments, for example, balconies fronting AQMA transport corridors and junctions
- Place sensitive uses at higher storeys only.
- A passive or mechanical ventilation strategy for flats and houses adjacent to road in the AQMA with recommended for intakes from the rear and top of the premises furthest from the road traffic emissions
- Consider the impact of new traffic generated as a result of the development including off site impacts on local road sections
- Follow the hierarchy for energy provision in and adjacent to the AQMA

8.2 Hierarchy for Energy Provision on AQMA developments

To avoid the inefficiencies of transmission of power over long distances many developments will seek to provide their own heat and power that is either independent or supplementary to electricity and gas grids. Such a strategy is combined with improved energy efficiency and insulation in buildings. Micro-generation on site is encouraged by a number of planning policies. The Environmental Protection team has developed a hierarchy of energy options that it would prefer to see on new developments and renovations. This preference order treats air quality and pollution (NO₂ and PM) avoidance as priority in and around the AQMA (3% of the City Council's area). These local air quality considerations are in addition to building regulations and BREEAM ratings. Renewable obligation certificates are best advised to direct combustion options outside of the AQMA.

Whilst log fireplaces in pubs are attractive and small scale, and wood pizza ovens are likely to be permitted with conditions, applications for commercial solid fuel burning in the AQMA are likely to be refused. Although tall chimney combustion processes with flue termination above the building canopy may address air quality concerns, in and around BHCC's AQMAs modern chimneys may be out of character where flue terminations need to be above Regency and Victorian architecture. Proposals for new tall building will need to address tall building considerations⁴¹. Chimney height determinations could be

invalidated where there is likely to be tall buildings in the future. Tall buildings may have energy centres connected to ultralow NO_x gas boilers and the lowest NO_x Combined Heat and Power (CHP) with exit flues on the top. The council wants to encourage renewable microgeneration, however this must be balanced with appropriate land use. Combustion plant including biomass is best suited to industrial estates or port side wharfs and is not appropriate in high density, largely residential areas.

For space heating hot water and electricity, new developments in and adjacent to the AQMA should seek alternatives to combustion by adhering to the following preference hierarchy that avoids emissions to air:

8.2.1 AQMA Non Combustion Solutions

- Air Source Heat Pumps
- Ground Source Heat Pumps
- Solar Panels
- Grid electricity from clean renewable sources such as offshore wind, wave and tidal
- Electric storage heaters
- Hot water via an electric immersion tank

8.2.2 Combustion Preference Order for the AQMA

If on site combustion is the only option for new developments in and adjacent to the AQMA, the following hierarchal preference list should be followed:

- Biogas for use in Ultralow NO_x boilers derived from Anaerobic Digestion (AD) that can seek Renewable Obligation (AD would be outside of the city centre)
- Ultralow NO_x boilers that run on natural gas with vertical flues at least 1.5m above the buildings highest roof apex, natural gas is the cleanest fossil fuel with
- Combined Heat Power tends to have higher emission of NO_x than the best gas boilers; any installation would have to demonstrate the lowest possible emission of NO_x, a flue release height above all roof tops in the vicinity, and a stack height determination would need to justify effective dispersion of NO_x emissions with no impact on dwellings in the AQMA
- “Low” NO_x gas boilers (not ultralow) that meet basic generic national requirements for the code for sustainable homes are not best available technology for the AQMA and may be refused planning permission
- Wood Fuel is renewable and carbon neutral but has higher emissions of NO_x and PM compared with gas, non-combustion, and grid supply meaning this method it is not appropriate for use in the AQMA. Determinations of Chimney height may be required as proof of effective dispersion of NO_x emissions including during start up and operation. A copy of Lord Hunts letter on biomass burning in areas sensitive for air quality is included in the appendix as a reference to the policy.

Gas fuel can achieve renewable obligation credit (ROCs) where it is derived from organic waste. Anaerobic digestion on farms or industrial estates outside the AQMA can produce biogas. The resultant gas is chemically very similar to natural gas (mostly methane) and

can be added to the gas grid and used for normal applications such as space heating, hot water and cooking.

Emission peaks happen during start up and shut down. That said, a simple rule of thumb is that oxide of nitrogen and PM emission rates depend on the type of combustion fuel. Emissions tend to increase down the list in the following order:

Fuel List of AQMA Dos for fixed combustion

- Electricity derived from renewable
- Natural Gas or Biogas
- Electricity derived from other grid generation
- Low Sulphur Gasoline

Fuel List of AQMA Don'ts for fixed combustion

- Wood Pellets
- Logs
- Heating Oil
- Diesel including low sulphur diesel and red diesel
- Heavy Fuel Oil (HFO)
- Low Sulphur Coal
- High Sulphur Coal

The fuels in the top list are fit for purpose in the AQMA environment.

8.2.3 Summary of AQMA Fixed Combustion Plant Policy

AQAP policy states in or adjacent to the AQMA that commercial scale combustion (> 45 kw peak) that is fuelled by wood, oil, or coal without a tall flu (above all surrounding building canopy and roof tops) should be avoided. Tall flues or chimneys are likely to be refused in the vicinity of Brighton & Hove and Rottingdean AQMAs due to conservation and visual planning considerations. Exemptions include small scale burning of wood and low sulphur coal in domestic properties. However in order to lawfully comply with the Clean Air Act, domestic burning in smoke control areas must use an exempt appliance with compatible fuels⁴². This AQAP strongly recommends that the Clean Air Act requirement is extended to those parts of the AQMA that are not part of pre-existing smoke control areas. Best practice in domestic solid fuel burning should happen throughout the city's AQMA and smoke control areas. Brighton & Hove City Council has produced a guideline pamphlet: *Using Solid Fuels Safely and Legally*⁴³.

8.2.4 Policy on Avoidance of Waste Burning

Another source of pollution in the city is household fireplaces and bonfires that are used as a means of disposing waste. Smoke and fumes can give rise to neighbourhood complaint that is difficult to prove as a statutory nuisance. The most sensitive, offensive place for this to happen is in and around the AQMA that is recognised as having the poorest air quality. Fires can contribute to transient emissions of oxides of nitrogen, smoke and the finest particles that can be an annoyance that offends neighbours. Smoke mixed with fog

can also impair visibility on highways that can be dangerous. This AQAP strongly recommends that alternative methods of waste disposal are used in and around both AQMAs. The council waste disposal site details can be found on the BHCC web page⁴⁴. Significant parts of the AQMA are in valleys and under certain meteorological conditions such as calm inversions a mix of smoke and invisible pollution can hang in these depressions in the landscape.

9 Community Involvement with Air Quality

The report has discussed how road traffic related air quality issues differ from climate change in that the impacts are immediate, local and constant. Some community groups have been very proactive and air quality issues are at the top of their agenda. However the Council will like to explore opportunities for more consistent community engagement across the remaining AQMA. This should be guided by the priorities identified in the summary tables listed. AQMA outreach needs to target residential dwellings in the area likely to exceed the nitrogen dioxide standard (Table 7-2) and locations where moderate emissions happen in a very confined street space (Table 7-3). The following summary describes community engagement relating to air quality to date.

9.1 Local Action Teams (LAT)

9.1.1 St James Street LAT

Air quality and traffic reduction are at the top of the St James Street LAT agenda. Recent discussions between Environmental Protection, elected members and Brighton & Hove buses and local people have discussed the possibility of exploring different bus routing options. Another favoured suggestion amongst some local residence is to make the street pedestrian priority with limited access for loading and pick up. Brighton & Hove buses are happy to consider an extension of the bus LEZ into St James Street and to consider some alternative routing trials. That said it is very important that there are no adverse consequences of route changes to Edward Street which already carries several times the amount of traffic compared with St James Street and is also part of the AQMA. By comparison, St James Street is narrower and has a higher density of dwellings within a few metres of the carriageway likely to exceed the nitrogen dioxide limit.

9.1.2 Rottingdean Parish Council

A number of meetings and talks have been held with the transport authority and Rottingdean Parish Council. Top of their list of items is air quality and reducing the impact of traffic in the High Street. Members and residents are very keen to minimise the impact of traffic on the character of the village in a conservation area and are concerned about the health impacts of pollution. Whilst the area of nitrogen dioxide exceedance is not as extensive as other AQMA streets, levels are considerably higher than background and continue to exceed the 40 µg/m³ level. It is recommended that alternative routings and keep clear zones are considered for a trial period. Air quality concerns can be relevant to neighbourhood planning, and it is important to consider air quality when drawing up a neighbourhood plan or considering a neighbourhood development order.

9.1.3 South Portslade Community Meeting

The council has received enquiries and complaints about air quality from residents in the Boundary Road and Trafalgar Road areas. Environmental Protection officers have met with residents to discuss traffic flow and air quality. Residents expressed interest in a countdown display that tells road users how many minutes and seconds until the railway crossing barriers are raised. If more than a few minutes', people would be happy to seek an alternative route to Boundary-Station Road. It was also hoped this idea would reduce the duration and frequency of traffic queuing at the level crossing on Boundary road. The road safety team have an active walk to school programme in Portslade and have considered the air quality benefits of such a scheme. Crossings include wider pavements and refuge islands to help pedestrians cross the road. The action plan recommends a funded exploratory study to determine and improve emissions standards for HGV using haulage routes along Wellington Road and Trafalgar Road.

9.1.4 Terminus Road Queens Road North Street

Discussions between Environmental Protection, Brighton & Hove Friends of the Earth, Brighton & Hove buses and the Transport Authority have emphasised the need for east-west priority for the Clock Tower Junction to ease bus congestion. As one of the most important parts of the AQMA community outreach is recommended to discuss air quality improvements for the area.

9.1.5 North Laine

With the exception of Frederick Place near to Queens Road Quadrant, air quality is good in this inner city area. A number of residents have been diligent to enquire about smoke control requirements and their legal duties with regard to the Clean Air Act. Environmental Protection has sent out advice and pamphlets as appropriate. Some residents have complained about motorbike parking and engine revving against lower ground floor windows and parking policy have been made aware. Action plan investigations show motorbikes are insignificant contributors to nitrogen dioxide over a calendar year or more.

9.1.6 Preston Circus Community Meeting

The last time the action plan went to open consultation an open community meeting organised by Councillors and was held near Preston Circus. The bus company, transport planning, University of London and Environmental Protection presented and participated in discussions relating to transport and air quality. About forty members of the public attended and the public had the opportunity to comment on the AQAP.

9.1.7 Lower Old Shoreham Road New England Road

Given the known Air Quality issues in this area further community engagement is required. The action plan recommends exploring options to minimise the amount of general traffic on the road link which is congested for many hours of the week.

9.1.8 Lewes Road

In the past community engagement for this area has expressed concern about the number of cars along the transport corridor. The new transport scheme favours extra capacity for cycling and bus usage. Since road works are completed, junction changes have been

implemented and buses retrofitted we would expect to see improvements in nitrogen dioxide along the corridor.

9.1.9 A23 Southbound: Beaconsfield Road Viaduct Road-Viaduct Terrace-Ditchling Road-St Peters-Grand Parade-Pavilion Parade-Old Steine

During 2014 a series of workshops discussed options for the proposed Valley Gardens transport scheme. The area has high residential population density adjacent to the main road and is collectively the most important section of the AQMA. Given the extent of the Air Quality issues in this area further engagement is required.

9.1.10 Eastern Road and Edward Street

Residents have expressed concerned about HGV deliveries in and around Edward Street, idling coaches and taxis near Eastern Road and buses routes from Edward Street to Egremont Place. Taxi licensing has adopted an anti-idling policy and coaches are asked to switch engines off. Further community engagement relating to air quality is recommended for Edward Street Eastern Road area around American Express and the Hospital. The middle section of the transport corridor has better air quality.

10 Educational Remit

In addition to communicating with community groups and LATs, part of the Air Quality Action Plans is an educational remit. Information and investigation findings are communicated in a variety of ways as follows:

- Environmental Protection Team Officers have given regular talks and lectures and local universities and schools.
- Talks and presentations to other council departments including health teams
- Regular information and press releases are edited and sent to the Council's media and communications teams that manage interest from press, radio and TV
- Information on monitoring and action planning is posted on the City Council's Web pages: "Air Quality Management in the City".
- Aim to continue to increase public awareness of local air pollution as a major influence on public health
- Linkages of travel plans
- Environmental Protection (author of this report) has given a number of Talks and presentations at national conferences. Topics have included air quality in a compact city, dispersion modelling, smoke control and air quality action planning.

11 Summary

For non-transport sources the report sets out a hierarchy of preferences for renewable energy options in the AQMA. For promoting pedestrian connectivity a hierarchy of crossing preferences to minimise emissions has been proposed in the section on road safety.

For transport this report has characterised where and why nitrogen limits exceed legal standards. The main contributors to roadside nitrogen dioxide vary in ratio, severity and extent:

11.1 Buses

The following routes are only likely to get better for local air quality if there is a substantial reduction in NOx emission from buses.

- B2066 North Street-Western Road
- A23 Northbound between Marlborough Place and Preston Circus
- A2010 Queens Road and Terminus Road
- B2118 St James Street
- B2194 Boundary Road

This aspect of the AQAP is advanced and has made tremendous progress in the past two years.

11.2 Heavy Goods Vehicles

The routes listed below require substantial reductions in emissions from HGV if we are to reduce nitrogen dioxide to compliant levels where people live adjacent to roadside.

- A23 Southbound Beaconsfield Road to Grand Parade and Pavilion Parade
- Edward Street and Eastern Road
- A259 Wellington Road through to B2139 Trafalgar Road, Portslade
- Hollingdean Road
- Sackville Road Old Shoreham Road Junction

HGV movements associated with an increase in construction and demolition risk adverse effects on air quality along these transport corridors and could compromise the air quality action plan.

11.3 Diesel Cars

The following routes are essentially bottlenecks or pinch points for diesel cars and vans. It is advisable that alternative modes and routing strategies are seriously considered.

- B2123 Rottingdean High Street
- A270 New England Road
- The Drove under the railway bridge to Millers Road

Whilst in many places bus and HGV emissions contribute most to ambient nitrogen dioxide the contribution for diesel cars and vans (LDV) is significant and should not be overlooked.

11.4 Taxis

Taxis are significant contributors to AQMA nitrogen dioxide especially around Queens Road, Brighton Train Station-Fredrick Place and the East Street-Castle Square ranks. Brighton & Hove continues exemplar Taxi Licence policy and is seeking opportunities, funds and incentives for encouragement of ultralow emission vehicles.

11.5 Recommendations

The council has had success with winning capital grant funds of one £million to enable measures in support of the ongoing air quality action plan. This has not included support for staff time to manage evidence base investigations, contractors, bids and projects. Resource support is required to enable staff to implement recommendations in the plan.

Explore funding for further improvements to bus emissions

- Fine-tuning of euro-5 performance conditioned for drive circuits through the AQMA
- Discuss realistic timings for bus LEZ to become euro six (2013 emission standard) or better (euro five has been available since 2008 and will soon fall out of date)

Explore funding for substantial improvement to HGV emissions

- A23 southbound Preston Circus to Edward Street including Grand Parade
- A259 Wellington Road and B2139 Trafalgar Road and Church Road, Portslade

Explore reductions in the amount of general traffic through:

- New England Street and link under the railway bridge
- Rottingdean High Street
- The Central AQMA A23 and A2010
- The Drove link under the railway bridge

Consider routings that:

- Favour gentle gradients and minimise stopping on steeper hill climbs
- Prioritise measures to improve flow and reduce emissions on AQMA road hill climbs especially; North Street, Terminus Road, Edward Street, St James Street, Trafalgar Street

12 Results from Formal Consultation on Air Quality Action Plan

Defra (Department of Environment Food and Rural Affairs) have requested that we include feedback from the council's consultation process in this action plan. Transport and Planning departments have made detailed comments on the document which have been incorporated into this post consultation edition of the action plan. This section summarises all the responses to the action plan consultation that was open between March and May 2015. Responses were received from the following departments, groups or individuals:

- Defra comments received April 2015 and are available as a report addendum
- Transport
- Planning
- Defra
- Friends of the Earth, Brighton & Hove
- Bricycles, the Brighton & Hove Cycling Campaign
- Brighton & Hove Food Partnership (more sustainable food delivery)
- West Sussex County Council

- Lewes Road for Clean Air Community Group
- Local residents that refer to: Lewes Road, North Street, Western Road, Preston Circus, London Road, Viaduct Road, New England Road, Valley Gardens, Pavilion Roundabout, Trafalgar Road Portslade and Balfour Road

Disclaimer: Individuals or couples have taken the initiative and responded to the consultation portal on behalf of groups or organisations; their views may or may not be representative.

12.1 Defra Review of the BHCC draft AQAP March 2015

This appraisal report covers the Air Quality Action Plan report submitted by Brighton & Hove City Council. The Action Plan sets out information on air quality obtained by the council as part of the Local Air Quality Management process required under the Environment Act 1995 and subsequent Regulations. It is a draft Action Plan, and will replace the previous action plan, which was published in October 2010.

The overall plan is clear, and generally follows the guidance outlined in LAQM Policy Guidance PG (09). The plan provides comprehensive background to the review and assessment work undertaken by the council. The plan also provides an overview of other relevant plans and policies that are likely to have a bearing on local air quality. Twenty-eight measures been included in the draft action plan and ones which have been estimated to have a high impact on air quality and are high priority measures include;

- Bus initiatives including: a Low Emission Zone for Buses, SCRT retrofit programme for buses and the development of a procurement strategy for buses;
- Changes to the taxi licencing and anti-idling policies;
- Alternative fuel infrastructure, including electric vehicle charging;
- Restrictions to vehicle numbers in AQMA areas;
- Refusal of new commercial solid fuel burning in or adjacent to the AQMA, with the focus on ultra-low NO_x boilers; and
- Consideration of freight initiatives including a Freight Consolidation Centre.

The council is advised to take consideration of the further commentary in the finalisation of its action plan.

Commentary

1. Brighton & Hove City Council has adopted a strategic approach to the update of their action plan with strong links made to other council policy and other authorities through the Sussex Air Quality Steering Group, which is welcomed. Details of the statutory consultees engaged with during the consultation phase should be included in the final draft (included above).
2. The AQAP includes a map of both AQMA sites and states that the AQMA has been declared for NO₂. The AQAP also includes a table outlining the nature of exceedences and this is an example of best practice.

3. The AQAP discusses the nature of source apportionment and provides details of both transport, commercial and domestic measures to reduce emissions. The AQAP would benefit from the inclusion of the source apportionment for each vehicle type, and each source to demonstrate whether the measures selected are the most suitable for reducing emissions in the two Brighton & Hove AQMAs.
4. Brighton & Hove City Council provide a clear indication of the dates that each of the measures is expected to be completed, although no information is provided in relation to the cost benefit analysis, or prioritisation method used to create the actions. Indicators that demonstrate when the action has been completed have been included, but an overall summary of when the overall objective is likely to be attained is not included.
5. The relevant authority for delivering each action has been identified and each has the necessary powers to create the change. Where funding is already in place, this has been identified within the AQAP. The council have identified several approaches for sourcing future funding, particularly through the Sussex Air Quality Steering Group, to deliver the changes required.
6. Information has been included within the AQAP relating to how Brighton & Hove City Council will monitor each of the actions to demonstrate that air quality has been improved within each of the AQMA areas.
7. The council strongly promotes partnership engagement and ownership within its action plan which is very much encouraged.
8. Overall, it is clearly evident that much work has gone into the production of this action plan and the importance of linking it to the transport policy within the authority and wider county.

Defra's commentary is not designed to deal with every aspect of the local Action Plan. It highlights a number of issues that should help the local authority in maintaining the objectives of its Action Plan, namely the improvement of air quality within the AQMA.

12.2 Friends of the Earth Brighton & Hove

On behalf of Brighton & Hove Friends of the Earth (BHFOE) I would like to welcome the opportunity to comment on the Brighton & Hove City Council Air Quality Action Plan. This comes at an interesting time with the recent Supreme Court ruling on air pollution.

Overall, BHFOE is very supportive of the need to take a more coordinated approach to tackling air pollution and where practicable in a more scientific way. However, this isn't always possible without a lot of modelling, while some of the solutions (such as investing in walking and cycling) can have other health and social benefits and so should be brought forward anyway.

BHFOE believes that a great deal of work has gone into the Action Plan, particularly in explaining the background and the nature of air pollution. However, BHFOE is not so convinced by some of the solutions suggested which it doesn't believe are based on an evidence based approach as espoused in the Action Plan.

The whole issue of air pollution is also a fast-moving area and since the consultation was started, the Supreme Court ruled on 29 April, 2015, that the Government needed to draw up a new Air Quality Action Plan by the end of the year. The ruling also touched on the issue that compliance with the Directive¹ needs to happen in “as short as time as possible”². This means that the Brighton & Hove City Council Air Quality Action Plan also needs to be considering actions in the same light and needs to be revised to accommodate this.

Similarly, while the council has done a fair amount to improve walking, cycling and public transport use, and all of these forms of transport have benefited from investment, there is still much to be done to create a fully connected cycle network which would allow a step change in cycle use. To a lesser extent, walking also needs further investment, while public transport needs urgent action to reduce delays on the bus network, something BHFOE has consistently raised now for many years. To date it has largely been ignored.

BHFOE also believes that the use of modelling to predict air pollution levels with changes in road layouts needs to be approached cautiously. That’s because a road layout change could lead to a change in road capacity, which might predict, a greater or smoother flow of motor vehicles initially and possibly a reduction in air pollution. However, this could be short-lived if the changes encourage more people to drive and could actually make the situation worse in the medium and long term. Ultimately, only schemes which facilitate modal shift have any chance of reducing long term air pollution.

In the section on road safety, BHFOE takes issue with some of the suggestions and analysis. For example, the report talks of the need to keep traffic moving, with pedestrian crossings subordinate to this. However, there is no consideration of whether it is more important to keep traffic flowing or whether by doing this pedestrians are kept waiting by the kerbside, exposed to poor air quality for longer and thereby placed at greater risk. This isn’t quite so black or white as it seems and the answer could vary depending on the location and the numbers of pedestrians involved.

BHFOE also disagrees with the comments on speed bumps which are potentially misleading. When considering the impact of speed bumps, research has shown that their frequency is the critical factor as to whether there is compliance with the speed limit and whether vehicles accelerate and brake in-between the speed bumps. Above a certain frequency of speed bump cars tend to be driven at a constant speed without increasing emissions. The situation as depicted in the Action Plan is not a given and highlights the need for good design, rather than the avoidance of ‘acute’ speed bumps.

BHFOE also questions the discussion of park & ride which fails to acknowledge that this has been problematic for decades now because of the impact that it would have on the South Downs National Park. Now that Brighton & Hove City Council is no longer the planning authority for the South Downs, this is likely to be even harder to deliver, or will involve using land which could more usefully provide housing or employment land.

The comments around park & ride are not backed up by any evidence and BHFOE cannot see how part time park & ride sites, other than when marketed for specific events, could prove to be of any use. If they became successful then it is likely that they would increase people’s expectation of being able to use them. This would encourage more people to

drive to the city but when they weren't available, this is likely to lead to more people then trying to park in the city centre, actually worsening the current situation.

Equally, BHFOE would be totally opposed to any suggestion of a park & ride site on greenfield land near the University of Brighton & Hove. BHFOE cannot see how encouraging more people to drive into the Lewes Road corridor is going to reduce air pollution there. It would lead to delays for traffic using Lewes Road both from the extra traffic and as cars would have to cross Lewes Road to access the site. Given the acute housing shortage, if that land is to be developed, it should be for housing.

It is also disappointing that this section does not discuss making better use of existing infrastructure (the railway) to deliver park & ride, or of reducing city centre parking. Unless city centre parking is not removed with the advent of park & ride, there is a real danger that overall, park & ride would just lead to more cars driving into the city with no relief from air pollution.

BHFOE would also suggest that the section on the Biosphere (section 5.3.5) needs revising and is rather confusing. Apart from the name of the Biosphere is incorrect, this section talks more about Bioregional and 'One Planet Living' than it does about Biosphere. While the two have overlapping objectives, they are not the same thing.

Comments on specific corridors

Castle Square to Lower Dyke Road and Western Road

The comments on this section are particularly disappointing and potentially misleading. It states that existing initiatives in the North Street corridor include improving *"east-west flow through Clock Tower by optimising the phasing of the traffic lights at the key junction"*. Yet this is clearly not happening.

BHFOE has campaigned for changes to be made in this area, including banning private vehicles from travelling through the area (north-south) which cause significant delays to taxis and buses from the station, but also this movement takes time from the east-west traffic flow. BHFOE has also proposed 2-way operation of the junction to increase its capacity (currently the signals only allow buses to go in one direction at a time) and allow more time for pedestrians as well. Brighton & Hove Buses have demonstrated that they can safely operate two-way bus movements at the Western Road junction with Lower Dyke Road so therefore improvements should be brought forward straight away. The recent ruling in the Supreme Court should add urgency to the need to make changes here.

A23 Northbound Marlborough Place and London Road (Aquarium roundabout to Preston Park)

The Valley Gardens scheme will be essential if pedestrian and cycle infrastructure in this critical part of the city is to be brought into the 21st century. When completed, this will boost walking and cycling into and through the area, providing safer and more convenient facilities for people going across town or accessing the seafront. The scheme, if designed properly, will also remove the hold-ups to the bus network that the current system creates at either end of York Place, the bus stop at the bottom of North Road and the advance bus filter near the Royal Pavilion.

BHFOE would, however, be totally opposed to electric vehicles being allowed to use the bus lanes, as the Action Plan seems to be suggesting. It would not take many electric vehicles to cause significant hold-ups to bus users, which would then increase emissions.

BHFOE is also concerned that in this corridor, no mention is made existing problems, some of which are listed above. Oxford Street junction is another area, where there needs to be improvements as southbound buses are often held up here, while services coming out of Oxford Street, frequently don't have enough time to exit and this leads to quite long delays. A rephasing of the lights and a more intelligent traffic light system are needed here.

Clock Tower north to Brighton & Hove Station and Seven Dials

BHFOE would welcome the suggestion to restrict private vehicles in this area to allow more space for buses, taxis and pedestrians where it is feasible. This would be helped by restricting private vehicles travelling north-south through the Clock Tower junction which needs to be prioritised to address the current hold-ups to the bus network in the North Street corridor.

A270 Lewes Road and wider area

BHFOE has real concerns about the suggestions contained in this section, as they are not evidence based and risk making traffic and air pollution worse. As already described, using existing parking intermittently as park & ride sites would not provide certainty for users and could lead to more people trying to park in the city centre when these intermittent sites were not available. Equally the unreliability could undermine their viability. Linked to this, BHFOE cannot understand how it is sensible to be suggesting building a park & ride site near Watts building / Preston Barracks on greenfield land. This would attract more traffic into the Lewes Road corridor and cause more delays and pollution.

Likewise, BHFOE would be suspicious of any attempt to upgrade Wilson Avenue – Drove Road route. While its purpose would be to relieve congestion, it could actually lead to an increase in car use and overall traffic levels as well as impacting on the South Downs National Park.

BHFOE would be totally opposed to allowing electric vehicles to use the bus lanes here too, even for a temporary period as once allowed it would be harder to then restrict again. It would also impact on cycle safety and bus efficiency along this route.

BHFOE strongly agrees with the need to have a restored rail link between Lewes and Uckfield as this would have significant and wider benefits.

A23 southbound Beaconsfield Road to Pavilion Parade

The implementation of the Valley Gardens scheme will be critical to the success of reducing emissions. In the scheme, all private vehicles will be routed down the eastern side of Valley Gardens. While, this will lead to more traffic on the eastern side, the 'reservoir' capacity of the roads will be reduced (not their flow capacity) and the road carriageway will be moved further away from the building frontages where possible. This should help reduce air pollution in the area.

St James Street

While BHFOE understands the reason for suggesting having the traffic flow westbound or downhill along St James Street, it is concerned at the impact that this could have on the area. Research needs to be done on how and why people are using buses in the area. If they are using the buses to get up the hill after they have done their shopping in St James Street, then changing the services around could severely undermine the shops in the area. Few people are going to want, or potentially going to be able to, walk either north to Edward

Street or south to Marine Parade with heavy bags of shopping to catch a bus east, up the hill.

Trafalgar Street – Frederick Place

BHFOE would support the idea of a freight consolidation centre serving the city. This would have many benefits in addition to air pollution, particularly on safety and the public realm.

Comments on specific issues

Taxi anti-idling strategy

This needs constant education and promotion. Having the sticker is not enough if the taxi driver then leaves their engine idling when they don't need to.

Railways and Air Quality

BHFOE would strongly support investment in railway infrastructure to improve services and reduce emissions. At present the unreliable services, particularly at weekends and bank holidays, are reducing the potential to bring more people into the city centre in a clean and efficient manner. The Council needs to lobby for improvements to address these issues.

Development and Buildings & 7.3 Policy Commitment from developer contributions for air quality

BHFOE is particularly disappointed that no mention is made of car parking and its role in encouraging more cars into the city centre, causing more congestion and pollution. This is an area that the Council does have some control over and it should be doing its utmost to reduce car parking in new developments, particularly in the city centre and adjacent to bus corridors. Failure to do so could have serious economic repercussions for the city centre and undermine city centre bus services, reducing their reliability and increasing their costs. The problem with the current planning system is that the investment in clean alternatives often pales into insignificance compared to the amount spent on subsidising car use. For example, the cost of the new car parking at the Royal Sussex County Hospital is likely to be over £10 million, while the money allocated to walking, cycling and public transport is only around £1 million. Unless this imbalance is addressed, the planning system is going to perpetuate the subsidy of car use which is only going to exacerbate the current air quality and congestion problems. This Action Plan needs to address these issues.

BHFOE is also concerned at what is meant in the Action Plan when it is suggested that developers pay for 'short access roads' in and around Rottingdean. BHFOE would be very concerned at new roads here and their possible impact on the South Downs National Park.

1 European Union law, Directive 2008/50/EC

2 Paragraphs 15 & 16, page 7, paragraph 27, page 12 and paragraph 33, page 14, Supreme Court Judgment on ClientEarth vs Defra, 29 April 2015 - <https://www.supremecourt.uk/cases/docs/uksc-2012-0179-judgment.pdf>

12.3 Bricycles, the Brighton & Hove Cycling Campaign

Bricycles (Brighton & Hove Cycling Campaign) and as a CTC (national cycling charity) representative for Brighton & Hove, we are writing to support the good work in this area and all policies and actions to ensure a switch to ultralow emissions or zero emissions of

oxides of nitrogen and particulate matter from traffic and other sources. Many thanks for all the work that has contributed to producing this report and acting on poor air quality. We would like to state our strong support for decisive action to improve the situation. Some things are clear. More evidence is emerging beyond the shocking figure that 29,000 people per year are dying prematurely due to poor air quality: <http://healthyair.org.uk/the-problem/>

There is a new link to strokes: <http://www.nhs.uk/news/2015/04April/Pages/Air-pollution-linked-to-shrunken-brains-and-silent-strokes.aspx>. Although most vehicle emissions occur less than one metre above ground, current sampling and monitoring does not take account of this: <http://www.airqualitynews.com/2015/04/24/road-pollution-at-pram-height-studied-in-glasgow/>. Poorer air quality at the level of children on foot or in buggies, often within inches of tailpipes, is likely to demonstrate even more serious health consequences for some young people. We were shocked at the air quality emergency in South East England in early April 2015. Brighton & Hove Public Health leads advised people with respiratory conditions such as asthma not to train outdoors at all. It is intolerable that due to air pollution, medical advice must be to stay indoors and avoid health-giving physical activity. We want this pollution to be reduced. We would like to be reassured that this Air Quality plan takes full account of the recent judgement on ClientEarth vs Defra of 29 April, 2015 <https://www.supremecourt.uk/cases/docs/uksc-2012-0179-judgment.pdf>. The UK Supreme Court has ordered the Government to take immediate action on air pollution, producing effective plans by the end of the year to cut illegal levels of air pollution in Britain. The Government, and therefore also the local councils, must urgently clean up pollution from diesel vehicles, the main source of the illegal levels of Nitrogen Dioxide found in many UK towns and cities. This ruling will benefit everyone's health but particularly children, older people and those with existing health conditions like asthma and heart and lung conditions. We support the point in the plan to target the most polluting traffic emissions that happen in high density retail and residential areas that have limited land and space. Where people shop or spend time is also important as well as where they live and work. This was not captured in the survey questions. Would like to see continued encouragement by the council of sustainable transport; building on the established high levels of bus use, low car ownership, and increased cycling in Brighton & Hove and Hove. We would like to see the Council continue to improve infrastructure so that more people are able to walk and cycle e.g. by making one way streets two-way for cycling and radically redesigning junctions to ensure that journeys are simpler and safer for people on foot or on bikes. We are strongly in favour of implementing the Valley Gardens scheme with big improvements for people who walk, cycle or use wheelchairs to make the journey from St Peters to the Sea front and back. At present this area is extremely confusing and hazardous due to convoluted roads and cycle tracks and a lot of polluting traffic, which is often at a standstill on summer weekends. We are very concerned that cyclists are exposed to this pollution, while producing none of it. We are very supportive of traffic reduction to combat toxic emissions. We do not support park and ride schemes as a solution because they involve big subsidies to car use, do not reduce car dependence for whole journeys and are traffic generators. We see that The Air Quality Action Plan (AQAP) recommends that wherever possible smooth traffic flow is maintained and not disrupted. The plan says (page 27) this means a strong preference for pedestrian

crossings that do not stop traffic, hinder smooth flow or create road blockages. The aim should be to minimise vehicle queue durations that risk delay. We want to make sure that pedestrians and cyclists are not delayed by non-stop traffic. We favour a scheme where motor vehicles are restricted to prevent poor air quality, rather than people being restricted. We would like to see walking and cycling being made safer and convenient throughout the whole City. Appropriate infrastructure and junction redesign needs to take place, with road space switched from motor vehicle use where necessary.

Given that NO_x / NO₂ emissions controls on diesels have not been successful so far then it is no surprise that the city has some of the highest concentrations in the UK, about (114 ug m⁻³ which is more than 2.5 times the 2010 EU Limit) according to the council's assessments on roads where traffic is almost exclusively diesel (North St, Western Road etc). It is suggested that the council should work with DEFRA to ensure that these measured concentrations are reflected in the reporting to the EU. This could risk EU fines for the council but it could also leverage more funding if the magnitude of problem was properly recognised beyond the city. The bus LEZ could be extended to taxis but crucially it has to be systems that are effective in city centre driving conditions. This has been the problem with the progressive Euro standards. There is some very early evidence that Euro VI for heavy vehicles might work better:

<http://www.theicct.org/comparing-real-world-nox-euro-iv-v-vi-mar2015>

Keeping an eye on this evidence and perhaps incentivising these newest vehicles as part of the LEZ would be good rather than spending resources in getting Euro V or Euro IV. Similar might apply to taxi Euro 6 but this is not clear yet.

Wood burning is important and the refusal of planning for new applications within the AQMA is good. The action hierarchy is well considered too.

PUBLIC HEALTH: It is suggested that the council could be more ambitious in this area. Public health is now part of the council and there is a public health indicator related to PM_{2.5} which focuses on reduction beyond EU Limits. New evidence on the health effects on NO₂ suggests that decreasing exposure below the EU Limit is desirable too. So the council should also work more actively to decrease pollution concentrations everywhere. If the council focuses on encouraging active transport then the public health benefits will be far greater than policies that focus on exhaust emissions alone. Another aspect would be to decrease exposure as well as concentrations. For example encouraging people to take low pollution routes when walking and cycling. This could be done by signage, education and building walking and cycle infrastructure away from the side of busy roads.

Care has to be taken with trees. If these reduce air circulation around roads they could lead to greater concentrations. Not really a substitute for a proper emissions abatement programme. They do make an area more attractive for walking and cycling and should be supported for this reason but are not really an air quality measure beyond this.

FREIGHT: Not much mention in the consultation document? Extending the LEZ to include delivery vehicles would be a great way forward especially given the amount of retail in the central AQMA.

ENGAGEMENT WITH BUSINESS: In central London many of the business improvement districts are becoming concerned that poor air quality might affect the attractiveness of their area as a place for shopping , locating offices etc. and are working to do something about it. Working with business would enable to council to get a great spread of ideas and maybe access different funding streams too. Have a look at the good work being done by <https://thenorthbank.london/>
<https://thenorthbank.london/making-progress/public-realm-and-environment/>
and some progressive things is their rather large report:
<https://www.thenorthbank.london/wp-content/manual-uploads/Publica-Northbank-Report.pdf>

Also

<http://inmidtown.org/>

specifically:

<http://midtown.london/our-work/air-quality/>

<http://midtown.london/our-work/cycling/>

http://inmidtown.org/wp-content/uploads/2014/09/IMT_Cycling_Report.pdf

12.4 Brighton & Hove Food Partnership

Just wanted to add a brief comment on behalf of the Brighton & Hove Food Partnership to say we welcome the fact the strategy draws out the links with wider sustainability initiatives, such as One Planet in which we are a partner, and in which food plays an important role. However we feel the strategy should also address: 1) The importance of facilities especially provision local shops in neighbourhoods, to reduce dependence on people travelling to purchase food. This also has food access/food poverty benefits. 2) when considering freight, Food transportation is a major contributor to pollution from this source. Getting food from A to B more intelligently is something we would like to see the city addressing and we hope may come out of any future freight strategy for the city.

12.5 West Sussex County Council

We welcome the detailed evidence-based justification for initiatives within the plan. In particular, we note the intention to consider a Low Emission Zone or low emission funds for HGV traffic routing along part of A259 around the port, as well as potential for alternative routing strategies for diesel cars and vans into the city on some corridors such as A270 Old Shoreham Road (near New England Road). We also note the potential for amendments to the bus low emission zone for the North Street-Western Road corridor and further work to promote ultralow low emission taxi vehicles. The County Council would like to be consulted on any specific proposals that come forward which could affect traffic routing in West Sussex, particularly any impacts on Air Quality Management Areas declared at A259 High Street, Shoreham-by-Sea and the A270 Old Shoreham Road, Southwick. It would be helpful if these AQMAs could be referenced in the plan and in due course for consideration to also be given to the impact of initiatives on AQMAs outside the city. Any further consultation should also include Worthing and Adur Councils, the

Shoreham Port Authority, and bus and taxi operators on any specific proposals that come forward.

12.6 Lewes Road for Clean Air Community Group

We appreciate how hard this issue is to tackle and how painfully slow progress can and has been. We are pleased to see this report offering information and action on the subject. We applaud the suggestion of a park and ride scheme making use of existing infrastructure in the form of Preston Barracks and university car parks along the Lewes Road. This is something that we have been suggesting for the last six years and so it's great to see it as a recommendation here. When we ran a trial weekend park & ride scheme in September 2009 (car-free day), using the Mithras House car park, drivers visiting the city were delighted to have this option. We'd like to add that park & ride should include cycling options and should link into the city's planned cycle-sharing scheme. Also the concept of 'park & stride' - walking into the city should be included. We do not believe that park and ride needs to rely on free or special bus services but should ideally be linked to existing bus services. We support all possible efforts to promote modal shift away from private car dependency toward active travel, public transport and car-sharing as much as possible. It's crucial that new housing and business developments are pressured to do everything possible to support and incentivise more sustainable travel and limit private car-use. We are particularly excited/concerned at the prospect of the Preston Barracks development and the need to ensure that traffic impact from this is minimised and active travel/bus/train use supported. We believe that a cycle-sharing scheme for the city has particular potential along the Lewes Road corridor with Preston Barracks as a key hub. The Valley Gardens scheme is also an exciting prospect for the city in what it can offer for more walking and cycling, particularly linking the Lewes Road and London Road corridors to the seafront and improved permeability to the North Laine area. The potential to improve bus services and smooth motor traffic flow is also significant. We fully support the proposals for Valley Gardens and acknowledge its importance in addressing air quality and other transport and health issues for the city. We support increased messaging to the public to increase awareness about the impact we can all make to improve air quality, including signage to encourage drivers (not just taxi-drivers) to switch engines off at traffic lights. We believe that severe air pollution events should be used more as an opportunity to ensure motorists take more responsibility and are encouraged to not drive on such days. We support charging for car parking at all university sites as essential in incentivising alternatives to car use for staff and students and helping to moderate traffic along the Lewes Road corridor. We also believe that this can help raise revenue for both universities and should be compatible with a park & ride scheme. We support lobbying for the opening of the Lewes to Uckfield line and believe that this would help to reduce some traffic along the Lewes Road and into and out of the city centre. We are delighted that the issue of diesel emissions from buses is being tackled and is vital in shifting the ironic situation where buses are increasing the main source of pollution. We believe that the routing of so many buses along North Street is problematic and support proposals to use alternative routes, including services linking neighbourhoods around the edge of the city. We believe that it would be helpful to encourage bus companies to consider express services between Falmer and the west of city (Portslade/West Hove) using the bypass and linking with

Hollingbury as an alternative to the popular 25 route. This would take some pressure off the city centre and Lewes Road corridor.

12.7 Local Resident Comments (order received)

If the parking restrictions were enforced (double yellow lines) along Western Road this would improve the flow of traffic. Particularly during peak times the free flow of traffic is prevented by illegally park cars. This causes problems for buses in general and bendy buses in particular. Enforcing parking restriction would also improve road safety and encourage cycling.

Fully support all action to improve air quality in our City. The incentives to electric vehicles could be highlighted a lot more to encourage private owned car switching to electric cars.

The pollution created by school drop off and pick up. Balfour road is particularly bad.

Lewes Road is very (much) polluted.

As a resident of Trafalgar Road living in a council property with an asthmatic partner and child, I feel the council should be obliged to fit double glazed doors (front and back) with proper draft exclusion to prevent fumes entering our house which is right near the traffic lights on Old Shoreham Road and also that our windows have adequate seals fitted for the same reason, also could the port not be charged for air filters for inside the house and window cleaning etc.

I have looked carefully at the document and the one thing that stands out is the fact that petrol cars seem to be a very small proportion of the NO₂ problem in all areas. Buses and HGVs and diesel vehicles are the main issue. The city has been at gridlock for the last four years due to constant road developments and tinkering. This looks set to continue if the Valley Gardens proposal actually goes ahead. I speak to bus drivers who are convinced that Traffic Light phasing is getting worse and causing more problems. Take for example the junction of New England St and Viaduct Rd. You can see up to 30 vehicles get out of New England during one phase but only three or four from Viaduct Rd when their turn comes round. The build-up of traffic under the viaduct and up the Old Shoreham Rd is unacceptable. Because the lights on Preston Circus do not work in proper phasing with these other sets the space between New England and Preston Circus fills up with cars from New England Rd, thereby not allowing other cars to even get moving at all. The Green administration has been using a stick to hit vehicle users with rather than a carrot. "Make life more difficult and unpleasant by slowing traffic down to a virtual standstill rather than allow traffic to flow freely" If the roundabout at the Palace Pier is changed to a T-Junction with traffic lights this will also make things far worse. We are told it is one of the most dangerous junctions in the city. I have never heard or read about an accident of any kind on this roundabout because all vehicles use it sensibly and carefully. Can you tell me how many accidents there have been in the last five years involving motor vehicles?

It is very comprehensive and for a lay person (ME!) difficult to understand and read. It is good to see emissions from types of transport from specific roads/areas. A Light version would be good for community engagement (Glad to see this mentioned) with the process. It would be interesting to see regular emissions levels for key 'zones' published regularly in

local media and council website so public could a) see the extent of the problem and b) The Progress from introducing the plan. Some public Education about NOx and where it is coming from in a simple format that is really pushed as many traffic related schemes have been publically criticised by people not being aware of the benefits.

A load of impenetrable jargon that is almost entirely meaningless to the layman. Recommend a 'one side of A4 summary in plain English.

12.8 Summary Response to Consultation Comments

It is noted that not all consultation comments share the same views. However there is considerable commonality that can be taken forward. Agree that extra initiatives are required to reduce vehicular movements associated with food and waste distribution most especially in the AQMA.

References provided by Bricycles are welcome. The council monitors outdoor pollution at various heights. HGV vertical exhaust pipes are often higher than other vehicles and can be 3 meters above the ground. In streets where freight emissions contribute significantly to ambient nitrogen dioxide this can influence the vertical distribution of pollution. Brighton & Hove is meteorologically different to Glasgow where the study references changes in pollution with height. Stronger and more frequent sunshine gives rise to unstable atmospheric conditions that can cause daily pollution to rise to first and second storey levels. Convective movements within an enclosed street canyon tend to mix pollution at ground and first floor levels. Stronger winds across rooftops (~10 metres height) are free from the building canopy and tend to be much better for dilution of pollutants and entrainment of fresher air. Dispersion modelling has mapped nitrogen dioxide one meter above the ground and these results have been reported to Defra. The Air Quality Management regime sets out to define areas, but the local authority does consider the depth and height of the problem which are important for the planning process.

Agree with Friends of the Earth (FOE) that Defra's policy is to comply with the EU Directive in "as short a time as possible". FOE is not convinced that some of the solutions set out in the AQAP are evidence based. The evidence presented includes; dispersion modelling, traffic counts, long term nitrogen dioxide monitoring, population density, the measured dimensions of streets combined with field observations. Agree that BHCC can implement solutions such as active travel for a variety of reasons and not only because a street has been identified as priority for air quality improvement.

Traffic needs to be kept flowing in order to reduce emissions per mile. At the same time there needs to be reasonable provision for pedestrians to cross (preferably without stopping the traffic). Pedestrians (including children) and cyclists can be exposed to pollution for brief (transient) periods at a time for example when waiting to cross a road; however the most likely exposure to pollutants over the long term is people that reside in roadside housing day after day over a number of years. This is our priority for environmental protection. It is therefore very important that traffic is not stop-start in close proximity (8 metres) to permanent residential especially high density and overcrowded housing.

The AQAP advises emissions avoid confined spaces where people live or spend time such as within street canyons with high footfall and where people lead sedentary lifestyles. We are not aware of committed plans to increase road capacity. Locally Friends of the Earth state that only modal shift in transport can reduce long term pollution. At this stage it would help if modal shift in transport choices is not from petrol over to diesel OR from public transport and active travel to electric cars (which would reduce road capacity). We note a number of objections to an inner or outer city centre park and ride. The revised section explains that vehicles (including cars and vans) left outside the centre could help reduce the amount of traffic that enters city centre transport corridors where air quality is a problem. Many new developments in and near the AQMA are car free with provision for cycle storage. It is imperative that the Valley Gardens transport scheme does not worsen pollution along Grand Parade. Suggestions for changes to junctions in the AQAP consultation can be passed onto to the Transport Department.

Locally there is a necessity to support the most sustainable forms of ultralow or no emission travel for; waste and food distribution, general freight movement, construction and works traffic, highways maintenance, school and work commutes, events, leisure, shopping and tourist visits.

Defra sets out guidelines of what it would like to see in Local Air Quality Management Reports (LAQM regime). The reports in the public domain provide detailed information that is useful for consultants and others. It can be less helpful for members of the public seeking simple take home messages.

A non-technical summary of this document (about four pages) is written for the Environment, Transport and Sustainability Committee scheduled for October 2015. Agree it would be of benefit to have further public education information about the benefits of council initiatives to create a healthier more active city.

Table 12-1 Air Quality Action Plan Summary Table (updated from 2014 Progress Report)

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
1	Low Emission Zone for Buses	Reduce bus NO _x emissions in the AQMA-LEZ using Bus Quality Partnership Agreements (BQPA) Traffic Regulation Condition (TRC)	EP with DfT	2013	Euro V compliance for frequent Services Completed early 2015	All frequent services in bus LEZ at least euro-5 standard by 2015 Prior agreement with bus operators. CCTV in place	Seeking >2g/km NO _x for buses Primary NO ₂ not more than 50%	Traffic Regulation Condition (TRC) for Brighton & Hove bus LEZ unanimously approved by committee Jan-14. Referenced in LTP4	COMPLETE	Portable Emissions Monitoring System (PEMS) revealed differences between euro3, euro 5 OME and retrofits

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
2	SCRT Retrofit Programme for Buses	Clean Bus Transport Fund (CBTF) £750,000 awarded	EP with BHB	2013	Delivered	50 Retrofit Completed	Seek 80% NOx emission reduction on fifty frequently used Euro III buses	Won £750,000 from 2013-CBTF for Brighton & Hove buses matched funded		Retrofit of Euro III close to Euro-IV
3	Flywheel Hybrid Euro-VI new Purchases	New buses for 2015 Metro Bus & Go Ahead Group	Go Ahead including Metro Bus	2014	Mid-2015	New Euro VI buses with flywheel	New buses operating in AQMA	New hybrid vehicles to arrive March-2015	COMPLETE	reduction in NOx on launch reduction in fuel and carbon

Brighton & Hove City Council Air Quality Action Plan

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
4	Procurement Strategy for new buses	Green Bus Fund bus company matched funding	Go Ahead including Metro Bus supports by CVTF, OLEV	Ongoing	2015 Move towards better than euro 5 for LEZ	Number of hybrid and euro 6 buses achieve better than OME euro-5 through the LEZ	Test NOx reduction with PEMS or roadside monitoring	13 hybrid buses in service 24 brand new buses euro 6 and flywheel hybrid for 2015	COMMITTED MID-2015	Euro III retired from the fleet by 2015 improvement euro 5 OME 2016/17
5	Retrofit of Taxi Minibuses	Clean Vehicle Transport Fund (CVTF) and taxi company	EP City Cabs and Green Urban	2014	2015	22 retrofitted minibus taxis NOx sensors and track testing	SCR	Successful bids at design phase for bespoke compact catalysts	ONGOING 2015	Aim for NOx down by >80% Seeking PEMS or Millbrook tests

Brighton & Hove City Council Air Quality Action Plan

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
6	Taxi Licencing Policy	Change licence policy to encourage lighter low emission vehicles	Taxi Licence Forum	2013/14	20415/16	Encourage niche market in light low emission taxis licenced for one or two passengers	Aim for emissions of NOx <50mg/km i.e. better than euro 6	Discussions with Taxi Licence Forum	AGREED IN PRINCIPAL 2015/16	To be supported by structure for fuel choice: such as methane ethanol and electric
7	Signs not Fines	Anti-Idling signs on all taxi ranks in around the AQMA	Taxi Licence Forum approved by Committee	2013/14	Done	Action to reduce idling time and taxis and other vehicles	Emission and annoyance	Agreed & funded by taxi licencing forum	COMPLETE	Avoid fuel consumption and emissions when not moving

Brighton & Hove City Council Air Quality Action Plan

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
8	Assess junction light phasing to reduce AQMA queuing	Assessment of key AQMA junctions to see if queuing time can be reduced	TA and prioritised schemes	2015	2015/2016	Better flow for AQMA road links	Reduce breaking and idling and new standing start accelerations	Brighton & Hove Gateway-Clock Tower. Lewes Road Elm Grove Junction Rottingdean	PROPOSED	Prioritise NOx reduction for key corridors with housing
9	Rapid vehicle charging network	OLEV funded project with electromotive	Sussex Air Project	2013 Lead Sussex Air	2014/15	Rapid chargers across the Region including Brighton & Hove	Zero tailpipe emission of NOx	Sites to include Brighton & Hove	COMMITTED 2014/15	Strong growth in e-car share of market

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
10	Alternative fuel Infrastructure for vehicles in the AQMA	Seek opportunities for methane and or ethanol	EP and Partners possibly supported by DfT OLEV, Defra	2015	2015/16	Use of bio-methane and by-product ethanol as transport fuel	Aim for emissions of NOx <50mg/km for light vehicles better than euro-6 for heavy vehicles	Dialogue with partners	PROPOSAL FOR 2015/17	Benefits for NOx, PM and CO ₂

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
1 1	Air Quality Assessment for Major Transport Schemes in the AQMA NO ₂ improvement sort	Urban realm improvement and Local Sustainable Transport Capital Projects	TA with support from SEP, LEP, LSTF modal changes and Gateway Project	2012/14	2016/17	Seek Improvements in ambient air quality especially NO ₂ in the AQMA	Better traffic flow, wider concourse, planting & amenity green space	Impact assessment of schemes to consider NO ₂ improvement in the AQMA paramount	ONGOING	Substantiate designed improvements with monitoring

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
1 2	Assess Environment Capacity of transport corridors through the AQMA	Assess heavy vehicle numbers relative to NO ₂ limit consider likely constraints and capacity limitations	EP Delivered as part of AQAP	To be balanced with emission reduction achieved by other measures	2015 and ongoing	Established Baseline of bus and HGV movements on AQMA road links	Substantial Emission reductions of NOX	From 2015	2015	Consider London AQ action plans; Oxford St and Putney High Street

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
1 3	Actively seek alternative renewable solutions and avoid combustion plant in the AQMA	Avoid solid and liquid fuel burn in the AQMA through comments on planning applications	EP and Planning	Active comment on the planning process	2015 AQ action plan policy	Take up alternative renewables	Solid fuel burning prone to emission peaks on starting up. NOx and PM higher than for oil and coal	Ongoing	ONGOING	Appropriate location for carbon saving strategies

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
14	For Developments in the AQMA aim for lower NO _x emission rates than the government zero carbon homes standards or BREEAM	Combustion development in the AQMA to use ultra-low NO _x boilers or electric heaters in and adjacent to the AQMA	EP comment on planning apps	Active via the planning process	Policy of the 2014 AQ action plan	Seek other renewable solutions before certification of ultralow NO _x gas boilers	>20 mg/MJ NO _x for new gas boilers in and adjacent to the AQMA	Ongoing	ONGOING	An order of magnitude reduction compared to regular boilers

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
15	Where new gas combustion plant is proposed in the AQMA to have vertical flue terminations above roof apex in accordance with the Clean Air Act guidance	Avoid horizontal flue termination to the street in the AQMA. Encouraged through comments on Pre-application consultation and comments on Planning Applications	EP comment on planning apps	Active via the planning process	Policy of the 2014 AQ action plan	Conditions on planning applications	Effective dispersion and exposure avoidance	Ongoing	ONGOING	Measure relates to flue height, location & dispersion and not emission rate

Brighton & Hove City Council Air Quality Action Plan

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
16	Ensure new residential developments do not have a negative impact on local air quality and public exposure to air pollutants is reduced at roadside.	Planning Comments relating to new residential land use BHCC Policy SU9	EP	Active via the planning process	Ongoing	Where appropriate Conditions on planning applications	Measure is not about emissions. Effective exposure avoidance	Ongoing	ONGOING	Ventilation strategy to avoid dose and exposure

Brighton & Hove City Council Air Quality Action Plan

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
17	Encourage domestic solid fuel burning to use smokeless fuels and exempt appliances	EP Info leaflet complaint responses comments on planning apps	EP	2012	2012/13	Enquires	Less NOx, PM and smoke reduction of indoor CO	Pamphlet and web sites Delivered	ONGOING	Reduce complaints from solid fuel burning in the home
18	Households not to use fires to dispose of waste in AQMA	Encourage where appropriate with enforcement having regard to the Council Enforcement Policy.		2012	Ongoing	Enquires	Less NOx, PM and smoke	Web information	ONGOING	Reduce complaint for fires

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
19	Ensuring that new developments do not have a negative impact on local air quality and public exposure to air pollutants is reduced.	S106 contributions secured where appropriate to support mitigation measures.	EP and Planning Policy	2015	2015	S106 contributions secured where appropriate to support mitigation measures.	Insure beneficial change from new development	Part of AQAP	ONGOING	Explore opportunities for offsite mitigation towards green infrastructure, traffic management measures, sustainable transport improvements

Brighton & Hove City Council Air Quality Action Plan

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
20	Intervention measures to consider alternative routings trails for traffic	AQAP Evidence to support a mandate for transport authority to intervene	TA	Proposed	To consider	NO2	Reduce Traffic entering AQMA especially with a view to main contributors	To be considered	PROPOSED	More than half
21	Higher Standards for bus LEZ Moving towards Euro-6 and higher % of Hybrid	Improving emissions of original manufacture equipment	TA, EP DfT and Go Ahead Group	2015/16	To be Defined	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	Approximately half of the bus fleet operating through the LEZ are Euro-6 emissions standard although actual performance varies

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
2 2	Explore Grant Application for lower emissions from construction traffic	Edward Street, A23 and Lewes Road, Grand Parade Identified by Source Apportionment	BHCC EP	2015	To Confirm	Seek funds for retrofits and or make up the difference of hybrid purchases	Target haulage corridors	First mention in AQAP 2015	PROPOSED	Aim for 95% NOx reduction with monitor check

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
2 3	Explore Grant Application for Lower Emission Standard for frequent HGV from the Port Inland	A259 and B2139 Wellington Road & Trafalgar Road Identified by Source Apportionment Assessment	To Confirm	2016	2017	Seek funds for retrofits and or make the difference on hybrid purchase	Target haulage corridors	First mentioned in AQAP 2015	PROPOSED	Aim for 95% NOx reduction with monitor check

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
24	Consider impact of pedestrian crossing points on traffic flow and impact on emissions and air quality	AQMA especially A23 A270 and A259	Road Safety and EP	2015	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	ONGOING	Reduce frequent transient emissions

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
25	Review Central parking spaces that attracts traffic into the AQMA	Queens Road North Road access requires traffic to drive through the AQMA More Parking outside AQMA	To Confirm	Proposed	Proposed	Reduction in general traffic attracted to the Central AQMA	Reduction in emission for general traffic	First mentioned in AQAP 2015	PROPOSED	Take out general traffic emissions

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
26	Consider Freight Consolidation Centres	Outside AQMA provision of "Last Mile Services" actually 3km along A23 and A270 from AQMA boundary to City Centre	To confirm	Proposed	Proposed	Reduce HGV impact on AQMA	Impact on AQMA	Discussed in the past and referenced in LTP4	PROPOSED	Avoidance of HGV emissions in AQMA for frequent services

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
27	Based on Existing Evidence Buses to reduce emissions for steep uphill sections. Consider preference for downhill routings	St James Street Edward Street Terminus Road, Technology use on North Street	To confirm	2015/16	PROJECT	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	PROPOSED	Substantial emission reduction where engines are in load
28	Location of new Taxi Ranks to consider ambient air quality	Especially Main Station and Coombe Terrace-Lewes Road	EP Taxi licence Forum	2015	2016	NO ₂ levels in the vicinity	At modal interchanges and new developments	Discussions on routing around Station Gateway	Ongoing	Move to locations away from people better for dispersion

Brighton & Hove City Council Air Quality Action Plan

	Measure	Focus	Lead Section BHCC and Partner Body	Planning Phase	Implement Phase	Indicator	Target Annual Emission Reduction in the AQMA	Recent Progress	Estimated Completion Date	Comments Relating to Emission Reductions
29	Coach Strategy	Coach Parking	TA to consult EP	2015	4 year plan		Mentioned in LTP4	Response to complaints	2019	Around coach parking areas

13 Appendix (separate pdf)

13.1 Emission Assessment

13.2 Model Verification

13.3 Model Map Results with annotated road links

13.4 Traffic Source Apportionment

13.5 Photographs in the AQMA

14 References and Endnotes

¹ World Health Organisation 2014, *Ambient Outdoor Air Quality and Health: Key Facts*. Found At: <http://www.who.int/mediacentre/factsheets/fs313/en/> [2 February 2015]

² Public Health England 2014, *Estimates of Mortality in Local Authority Areas Associated with Air Pollution*. Found At: <https://www.gov.uk/government/news/estimates-of-mortality-in-local-authority-areas-associated-with-air-pollution> [2 February 2015]

³ Air Pollution may cause more deaths than previously thought say scientists. Found At: <http://www.theguardian.com/environment/2015/apr/02/air-pollution-may-cause-more-uk-deaths-than-previously-thought-say-scientists> [July 2015]

⁴ The Environmental Research Group, University of London 2015 *Air Quality Research Analysing the Impacts of Air Pollution on Health in the Modern World*. Available from: <http://www.kcl.ac.uk/lsm/research/divisions/aes/research/ERG/index.aspx> [2 February 2015]

⁵ Committee on the Medical Effects of Air Pollutants 2010, *The Mortality Effects of Long Term Particulate Air Pollution in the UK*. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/304641/COMEAP_mortality_effects_of_long_term_exposure.pdf [2 February 2015]

⁶ Part IV of the Environment Act 1995, Available from: <http://www.legislation.gov.uk/ukpga/1995/25/contents> [2 February 2015]

⁷ Brighton & Hove City Council 2013 *Declaration of Air Quality Management Areas* Available from: <http://www.Brighton & Hove-hove.gov.uk/content/environment/air-quality-and-pollution/air-quality-management-city> [2 February 2015]

⁸ Brighton & Hove City Council *Local Transport Plan 4, 2015* Available from: <http://www.Brighton & Hove-hove.gov.uk/content/parking-and-travel/travel-transport-and-road-safety/local-transport-plan> [February 2015 pending]

⁹ Parliamentary Commons Select Committee, *Air Quality Inquiry last update 2014* Available from: <http://www.parliament.uk/eac-air-quality-2014> [2 February 2015]

¹⁰ Risk of exceeding 90% of the NO₂ standard >36 µg/m³ (micrograms per cubic meter of air) over at least three years that is also more than twice ambient background levels monitored in local parks and suburbs. Method developed from department of the Environment Local Air Quality Management 2009 Technical Guidance https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69334/pb13081-tech-guidance-laqm-tg-09-090218.pdf

¹¹ Westminster City Council *Air Quality Action Plan* https://www.westminster.gov.uk/sites/default/files/uploads/workspace/assets/publications/AQAP_2013-2018_FinalDraft_V1-re-1368525818.pdf [Feb 2015]

¹² Note: 2013 AQMA 220 hectares of Brighton & Hove, Hove and Portslade and < one hectare of Rottingdean Village

¹³ BBC Radio 4 Costing the Earth *The Diesel Decade 2014* <http://www.bbc.co.uk/programmes/b04f9r9h> [25th February 2015]

¹⁴ Channel 4 Dispatches *The Great Car Con* January 2015 available at: <http://www.channel4.com/programmes/dispatches/on-demand/59670-003> [25th February 2015]

¹⁵ Brighton & Hove City Council 2014 *Air Quality Progress Report* found at: <http://www.Brighton & Hove-hove.gov.uk/content/environment/air-quality-and-pollution/air-quality-management-city> [25th February 2015]

¹⁶ EU Environment *Air Quality Standards* including Particulate Matter less than 2.5 microns found at <http://ec.europa.eu/environment/air/quality/standards.htm> [25th February 2015]

¹⁷ EU Urban Access Regulations Found at: <http://urbanaccessregulations.eu/home> [Feb 2015]

-
- ¹⁸ EU Environment and Transport *Vehicle Emissions Standards* Found at: <http://ec.europa.eu/environment/air/transport/road.htm> [Feb 2015]
- ¹⁹ Brighton & Hove City Council Old Town Improvements <http://www.Brighton & Hove-hove.gov.uk/content/parking-and-travel/travel-transport-and-road-safety/old-town-traffic-improvement-proposals> [Feb 2015]
- ²⁰ EU Urban Access Regulation Summary of *Brighton & Hove's Low Emission Zone* found at: <http://urbanaccessregulations.eu/countries-mainmenu-147/united-kingdom-mainmenu-205/Brighton & Hove> [2015]
- ²¹ For 2014 New government rules for DPF <https://www.gov.uk/government/news/new-rules-for-mot-to-test-for-diesel-particulate-filter>
- ²² The Sussex Air Quality Steering Group found at <http://www.sussex-air.net/> [Feb 2015]
- ²³ Brighton & Hove City Council City Plan Part 1 found at: <http://www.Brighton & Hove-hove.gov.uk/content/planning/local-development-framework/submission-city-plan-part-1> [June 2015]
- ²⁴ Considerate Constructors Scheme found at: <http://www.ccscheme.org.uk/> [June 2015]
- ²⁵ Brighton & Hove City Council One Planet Status found at: <http://www.Brighton & Hove-hove.gov.uk/content/environment/sustainability-city/one-planet-city> [25th Feb 2015]
- ²⁶ Department of the Environment *Emission Factor Toolkit v 6.01* <http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>
- ²⁷ Cambridge Environmental Research Consultant *ADMS-Urban Model* <http://www.cerc.co.uk/environmental-software/ADMS-Urban-model.html>
- ²⁸ Brighton & Hove City Council *Joint Health and Wellbeing Strategy* draft [Feb 2015] <http://www.Brighton & Hove-hove.gov.uk/content/council-and-democracy/councillors-and-committees/health-and-wellbeing-board>
- ²⁹ Brighton & Hove City Council Climate Change Strategy found at: <http://www.Brighton & Hove-hove.gov.uk/content/environment/sustainability-city/climate-change>
- ³⁰ Rampion Offshore Windfarm Latest newsletter found at https://eon-uk.com/downloads/1304_Rampion_Newsletter_%28Final%29_pdf.pdf
- ³¹ South East Car Charging Network found at: <http://www.energisenetwork.co.uk/>
- ³² Edgeley Green Power Station found at: <http://www.edgeleygreenpowershareham.co.uk/> [June 2015]
- ³³ Electric Car Sales Accelerate in 2015 found at: <http://www.businessgreen.com/bg/news/2394293/electric-car-sales-accelerate-into-2015>
- ³⁴ Renewable Heat Incentive found at: <http://www.rhinentive.co.uk/> [June 2015]
- ³⁵ Appraisal of the London Plane in polluted environments <http://www.field-studies-council.org/urbaneco/urbaneco/woodland/trees.htm> [March 2015]
- ³⁶ Annual Report of the Director of Public Health (2014 written as if it were 2024) <http://www.Brighton & Hove-hove.gov.uk/content/health-and-social-care/health/public-health-annual-report>
- ³⁷ Brighton & Hove City Council Press Release *Bus Patronage Doubles* June 2013 <http://www.Brighton & Hove-hove.gov.uk/content/press-release/bus-patronage-doubles> [Feb 2015]
- ³⁸ Gatwick Airport *Facts and Stats* <http://www.gatwickairport.com/business-community/about-gatwick/at-a-glance/facts-stats/> [Feb 2015]
- ³⁹ Refining Britain's Fuels found at: http://www.ukpia.com/industry_issues/fuels/sulphur-free-petrol-diesel-and-non-road-fuels.aspx [March 2015]
- ⁴⁰ Western Railways between Southern England and Wales Route Modernisation found at: <http://www.networkrail.co.uk/great-western-route-modernisation/> [Feb 2015]
- ⁴¹ Brighton & Hove City Council Supplementary Planning Guidance on Tall Buildings http://www.Brighton & Hove-hove.gov.uk/sites/Brighton & Hove-hove.gov.uk/files/downloads/localplan2001/15_SPGBHTall_buildings.pdf
- ⁴² Defra's List of Exempt Appliances for legal use in Smoke Control Areas (SCA) declared under the Clean Act 1968
- ⁴³ Brighton & Hove City Council Burning Solid Fuels Safely and Legally [2012], <http://www.Brighton & Hove-hove.gov.uk/content/environment/air-quality-and-pollution/using-solid-fuels-safely-and-legally>
- ⁴⁴ Brighton & Hove City Council Recycling Centres <http://www.brighton-hove.gov.uk/content/environment/recycling-rubbish-and-street-cleaning/recycling-centres>