

Portsmouth Air Quality Management 2012

Redouan Sadak MSc. BSc. *Environmental Protection Officer*

www.portsmouth.gov.uk



New cars are less polluting than old and poorly maintained cars

Traffic is the main polluter in Portsmouth, causing around 70% of the pollution.

Poor air quality is bad for health, reducing life expectancy by an average of 8 months in the UK.

Portsmouth has 13 areas where pollution levels are above the government standards. 3% of the population live in these areas.

Lorries alone cause around 45% of the pollution, but they are crucial for the economy of the city.

Remit of Local Air Quality Management talk

Why does Air Quality Matter?

- The public health White Paper “*Healthy Lives Healthy People*” proposes that **local authorities should play a stronger role in the delivery of public health at local level, including setting objectives and priorities locally.**
- AQ can have significant health factor and should be appreciated by local authorities: *AQ improvement contribute to public health goals, such as **improving life expectancy.***

2011 reports on Air pollution effects

- The Government's Committee on the Medical Effects of Air Pollution (COMEAP) reported that the air pollution contributed to the loss of about 340,000 years of life during 2008 in the UK
- Equivalent to the yearly loss of 1-2 years of life for about 200,000

LAQM statutory drivers

1. The Air Quality Standards Regulations 2010.
2. Part IV of the Environment Act 1995
3. The Air Quality Regulations 2000 and Air Quality (Amendment) Regulations 2002
4. European Union Directives

1- The Air Quality Standards Regulations 2010

The principal air quality legislation within the UK is the Air Quality Standards Regulations 2010 which transposes the EU Directives into national legislation.

2- Part IV of the Environment Act 1995

- (Framework for Local Air Quality Management (LAQM) in the UK
- Duties.

3- The Air Quality Regulations 2000 and Air Quality (Amendment) Regulations 2002

- Prescribe **AQ objectives** and the dates for achieving them.
- **Designation** of an Air Quality Management Area (AQMA) by means of an order under **section 83(1)** of the 1995 Act.
- **Section 84(1)** of the Act requires local authorities to carry out a **further assessment** of air quality within 12 months of the designation order.
- **Section 84(2)** requires the preparation of an **Air Quality Action Plan (AQAP)** to be submitted between 12-18 months following the designation order.

4- European Union Directives

- National policy on AQ is currently largely driven by EU legislation:
 - The 2008 ambient air quality directive (2008/50/EC) sets **legally binding limits** for concentrations in outdoor air of major air pollutants that impact public health such as particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂).
 - The 2008 directive replaced nearly all the previous EU air quality legislation and was made law in England through the **Air Quality Standards Regulations 2010**, which also incorporates the 4th air quality daughter directive (2004/107/EC) that sets targets for levels in outdoor air of certain toxic heavy metals and polycyclic aromatic hydrocarbons.

Pollutants covered by the LAQM

- Benzene
- 1,3 Butadiene
- Carbon monoxide
- Lead
- Nitrogen Dioxide
- Particles
- Sulphure dioxide

LAQM Objectives

Pollutant	Averaging Time	Concentration (ug/m3)	Date to be achieved by	Relevant Exposure examples
Benzene	Running annual mean	16.25 5	Dec 2003 Dec 2010	Residential etc facades Residential etc facades
1,3 Butadiene	Running annual mean	2.25	Dec 2003	Residential etc facades
Carbon monoxide	Running 8 hour mean	10 x 10 ³	Dec 2003	Gardens
Lead	Annual mean	0.5 0.25	Dec 2004 Dec 2008	Residential etc facades Residential etc facades
Nitrogen Dioxide	1 hour mean Annual mean	200 <19x/year 40	Dec 2005 Dec 2005	Kerbside Residential etc facades
PM10	24 hour mean Annual mean <i>24 hour mean</i> <i>Annual mean</i>	50 <36x / year 40 <i>50 <7x /year</i> <i>20</i>	Dec 2004 Dec 2004 <i>Dec 2010</i> <i>Dec 2010</i>	Gardens Residential etc facades <i>Gardens</i> <i>Residential etc facades</i>
Sulphur dioxide	15 min. mean 1 hour mean 24 hour mean	266<36x/year 350 <25x/year 125 <4x /year	Dec 2005 Dec 2004 Dec 2004	Any public place Kerbside Gardens
<i>Polyaromatic Hydrocarbons B[a]P</i>	<i>Annual mean</i>	<i>0.25 ng/m3</i>	<i>Dec 2010</i>	Residential etc facades

COMEAP

Committee on the Medical Effects of Air Pollutants, COMEAP is an Advisory Committee of independent experts that provides advice to Government Departments and Agencies on all matters concerning the potential toxicity and effects upon health of air pollutants.

Nitrogen Dioxide 1

- Oxides of nitrogen
 - Nitric oxide (NO) and nitrogen dioxide (NO₂) = “NO_x oxides of nitrogen”
 - NO is usually very rapidly oxidised (by oxygen or ozone) in air to NO₂.
- Sources
 - Road Traffic
 - Fossil fuel based combustion processes (power stations)

Nitrogen Dioxide 2 (cont..)

- Health (1)

- At relatively high concentrations:

- An irritant causing inflammation of the airways.
 - By affecting the immune cells in the lungs, can increase susceptibility to respiratory infections.

- Evidence suggests that ambient (outdoor) concentrations of nitrogen dioxide can:

- Increase the sensitivity of asthmatics to allergens and therefore increase the likelihood of asthma attacks.
 - Longer term exposure to nitrogen dioxide can increase the likelihood of respiratory illnesses in children.

Nitrogen Dioxide 3

- Health (2):
 - Lack of scientific agreement on the interpretation of the epidemiological studies .
 - Is NO₂ a pollutant that affects health at ambient levels or is it simply a marker for other combustion related pollutants that are responsible for the observed effects on health?

Particles 1

- A complex mixtures of organic and inorganic substances
- vary greatly in their Source, Nature (Composition), and Size
- They are arguably the most important component of ambient air with regards to health and are the focus of much of the current work on air pollution.

Particles 2 (Cont..)

- Sources
 - Motor vehicles and non-nuclear (e.g. coal fired) power stations.
 - Natural sources (wind blown dust and sea salt).
- Nature
 - The composition of particles in air varies according to source and this varies with location.
 - carbon, sulphates, chloride, nitrates, minerals, metals, aromatic hydrocarbons and bound water.
 - For example:
 - On the coast sea spray may mean that the main component is salt.
 - Next to a busy road, exhaust emissions from vehicles, especially diesel vehicles determine the composition.

Particles 3 (Cont..)

Particle category	Aerodynamic diameter	Penetration into the airways	Other names
Ultrafines	<0.1µm (100nm ^{**})	Penetrate deep into the lung to gaseous exchange zone ^{***}	Nanoparticles
PM1	<1µm*	Reach small airways and gas exchange zone	
Pm2.5	<2.5µm	Reach small airways and gas exchange zone	Fine fraction
Black smoke	<4µm	Reach small airways and gas exchange zone	
Coarse fraction of PM10	2.5µm - 10µm	Deposit in the larger airways of the lung	Subset of PM10 corresponding to PM10 minus PM2.5
PM10	<10µm	Penetrate beyond the larynx	Thoracic particles
	>10um	Trapped by nose,throat and upper airways.Don't enter airways of the lung	

Particles 4 (Health Effects. Cont..)

- Most of our knowledge of the effects of particles on health comes from studies that relate either short-term or long-term levels of PM10 and PM2.5.
- Effects on health (*mortality (death), increased admissions to hospital*)
- Susceptible people:
 - cardiovascular (heart) disease
 - pulmonary (lung) disease e.g. lung cancer, chronic pulmonary obstructive disease, bronchitis and asthma.
- Smaller particles can be carried deeper into the lungs where they can cause inflammation and worsen heart and lung diseases.

Particles 5 (Health Effects. Cont..)

- The 2009 COMEAP report “Long-Term Exposure to Air Pollution:
Effect on Mortality”, found that as long term exposure to fine particles in air increases, the risk of death also increases (a 10 $\mu\text{g m}^{-3}$ increase in fine particles was associated with a 6% increase in risk of death from all causes).
- The 2006 COMEAP report:
“Cardiovascular Disease and Air Pollution”, found clear associations between both daily and long-term average concentrations of particles and effects on the cardiovascular system, and proposes that fine particles play an important role in these effects.

Particles 6 (Health Effects. Cont..)

However, it is still not clear which components of particles are responsible for their observed effects on health.

Volatile Organic Compounds 1 (VOC)

- Examples:
 - Benzene, 1,3-butadiene, tri- and tetra-chloroethylene and some Polycyclic Aromatic Hydrocarbons.
- Sources:
 - Road traffic,
 - Industrial processes.
 - The use of solvents in paints,
 - Dry-cleaning,
 - Degreasing agents.
- Their environmental impact: *..many of them take part in photochemical reactions with other pollutants such as oxides of nitrogen in the atmosphere to form ozone.*

Volatile Organic Compounds 2 (VOC)

- Benzene (C₆H₆)
 - found in cigarette smoke, so smoking (and passive smoking) is another exposure route.
 - has carcinogenic (it is a genotoxic* carcinogen) and toxic properties:
 - Cancer (leukaemia) and effects on the central nervous system and blood-forming elements of the bone marrow have been observed in workers exposed to high levels of benzene over long periods of time.
 - Average levels in outdoor air are much lower and do not pose a measurable risk to health.

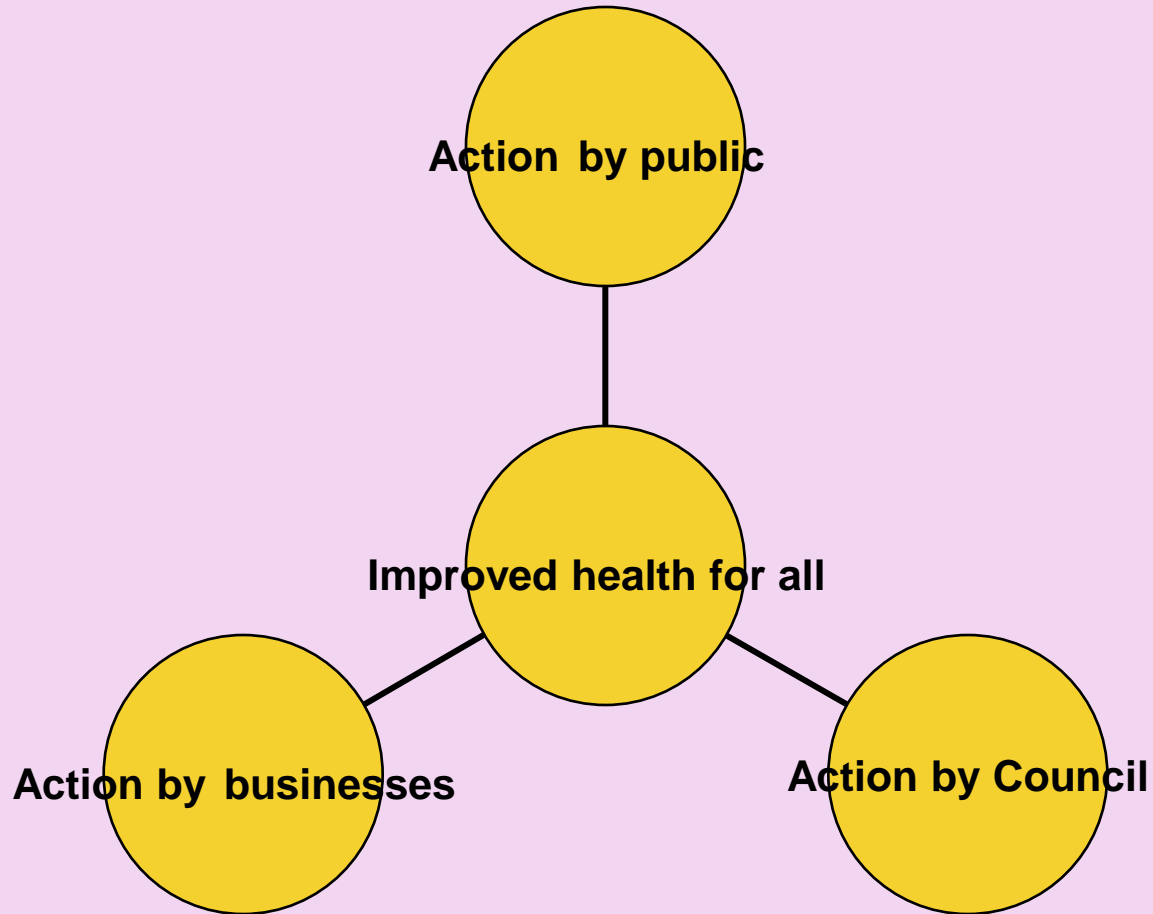
Volatile Organic Compounds 3 (VOC)

- 1,3-butadiene
 - Petrol and diesel vehicles, and is also found in cigarette smoke. 1,3-butadiene is also an important chemical used in the manufacture of synthetic rubber tyres.
 - A genotoxic* carcinogen and leukaemias, lymphomas and cancer of the bone marrow and lymphoid system have been observed in workers exposed to high levels over long periods of time.
 - Ambient levels are generally very much lower and thus pose a much lower risk to health.

Who is responsible for delivering cleaner air?

- All of us
- International/ European
- National government
- Local authority
- Industry/ Transport/ Businesses
- Individual

Action needed



How are local authorities expected to act to improve air quality?

- Local Air Quality Management
 - Assessment and review of whether a problem exists
 - Act strategically to improve air quality
 - Foster partnership working with others
 - Educate and provide incentives / disincentives
 - Show leadership
 - Regulation of some sources of air pollution

Local Authority Emission Control

- Air quality – Environment Act 1995 – General
- Industrial Pollution Control – Pollution Prevention & Control Regulations 2000 (just changed to Environmental Permitting Regulations 2007)
- Statutory Nuisance EPA – Section 80 (neighbourhood issues)
- Clean Air Act 1993 (stationary combustion sources)

Planning Policies

- National Legislation

- The UK is the Air Quality Standards Regulations 2010
- The Environment Act 1995

- National Planning Policy

- National Planning Policy Framework (NPPF) and its associated Technical Guidance
- Guidance Note 'LAQM.PG(09)'

- Regional Planning Policy

- Regional Spatial Strategy for the South East
- Policy NRM9: Air Quality states that Local development documents and development control can help to
- The Hampshire Sustainable Communities Strategy 2008 - 2018

- Local Planning Policy

- The Portsmouth Plan
- Air Quality and Air Pollution SPD

How do we review and assess local air quality?

- Air quality monitoring
- Air quality dispersion modelling
- Reporting

1- AQ monitoring?

- Continuous monitoring
- Passive monitoring



Continuous monitoring in Portsmouth



- Gatcombe Park (urban background)
- London Road (kerbeside)
- Mile End Road (roadside)
- Burrfield Road (roadside)

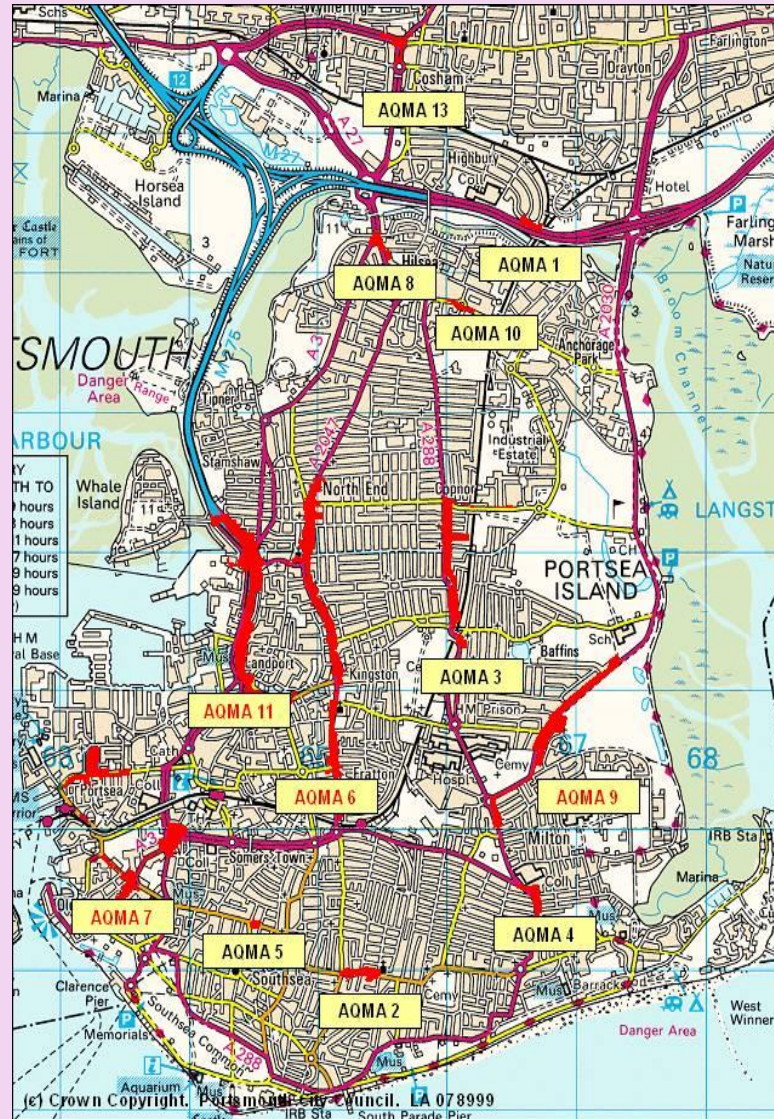
2- How is air quality levels predicted?

Air Quality Dispersion Modelling

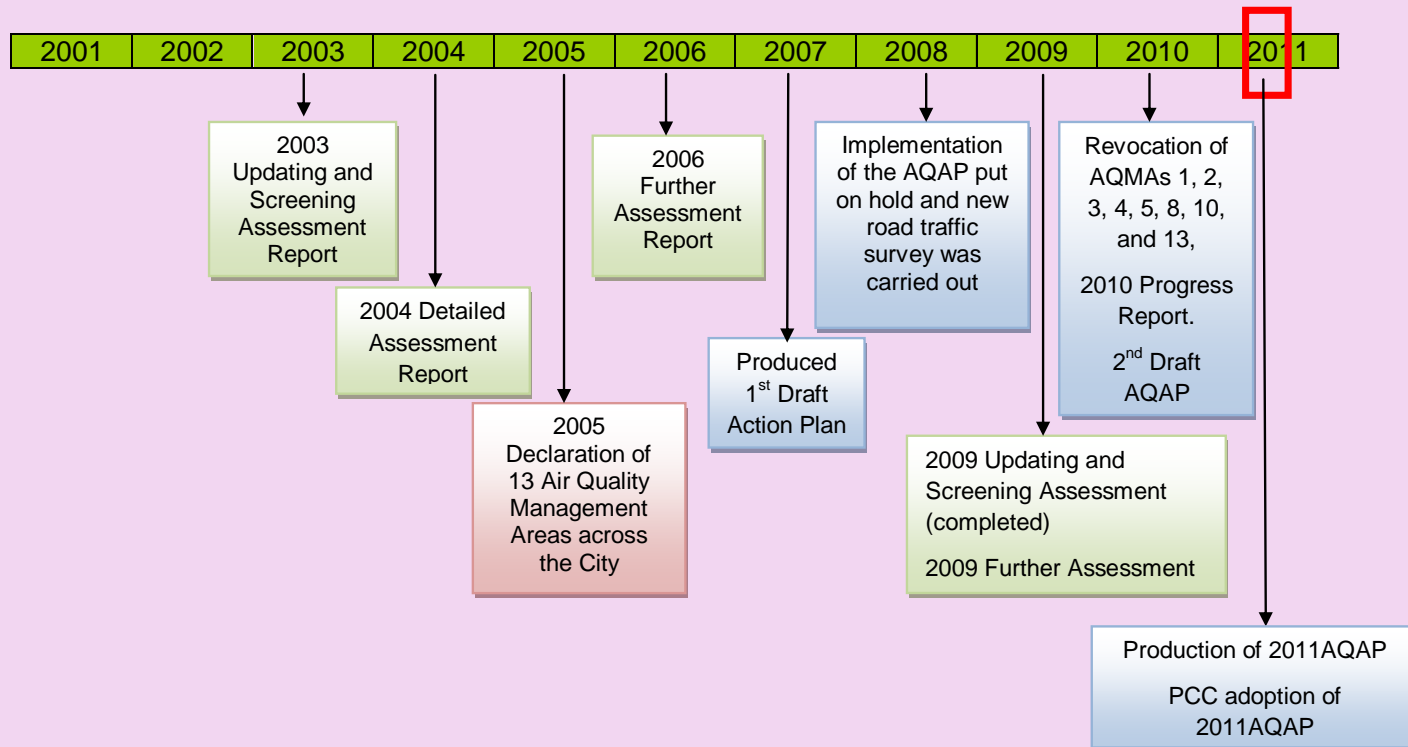
What is/ are the main pollutant (s) of concern in Portsmouth?

Nitrogen dioxide

Portsmouth AQMAs



3- Historical reporting of Portsmouth AQ



European Commission Compliance Assessment.

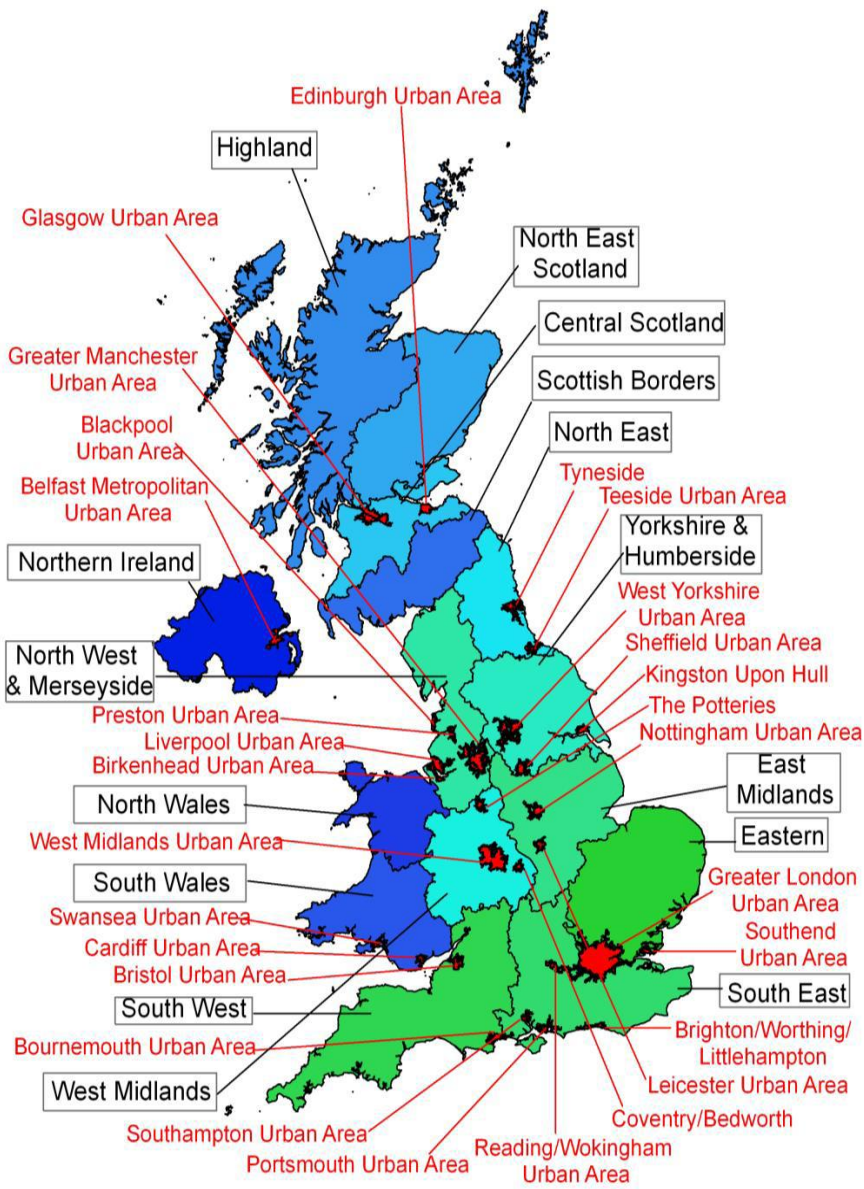
- 2008 EU Ambient Air Quality Directive (2008/50/EC).
- European Commission Compliance Assessment

Historical on EU return

- NO₂ EU limit were to be met by 2010.
- September 2011, the UK submitted to the Commission updated air quality plans (national and local measures) for 40 (out of the 43) UK zones where NO₂ exceedences had been reported.
- The plans were set to meet NO₂ limits by 2015 or as soon as possible thereafter.
- The extension was granted in June 2012 for 9 areas

UK zones and agglomerations for AQ reporting 2011

Zones shaded in RED did not comply with the relevant limit values, targets or long-term objectives



The 2011 AQCA findings

- the UK now meets EU air quality limit values for all air quality pollutants, including particulate matter (PM₁₀), but nitrogen dioxide (NO₂).
- NO₂ shows continuation of a weak downward trend in roadside concentrations.
- Exceedences continue to be reported in nearly all England air quality zones.



**WHAT'S THE
SOLUTION TO
AIR POLLUTION?**



Portsmouth
CITY COUNCIL

AQMAs and PCC housing stock

Refer to the plans

Some example transport measures

- Improved Emission standards for public vehicles
- Reduced cost of Licenses for Taxis
- Public Transport initiatives
- Cycling promotion
- Re-routing traffic
- Vehicle Emission Testing

The main strategies for Portsmouth AQAP

- Cars – Reduce, improve congestion and flow
- Buses – Increase – improve technology
- HGV – Re-route, consolidate, avoid congestion

Portsmouth AQAP

- Non traffic related measures (background emissions)
- Traffic related measures – Transport schemes
- Public Information – Enforcement – Public transport patronage
- Policy / Technology

1- Non traffic related measures (background emissions)

- AQ information (CW.OG)
- School travel plans (CW.OG)
- Creation of PCC transport manager (CW.C)

2- Traffic related measures – Transport schemes

- High occupancy vehicle lanes (CW.OG)
- Park and Ride (P&R) (2015)
- Traffic control southbound M275 slip (2013)
- Traffic control Mile End roundabout (C)
- Junction improvements (2015)
- Variable message signs (VMS) (C)
- Freight quality partnership
- Regeneration of North End shopping area (C)
- Traffic initiatives (On Hold)
- Hampshire Terrace junction with St Michael's gyratory (Committed)
- Queen Street junction with Anglesea Road (2012)
- Public transport initiative I (CW. 2020) & Public transport initiative II (CW.2015)
- Bus transport & patronage (CW.OG)
- Idling engines (2012) and VOSA emission testing (2010)

3- Public Information – Enforcement – Public transport patronage

- Idling engines (2012)
- VOSA emission testing (2010)
- Bus transport & patronage (CW.OG)

4- Policy / Technology

- Implementation / incorporation of AQAP (CW.OG)
- Planning / service liaison initiatives beyond SDP (2012)

Some Key Messages



Want to know more?

Try:

- www.airquality.co.uk
- <http://www.naei.org.uk/>
- <http://www.laqmsupport.org.uk/>
- <http://www.uwe.ac.uk/aqm/centre/aqaps/index.html>
- <http://www.defra.gov.uk/environment/airquality/index.htm>
- <http://www.tfl.gov.uk/roadusers/lez/default.aspx>
- <http://www.smartmoves.co.uk/>
- <http://www.transport2000.org.uk/>
- <http://www.portsmouth.gov.uk/living/32.html>