ROTHERHAM BOROUGH COUNCIL – REPORT TO MEMBERS

1.	**Meeting:**	**Cabinet Member For Health & Wellbeing**
2.	**Date:**	**15th April 2013**
3.	**Title:**	**Air Quality – Local & Public Health Impact**
4.	**Directorate:**	**Neighbourhoods & Adult Services**

5. Summary

This paper details the current position of air quality in Rotherham, possible effects on health, and the proposed future approach to tackle the problem.

The major cause of poor air quality is mainly from vehicle emissions, with additional pollution from industrial processes. Subsequently there is an effect on public health including mortality rates

The report focuses on meeting the Council's statutory responsibilities relating to ambient air quality but also highlights land use and transport developments which have the potential to impact on local air quality. This area of work constitutes a small proportion of the workload of the community protection service, and as such it is provided by one part time post.

6. Recommendations

It is recommended that the Cabinet Member for Health & Wellbeing receives further reports to bring recommendations and action plans to address;

- **The findings of the finalised Health Impact Assessment, and**
- **Introduction of the Government's proposals regarding Local Air Quality Management and future statutory framework for Local Authority air quality review and assessment work.**

7. Proposals and Details

The Council is required to fulfil its statutory duties under the Environment Act 1995 relating to the improvement of ambient air quality. As such, the Council is required to carry out regular reviews and assessment of air quality against the standards and objectives of the National Air Quality Strategy.

If these standards are not met it is required that Air Quality Management Areas (AQMAs) be declared. In these cases an Action Plan must be prepared and carried out to tackle the problems with the air quality in the area.

Currently the Council is prioritised solely to meet these duties with resources accordingly focused towards the five declared AQMAs in Rotherham (detailed in ***Appendix 1***). We have, however, challenges due to our minimum staffing levels to deliver timely action planning. Each year an annual performance report is required by the Department for Environment Food and Rural Affairs (DEFRA) to demonstrate that the Council is achieving its statutory obligations. The Council has not been challenged on its performance with, indeed, its previous Air Quality Action Plan Progress Report being recognised as good practice.

Locally and nationally air quality has generally been improving, however, exceptions do occur near to heavily trafficked roads such as motorways and busy urban centres. Rotherham, like many other towns and cities in the UK, experiences air quality which currently breaches national and European limits hence the need for AQMAs.

Direct intervention relating to the reduction of vehicle emissions, are outside of the Council's direct influence, but, from direction by the Department for Transport, the Council is required to consider, as an over-arching priority in the Local Transport Plan, its contribution to reduce the social and economic costs of transport to public health, including air quality impact. Consequently the Council works closely with its partners including the South Yorkshire Passenger Transport Executive, Barnsley MBC, Sheffield MBC and Doncaster MBC, to provide a regional approach to achieve national air quality objectives.

In addition, a key element in the overall management of air quality importantly includes the enforcement and compliance of legislation relating to the control of emissions of pollution to air from industry. Under these statutory requirements all prescribed industrial processes in Rotherham in the last reporting year complied with legislative requirements.

DEFRA is to publish in early 2013 a consultation to review Local Air Quality Management detailing the statutory framework for Local Authority air quality review and assessment work. This is likely to suggest a range of options including Business as usual; Stronger focus on action planning and Stronger alignment with EU requirements to meet air quality limit values.

Health Impact

Breathing healthy air is a crucial to health and well being of everyone
There are short and long-term health impacts of poor air quality, including:

- Respiratory and cardiovascular health.
- Increased admissions to hospital.

- Unequal in relation to life expectancy and health, for the young, the old and those with pre-existing heart and lung conditions.
- Estimated reduction in life expectancy of as much as nine years for those Individuals who are particularly sensitive.
- Bigger impact on the average life expectancy of the population than road traffic accidents or passive smoking.

A key message from leading respiratory and cardio-vascular physicians as well as environmental health experts, is that modest reductions in pollution would lead to significant health gains.

Evidence of the effects of air pollution on health has grown stronger, yet the UK is still failing to meet European targets. Forty out of the UK's forty-three assessment zones fail to meet the levels of annual mean nitrogen dioxide. Consequently, as detailed in ***Appendix 2***, it is estimated that poor air quality reduces the life expectancy of up to 200,000 people by an average of 2 years across the UK.[1] In Rotherham this has been calculated to be 153 people per year dying earlier.

A more detailed Health Impact Assessment is being undertaken in Rotherham led by Rotherham Public Health, with the Community Protection Unit providing input in the form of air quality data and project implementation. This assessment will examine any potential links between air quality and health. The scope of health impacts will include stroke, cardio vascular disease, coronary heart disease, respiratory disease, lung cancer, life expectancy, population survival, respiratory disease, infant mortality, and daily mortality. It is expected that the project will be complete in late 2013.

Local Development Impacts

In addition to the above position relating to ambient air quality standards there are a number of land use and transport development proposals which will require assessment of their environmental impact. These include

- ***The Managed Motorway Scheme for the M1 J35A-32*** will commence construction during 2013. Additional work including the assessment of the Environmental Impact Assessment and modelling and monitoring of the impact on air quality in the Air Quality Management Areas adjacent to the M1 in Rotherham will be required.
- ***A proposed Opencast Coal Site at Hesley Wood*** in Sheffield which is relatively close to Thorpe Hesley will also require assessment of emissions in conjunction with colleague officers in Sheffield.
- ***Waverley Development*** at Orgreave with around 4,000 new homes to be built, air pollution from vehicles will increase and require assessment, although this will be supported by the establishment of 106 provisions at the planning stage.
- ***Visions of China development*** at Pit House West is anticipated to bring in many visitors to Rotherham. This is likely to impact on the existing Air Quality Management Area along the M1 corridor. Further work will be required in terms of modelling and assessment of air pollution.
- ***BDR Development*** at Manvers will increase heavy vehicle movements through areas where AQMAs already exist or where levels are close to the standard. The Mechanical

[1] The source of this is the Committee on the Medical Effects of Air Pollution (COMEAP), the Government's advisory body on this issue, who published a report on the *Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the UK (*December 2010). These wider determinants of health and their effect on widening health inequalities are highlighted in the influential Marmot Report – Fair Society, Healthy Lives (institute of health equity 2010).

Biological Treatment plant and anaerobic digester at the site have potential for a more localised impact. The major routes to the plant, together with the localised area will require assessment of emissions, which for the roads is likely to be continuous.

8. Finance

Monitoring and modelling of air quality in Rotherham is supported through the Council's Environmental Health revenue budget (the air quality element being reduced by 20% (£6,000) for 2013/14) and Government allocated funding. These Government funding streams cover:

- **The Air Quality Action Plan;** DEFRA awarded the Council an air quality grant to provide an evidence base for informing the development of Rotherham's new Air Quality Action Plan. This will build on previous work and focus on the potential of low emission schemes in the most polluted hotspots in Rotherham to inform the definition of potential schemes.

- **Local Transport Plan funding**. Measures to improve air quality funded through the Local Transport Plan and Department for Environment Food and Rural Affairs grants, which are bid for on an annual basis when available for approved projects which will improve air quality. The Local Sustainable Transport Fund has provided £30 million to support transport investment along 4 geographical corridors in South Yorkshire, based on genuine local need and a high potential for carbon-friendly economic growth. The corridors in Rotherham are the Dearne Valley Enterprise Corridor and the Don Valley Enterprise Corridor. The projects aim to both encourage economic growth whilst cutting carbon and air pollutant emissions.

  Investments include bus priority, 'Jobconnector' bus services, cycle routes, upgrade of tram stops, rail-based Park and Ride, promotion of electric vehicle use, infrastructure to unlock urban regeneration, training, marketing and travel planning. A number of measures within the South Yorkshire Local Transport Plan are shown in ***Appendix 3***.

9. Risks and Uncertainties

Failure to address poor air quality has a significant impact on the health of residents in Rotherham, including mortality with, in addition, if the Council fails to undertake its statutory duties a risk of legal challenge to the Council.

Attainment of nitrogen dioxide air quality standards has recently taken on greater importance. UK legislation has always to date required local authorities 'to work towards' achieving the standards, with the annual average air quality objective to originally have been achieved by 2010 within the UK. Following widespread continued breaching of the objective (and EU limit value) within Europe and the UK, the EU is requesting that member states ensure that the limit value is met by 2015, or face the sanction of fines for non attainment of the limit value.

This may have implications for Rotherham MBC, as there is a possibility that local authorities could become liable to pay these fines to central Government under the Decentralisation and Localism Act. This is a developing issue causing much debate nationally and a definitive position has yet to be reached. The Community Protection Unit is however monitoring developments and, should it prove necessary, this Service will report back to Cabinet when the situation becomes clearer.

10. Policy & Performance Agenda Implications

The work on Air Quality and health contributes to the Corporate Plan's objectives of:

- Helping to create safe and healthy communities, and
- Improving the environment

In addition the work on Air Quality and health contributes to:

- Sustainable Development.
- Creating a place where people feel good, are healthy and active.
- Increasing the satisfaction in the local area.

The aspirations of Rotherham MBC are to:

- Achieve national health-based air quality targets by 2015
- Protect areas where air pollution is low, and
- Improve areas where air pollution is elevated.
- Impacts can be minismised to levels to protect health, environemtal quality and amenity.particularly if there is risck to breach of air quality standards.

These are reflected in the Environment and Climate Change Strategy, the Local Transport Plan the Local Development Framework's Published Core Strategy [CS27] and soon to be consulted Development Sites & Policy [SP55].

The work on Air Quality and health in particular addresses Public Health priorities through Tackling Health Inequalities and is prioritised within the new Public Health Outcomes Framework. This is achieved through:

- Getting it right first time
- Working with partners
- Having the right people and right skills in the right place

Dealing with issues related to air quality has clear linkages to the seven outcomes of the Outcomes Framework for Social Care, and importantly includes:

- Improved Health and Emotional Well-being, by promoting and facilitating the health and emotional well-being of people who use the services.
- Improving the Quality of Life.

11. Background Papers and Consultation

- The (National) Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007 Part 1
- A public health outcomes framework for England, 2013-2016; DOH
- Environment Act 1995
- Air Quality Standards Regulations 2007
- Decentralisation and Localism Act 2012
- Published Core Strategy – LDF
- South Yorkshire Local Transport Plan 3
- RMBC Environment and Climate Change Strategy

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Appendix 1 i

Rotherham Air Quality Management Areas

Description of Air Quality Management Area	Year of declaration	Estimated population within AQMA	Highest level of NO2 annual mean in micrograms/m^3 monitored in the AQMA in 2011 (Standard = 40)
M1 Motorway - Brinsworth, Catcliffe, Hill Top Meadowbank (nitrogen dioxide annual mean, road transport)	2001	11,940 6 schools	53
M1 Motorway – Wales (nitrogen dioxide annual mean, road transport)	2005	30	38
Town centre Air Quality Management Areas: Wellgate (nitrogen dioxide annual mean, road transport) Fitzwilliam Road (nitrogen dioxide annual mean, road transport) Wortley Road (nitrogen dioxide annual mean, road transport)	2004	Total 17500	 43 49 54

Since the introduction of the National Air Quality Strategy and national AQMA framework there has been local success in improving air quality in areas which have caused AQMAs to be declared. This has resulted in two AQMAs being revoked; one in Brampton Bierlow relating to sulphur dioxide; and one at Fitzwilliam Road declared for PM_{10} particulate pollution.

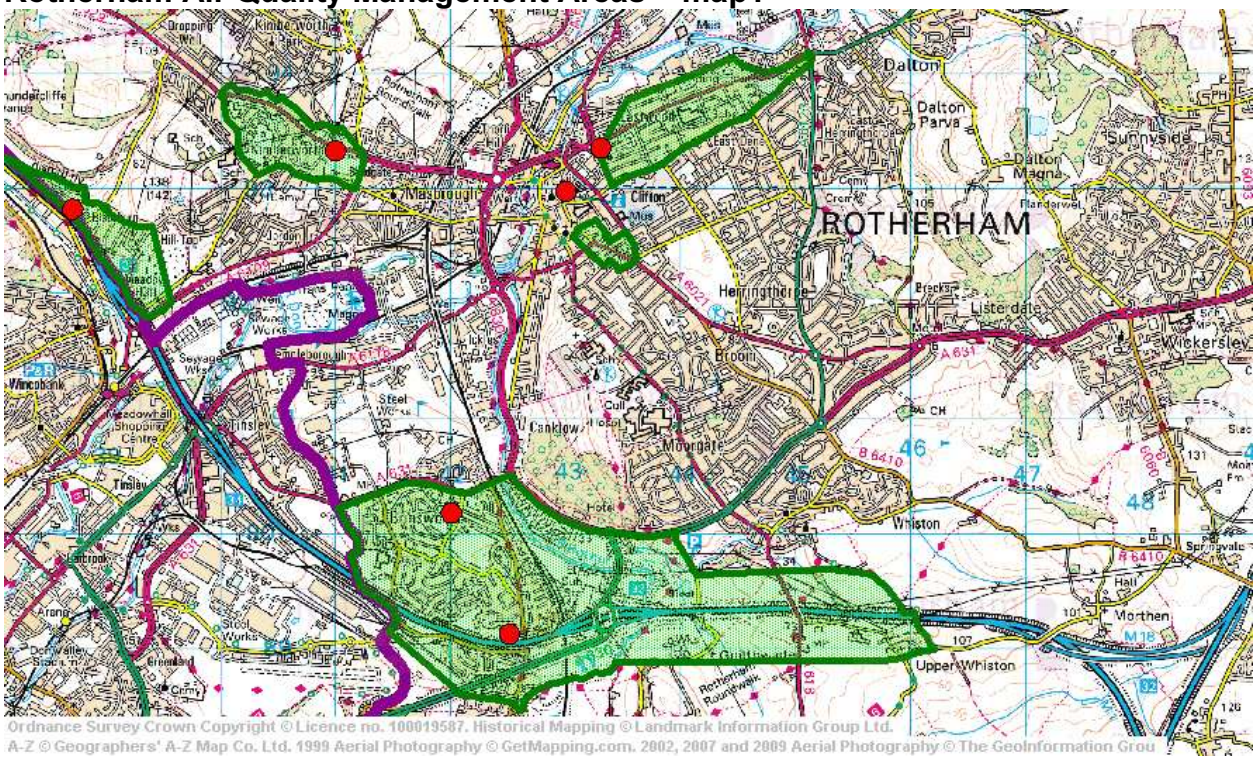
The current AQMAs in Rotherham have all been declared because of emissions from traffic causing excedence of the nitrogen dioxide annual average standard (40µg/m^3). Across the country over 200 other UK local authorities have declared AQMAs due to the same reason.
The main cause of the elevated levels of nitrogen dioxide stems from the increasing volume of road traffic (emissions from individual vehicles have fallen by an average of 50% since 1990). Developments in engine technology that have been predicted to result in improvements in air quality have not been effective enough to meet the National Air Quality Standards.

There is, however, evidence of a relatively slow downward trend in the levels of pollutants in the Fitzwilliam Road AQMA. The other AQMAs do not show a similar downward trend. (***Appendix 1 iii***)

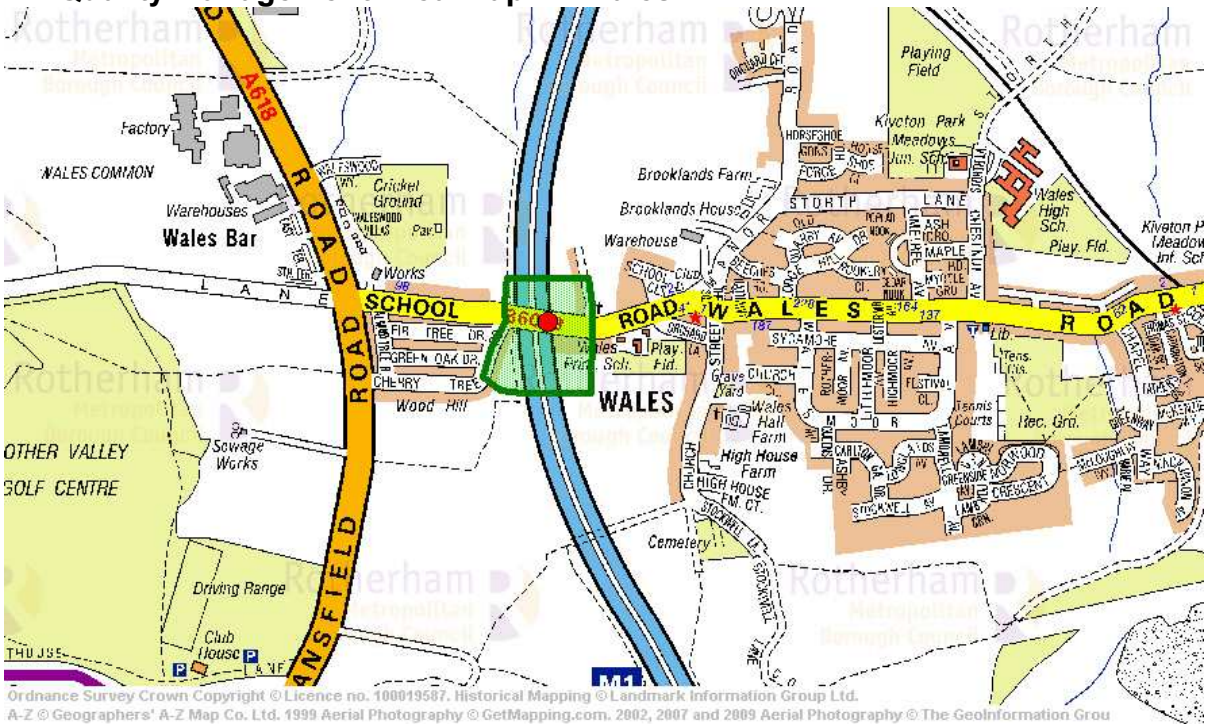
Current emissions baselines have been developed for the year 2012, and these will ne complemented by modelled projections for 2015. A number of measures being implemented are funded by the South Yorkshire Local Transport Plan. (***Appendix 2***).

Appendix 1 ii
Air Quality Management Area Maps

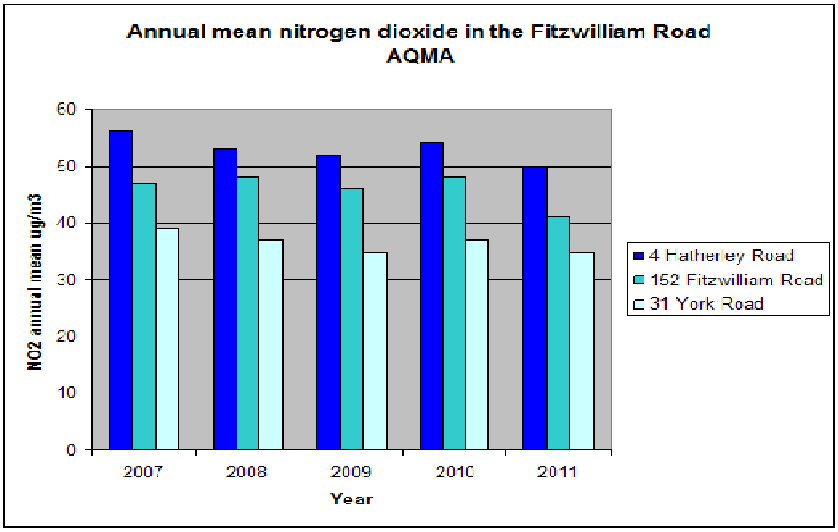
Rotherham Air Quality Management Areas – map1

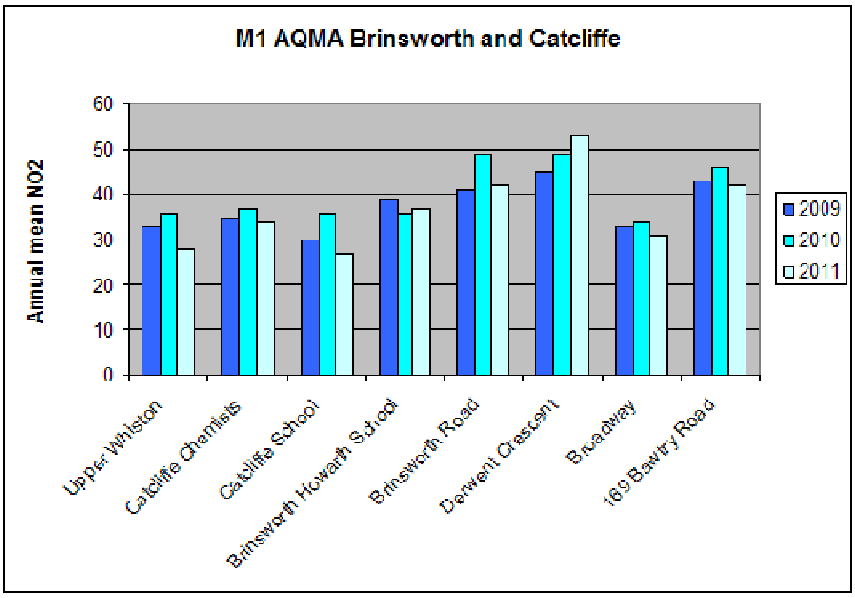


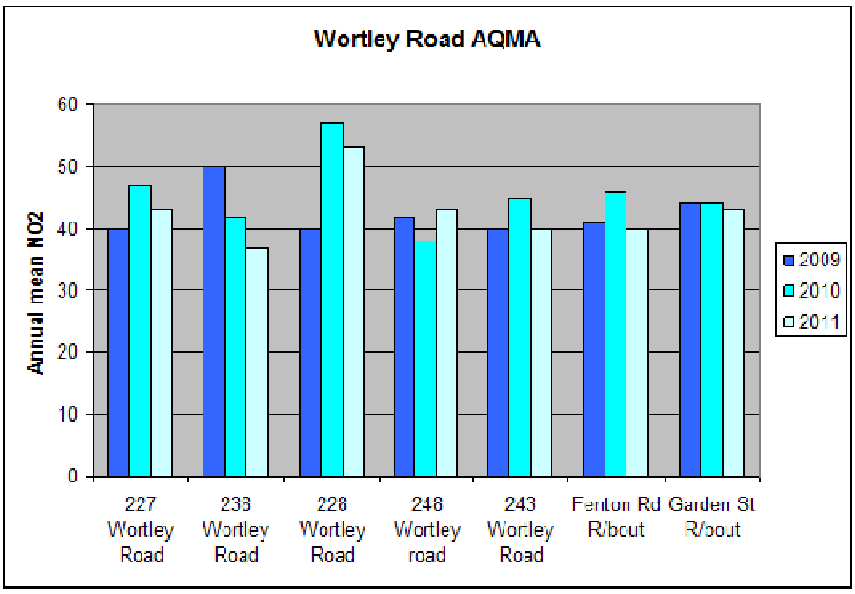
Air Quality Management Area map 2 - Wales



Appendix 1 iii







Appendix 2

Estimating the mortality burden of particulate air pollution in Rotherham

Methods

The methods used in this Impact Assessment follow the recommendations of the Committee On the Medical Effects of Air Pollution (COMEAP) statement on estimating the mortality burden of particulate air pollution at the local level (2012), which have been reproduced below:

Calculating the attributable fraction

1. For a given relative risk, RR, associated with a ubiquitous exposure such as outdoor air pollution, the proportion of disease (or deaths) that is attributable to that exposure (the population attributable risk fraction, or attributable fraction) is calculated by a simple formula: AF = (RR-1)/RR. This is often expressed as a percentage.[2]

2. For example, the proportion of deaths attributable to 10 µg/m3 of PM2.5 air pollution, assuming an associated relative risk of 1.06, would be 100 × 0.06/1.06 = 5.7%.

3. Estimates of mortality burden in a local area need to use a relative risk (and associated attributable fraction) reflecting the risk associated with the local population-weighted annual average[3] PM2.5 concentrations under consideration.[4] The RR applicable locally can be approximated by linear scaling (i.e. by assuming that if 10 µg/m^3 leads to a 6% change in risk, then concentrations which differ by 1 µg/m^3 should lead to differences in RRs of 0.6%. From this, the local attributable fraction can be derived. Linear scaling is inexact[5] but this approach is unlikely to lead to practically important differences when estimating local RR and attributable fraction, particularly as the PM2.5 concentrations under evaluation are not likely to be hugely different from 10 µg/m^3.

Calculating attributable deaths

4. An estimate of the number of deaths attributable to long-term exposure to air pollution in a local area is given by multiplying the attributable fraction by the number of deaths annually in the local area.

5. To reflect the study from which the concentration response coefficient (relative risk) was reported, we used the number of deaths at ages 30 years or more in this calculation when

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[2] The formula above is a special case (for universal exposures) of the more general formula: AF = p(RR-1) / [1 + p(RR-1)], where p is the prevalence of exposure to the cause of disease (or deaths) in the population under consideration.

[3] The population-weighted mean is a useful summary statistic, which greatly simplifies the calculation of human health impacts if the concentration–response function used is linear with no threshold. In our estimation of the national mortality burden of air pollution (COMEAP, 2010) the population-weighted mean was calculated by multiplying the 1 km x1 km concentration values by 1 km x 1 km population statistics from the 2001 census. The values for all of the grid squares were summed and then divided by the total population to calculate the population-weighted mean.

[4] Our national estimates (COMEAP, 2010) were of the burden associated with PM2.5 from anthropogenic sources. Published data on the contribution of different sources to background (i.e. not roadside or kerbside) PM2.5 concentrations were used to estimate background PM2.5 concentrations originating from anthropogenic sources.

[5] The way of translating the RR to other PM2.5 concentrations that best corresponds to the concentration response function from which it derives (based on a proportional hazards model) is through the power function: RRc= 1.06^(c/10). In the case of a burden estimate, c is the PM2.5 concentration. This approach differs increasingly from linearity for higher relative risks and higher concentration increments. (This specific formula is applicable to coefficients - such as this one linking PM2.5 concentrations with mortality risk - that are expressed in terms of RR per 10 units (here 10 µg/m^3). The denominator in the power term would be different for RRs expressed in terms of a different increment.)

estimating the national mortality burdens. However, the Office for National Statistics (ONS) in England and Wales publishes data on adult mortality in 10-year age groups of 25-34, 35-44 etc, so a figure of deaths at ages 30+ at the local level might not be easy to obtain. Similar considerations apply in Scotland and Northern Ireland. An estimate could be made by combining one half of the deaths in age group 25-34 with those for 35-44. However, such an adjustment seems unnecessary: the numbers of deaths below age 35 are a small proportion of the total, and the 'cut-off' at age 30 is based on lack of evidence at lower ages – it is possible and indeed plausible that long-term exposure to air pollution affects mortality risks in younger people also. We consider that, even if deaths below age 25 were included in the calculation (i.e. total number of local deaths), the difference between total deaths and those at ages 30+ would make only a small difference to the burden estimate.

6. Because of the variability and instability in small datasets, the reliability of local burden estimates can be improved by using death statistics from a number of years combined (e.g. 3 or 5 years) rather than basing the calculation on the number of deaths reported locally in a single year, and we recommend that this be done unless the year-on-year variation in annual deaths is small, in percentage terms.

Calculating years of life lost to the local population

7. The years of life lost to the population can be estimated by summing the years of age-specific remaining life expectancy associated with each of the attributable deaths. This is the approach we took when estimating the national burden of air pollution (COMEAP, 2010).

8. As this method requires the use of complex life-table analysis, we suggest a simpler approach be used to generate local burden estimates: multiplying the calculated number of attributable deaths by the average loss of age-specific life-expectancy associated with attributable deaths in our national estimates, of approximately 12 years[6] (COMEAP, 2010). In recommending this approach we re-emphasise an important issue of interpretation. We look on this calculation - using the number of attributable deaths and the associated average loss of age-specific life-expectancy - as a computationally convenient way of estimating the total mortality burden, in terms of life-years lost in a given year aggregated over the whole population. As emphasised in COMEAP (2010) and noted again in Para 8 above, the number of attributable deaths should not be interpreted as the number of individuals affected; and whatever the number of deaths affected and the average loss of life, the actual amount of life lost would vary between individuals.

Rotherham results

Attributable Fraction
AF = (RR-1)/RR
Where 10µg/m3 of $PM_{2.5}$ = 100 × 0.06/1.06 = 5.7%
Assuming linear scaling of RR where 1 µg/m3 of $PM_{2.5}$ =0.6 % difference in RR
Then AF of Rotherham 10.49 µg/m3 of $PM_{2.5}$ =5.98%

[6] This should not be regarded as the loss of life likely to be associated with each death affected by air pollution. A figure of 11½ years was calculated (COMEAP, 2010) as being the *average* loss of life if 29,000 deaths were affected by air pollution.

Attributable Deaths

AD = AF × Local number of deaths per annum

Rotherham deaths per annum	
2007	2580
2008	2678
2009	2546
2010	2496
2011	2509
Average	**2561.8**

Rotherham AD = 5.98% × 2,561.8 = 153.2 deaths per annum

Years of Life Lost to the local population

YLL = AD × COMEAP Average loss of age-specific life-expectancy

Rotherham YLL = 153.2× 12 years = 1,838.4 Years of Life Lost

N.B. This should NOT be interpreted as the number of individuals affected, and the actual amount of life lost would vary between individuals. Rather it is an estimate of total mortality burden.

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Appendix 3

LTP3 COUNTY-WIDE AIR QUALITY AND CLIMATE PROGRAMME 2012/13

Name of Intervention	Description	Project Lead	LTP3 Policy
Air Quality Monitoring	Mobile automatic air quality monitoring project and key routes nitrogen dioxide diffusion tube monitoring project.	Rotherham MBC	To improve air quality, especially in designated Air Quality Management Areas
Air Quality / Carbon Emissions Modelling	Development of the South Yorkshire Air Quality Modelling system	Rotherham MBC	To improve air quality, especially in designated AQMA areas
ECO Stars Fleet Recognition Scheme (South Yorkshire)	This scheme has agreed European Intelligent Energy funding and Local Sustainable Transport Funding, as well as LTP3 funding. The scheme offers recognition and provides guidance on environmental best practice to operators of goods vehicles, buses and coaches, whose fleets serve South Yorkshire. ECOSTARS aims to reduce the amount of energy used by commercial transport fleets by encouraging the adoption of fuel efficiency measures. This will bring benefits for members through more efficient operations and reductions in both fuel costs and emissions.	Barnsley MBC	To work to improve the efficiency of all vehicles and reduce their carbon emissions To improve air quality, especially in designated AQMA areas
Care4Air Campaign	South Yorkshire air quality conference and campaign	Doncaster MBC	To improve air quality, especially in designated AQMA areas
Low Carbon Vehicles Project	South Yorkshire CNG refuelling sites project Plugged in South Yorkshire Electric Vehicles Project	Sheffield City Council	To work to improve the efficiency of all vehicles and reduce their carbon emissions To improve air quality, especially in designated AQMA areas
Clean Energy Generation From Transport Assets	Low carbon energy generation and energy saving project concentrating on South Yorkshire Passenger Transport Executive's buildings and infrastructure.	South Yorkshire Passenger Transport Executive	To support the generation of energy from renewable sources and use energy in a responsible way