

17 February 2015		ITEM: 7
Health and Wellbeing Overview and Scrutiny Committee		
Air Quality, Regeneration and Health		
Wards and communities affected: All	Key Decision: Non-key	
Report of: Dr Catherine Edwynn, Interim Consultant in Public Health		
Accountable Head of Service: Debbie Maynard, Head of Public Health		
Accountable Director: Roger Harris, Director of Adults, Health and Commissioning / Dr Andrea Atherton, Director of Public Health		
This report is public		

Executive Summary

This report provides an overview of the multiple sources and types of air pollution and the associated acute and chronic health effects from exposure to air pollution.

There are a range of measures that can be taken to improve air quality including traffic management and public health approaches such as active travel, urban greening, living streets, which can improve local air quality as well as having other benefits to health and wellbeing.

Thurrock Council has a statutory duty to undertake monitoring of air quality across the Borough, against the air quality standards and objectives laid out in the Air Quality Regulations 2000. However, it is acknowledged that effective impact on air pollution requires cross-boundary action, spanning a range of actions beyond the local level and usually needing to involve a range of players to be effective. In light of this, this report advocates an approach based on lowering exposure to mitigate health risks.

There are a number of new local developments occurring in Thurrock which may have an impact on air quality, and so it seems timely to consider the health impacts and how we might mitigate these.

1. Recommendation(s)

1.1 The Health and Wellbeing Overview and Scrutiny Committee is asked to note the contents of this report.

2. Introduction and Background

2.1. The Environment Act of 1995 included a requirement for the development of a strategy to address areas of poor and declining air quality, to reduce any significant risk to health and to achieve the wider objectives of sustainable development in relation to air quality in the UK. The National Air Quality Strategy was published in response to this Act on March 12th 1997, with commitments to achieve new air quality objectives throughout the UK by 2005. A review of the Strategy led to the publication of Air Quality Strategy for England, Scotland, Wales and Northern Ireland in January 2000.

2.2 The Strategy sets out standards and objectives for the 8 main health-threatening air pollutants in the UK.¹

- Particulates (PM10 & PM2.5)
- Nitrogen dioxide
- Ozone
- Sulphur dioxide
- PAH
- Benzene
- 1,3-Butadiene
- Carbon monoxide
- Lead

2.3 Local authorities are responsible for seven of the eight air pollutants under Local Air Quality Management (LAQM). National objectives have also been set for the eighth pollutant, ozone, as well as for nitrogen oxides and sulphur dioxide.

2.4 Local authorities in the UK regularly review and assess air quality in their area and determine whether or not the air quality objectives are likely to be achieved. Where air quality objectives are unlikely to be met, Air Quality Management Areas (AQMAs) must be declared and action plans developed outlining how the local authority intends to address air pollution in this area. LAQM is the main tool for local authorities to deal with problem areas of pollution.

¹ The standards are based on an assessment of the effects of each pollutant on public health. They are based on recommendations by the Expert Panel on Air Quality Standards, The European Union Air Quality Directive and the World Health Organisation

2.5 Thurrock is no exception and in line with other Councils works hard to identify areas where the government’s air quality objectives are likely to be exceeded.

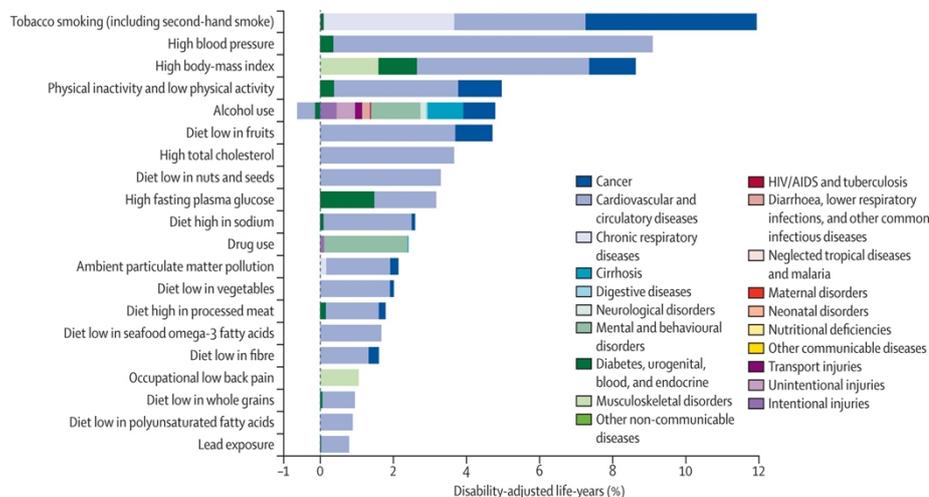
3. Issues, Options and Analysis of Options

3.1 Overview of issues – the impact of air pollution on health

The nature of air pollution has changed over the past 40 years; emissions of smoke and sulphur dioxide associated with smogs of the past have declined, but the proportion of pollution from vehicles has greatly increased. Pollutants from these sources may not only prove a problem in the immediate vicinity of these sources but can travel long distances.

3.2 The 2010 Global Burden of Disease (GBD) assessment, showed exposure to air pollution is a significant contributor to ill health and when the impact of air pollution is ranked against other harms. In a recent study ambient particulate matter pollution was ranked 12th in the UK², below top risk factors such as tobacco, alcohol, lack of physical activity and some aspects of diet but above factors such as “diet high in processed meat”, “diet low in vegetables” (See Figure 1).

Figure 1: Ranking of risk factors for UK



3.3 The Committee on the Medical Effects of Air Pollutants (COMEAP³) report ‘Long-term Exposure to Air Pollution: Effect on Mortality’⁴ summarised the latest evidence.

² UK health performance: findings of the Global Burden of Disease Study 2010

³ COMEAP provides independent advice to government departments and agencies on how air pollution impacts on health.

⁴ Committee on the Medical Effects of Air Pollutants. (2009) Long-Term Exposure to Air Pollution: Effect on Mortality.

The report estimated that long term exposure to a 10µg per m³ increase in PM_{2.5} concentrations⁵ leads to a 6% increase in 'all cause mortality', or total deaths. A later report⁶ included an estimate of the mortality burden of existing air pollution on the population of the UK: demonstrating an effect on mortality in 2008 equivalent to 29,000 deaths and an associated loss to the population of 340,000 life years.

- 3.4 The evidence for effects of long-term exposure to sulphur dioxide, nitrogen dioxide, carbon monoxide and ozone on mortality were also assessed but judged to be weaker than that regarding particles and insufficient to justify quantification, either in place of, or in addition to, the mortality effects of long-term exposure to PM 2.5.
- 3.5 The Defra publication 'Air Pollution: Action in a changing climate'⁷, contained updated values for loss of life-expectancy and costs based on anthropogenic PM_{2.5} levels in 2008. The loss of life-expectancy due to PM_{2.5} at 2008 levels was estimated at about 6 months, with estimated equivalent costs in 2005 prices of between £7.7 billion and £16.9 billion per annum.
- 3.6 A recent report issued by Public Health England (PHE) ⁸ focuses on the long-term effects of background PM_{2.5} due to human activity, i.e. fuel combustion (vehicles, industry, power generation, etc.). The report found that, in some parts of London, PM_{2.5} pollution contributes to 8.3% of deaths in people aged over 25, while the estimate for Somerset is 4.4%. The national estimate for the UK is that PM_{2.5} pollution contributes to 5.3% of deaths, which converts into 28,969 deaths per year.
- 3.7 The impacts on health from air pollution can be considered to be both short and long term.
Short term: In most healthy individuals, moderate levels of air pollution levels are unlikely to have any serious short term effects. However, elevated levels and/or long term exposure to air pollution can lead to more serious symptoms and adverse effects. These mainly affect the respiratory and inflammatory systems. These can include exacerbations of asthma, negative effects on lung function, increases in hospital admissions for respiratory and cardiovascular conditions, as well as increases in mortality. People with existing lung or heart conditions may be more susceptible to the effects of air pollution^{9,10}.
- 3.8 The most vulnerable groups including children, older people and those with heart and respiratory conditions are most affected by elevated levels of air pollution. People living in deprived areas are also more affected by poor air

Health Protection Agency.

⁵ Definition of PM_{2.5}

⁶ COMEAP: The Mortality Effects of Long-Term exposure to Particulate Air Pollution in the UK, December 2010

⁷ Department for Environment, Food and Rural Affairs (Defra) (2010a) Air Pollution: Action in a Changing Climate: <http://www.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-pollution.pdf>

⁸ Estimating Local Mortality Burdens associated with Particulate Air Pollution, PHE, 2014

⁹ COMEAP (1998). The Quantitation of the Effects of Air Pollution on Health in the UK.

¹⁰ COMEAP (2001) Statement on Long Term Effects of Particles on mortality.

quality, partly because these areas are often near busy roads. This can exacerbate health inequalities.

The table below shows the types of health effects experienced by the most common pollutants at elevated levels:

Pollutant	Health effects at very high levels
Nitrogen Dioxide, Sulphur Dioxide, Ozone	Cause inflammation and consequent narrowing of the airways after short exposure and can increase response to irritants. Asthma symptoms can be exacerbated
Particles	Long-term exposure to particles (especially PM _{2.5}) is associated with premature mortality, especially from heart and lung conditions. Recent studies have also suggested that high levels of PM _{2.5} in childhood can permanently impair lung function. High levels of particles can affect asthma sufferers
Carbon Monoxide	This gas prevents the uptake of oxygen by the blood. This can lead to a significant reduction in the supply of oxygen to the heart, particularly in people suffering from heart disease

3.9 Long-term:

The World Health Organisation (WHO) estimate air pollution caused 3.7 million premature deaths worldwide per year in 2012; largely due to exposure to small particulate matter of 10 microns or less in diameter (PM₁₀), which cause cardiovascular and respiratory disease, and cancers.

3.10 The WHO IARC study in 2013 found outdoor air pollution to be a leading environmental cause of cancer deaths in humans. Some deaths may be attributed to more than one risk factor at the same time. For example, both smoking and ambient air pollution affect lung cancer. Some lung cancer deaths could have been averted by improving ambient air quality, or by reducing tobacco smoking.

3.11 Health outcomes resulting from particulate matter:

Particulate matter affects more people than any other pollutant. Research evidence strongly suggests that chronic exposure to particulate matter can lead to higher levels of mortality (death), increased admissions to hospital of people suffering from cardiovascular disease (heart attacks and strokes) and pulmonary (lung) disease, such as chronic obstructive pulmonary disease (COPD), bronchitis and asthma. The effects may be due to size, as the most health-damaging particles are those with a diameter of 10 microns or less, (\leq PM₁₀), which can penetrate and lodge deep inside the lungs. But other factors such as composition (some hydrocarbons, fossil fuels¹¹ or metals which can cause cancer, poisoning or adverse health outcomes¹².), length of time of exposure as well as source and age of particle are also relevant.

In the UK, annual mean objectives for the protection of human health have been set at 40 $\mu\text{g}/\text{m}^3$ for PM₁₀ and 25 $\mu\text{g}/\text{m}^3$ for PM_{2.5}. However, the WHO

¹¹ Review of evidence on health aspects of air pollution, REVIHAAP, WHO, Europe, 2013

¹² Review of evidence on health aspects of air pollution, REVIHAAP, WHO, Europe, 2013

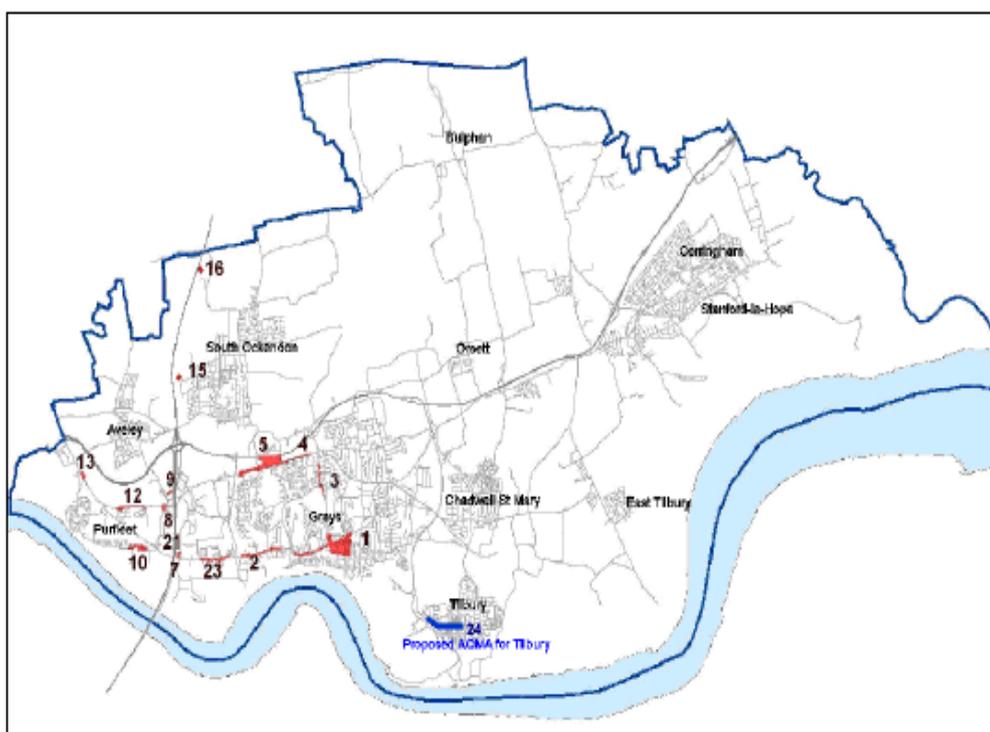
'Review of evidence on health aspects of air pollution (REVIHAA) project': suggests there is no safe level below which no adverse health effects occur.

3.12 The Picture in Thurrock

In April 2001, Thurrock Council declared 20 AQMAs for exceeding threshold annual average limit values for NO₂, four of which were also exceeding the 24 hour mean limit value for particulate matter (PM₁₀). This was reassessed in 2004, identifying that 7 AQMAs could be withdrawn and 2 additional AQMAs should be designated. This resulted in Thurrock having 15 AQMAs exceeding the annual average NO₂ objective, four of which were previously designated for problems with PM₁₀. Source apportionment exercises determined that the primary reason in all 15 AQMAs was road transport. A further AQMA was declared in November 2014 in part of Tilbury. The location of current AQMAs is shown in Figure 2.

Currently local authorities are required to submit an assessment every three years, plus further detailed assessments and a formal action plan when an Air Quality Management Area is declared.

Figure 2: Thurrock Air Quality Management Areas



3.14 The Local Authority is working hard to bring improvements to air quality within current AQMA's and work being progressed is highlighted in the Air Quality Progress Report for Thurrock Council¹³, including promoting use of greener buses, engagement to reduce car usage and promote active travel ("beat the street") and working with businesses and workplaces. However, it has to be acknowledged that local action alone is unlikely to bring about all the

¹³ Thurrock Council, July, 2014

improvements required in order to comply with the air quality objectives. One of the main issues for Thurrock is that it is a major transport hub for Heavy Goods Vehicles (HGV's) and most of the current AQMA's in the west of the borough are impacted by the weight of traffic and HGV's moving along the roads. The local authority manages these roads to lower impact, but it has to ensure a balance between air quality considerations and potential economic and political consequences. An important issue which has had a negative impact on air quality in recent years is the increasing uptake of diesel vehicles over petrol vehicles. This has unfortunately been incentivised nationally by lowering car tax on these vehicles and has impacted on recent trends for both nitrogen dioxide and particulate matter.

- 3.15 The air quality action plan contains some very good initiatives aimed at lowering emissions and changing behaviour, but given that the Council is constrained in its' ability to influence local air quality directly, partly as a result of pollution arising from neighbouring areas, London (and beyond) and partly because it has limited responsibility for the main sources of emissions in Thurrock, it might be suggested that Thurrock Council might have more health impact by focusing on lowering exposure.

3.16 **Public Health Outcomes Framework indicator on air pollution**

Due to the significant impact on human health, the Public Health Outcomes Framework (PHOF) includes an air pollution indicator. This relates to the mortality effect of man-made particulate matter expressed as the percentage mortality fraction attributable to PM2.5 for upper tier local authorities.

- 3.17 Reviewing the PHOF for the PHE Centre Essex and Anglia Region, (Figure 3) it can be seen that Thurrock has the highest outcome indicator value for particulate pollution (5.9). It has been suggested that work to improve the air pollution indicator would see beneficial impacts on other PHOF indicators. For example lifestyle indicators such as excess weight or physically active adults, as improving air pollution might foster living streets developments and more engagement in active travel schemes.

Figure 3: Public Health Outcomes Framework indicator for air pollution



3.18 Options going forward

The introduction of the Public Health Outcomes Framework (PHOF), greater evidence on health impacts of air pollution and the likely benefits of addressing this, and the transfer of public health responsibilities to local authorities offers great opportunities in improving both health and wellbeing. Joined up approaches could be of great value in both promoting air quality at

a local level and bringing together action to improve public health across all our communities. This is especially relevant for the health impacts of PM2.5.

3.19 Air quality and impact on health and wellbeing should be highlighted in the Joint Strategic Needs Assessment. Health and Well Being Boards and local Directors of Public Health are able to prioritise action on air quality as part of the need to tackle the wider determinants of health in order to reduce the health burden from air pollution and more generally.

3.20 A number of measures can be undertaken at a national and local level to reduce air pollution including:

- Proactive enforcement of vehicle emissions standards for cars and buses, and awareness raising campaigns.
- Responsible fleet procurement and management e.g. nationally enforced age limit for Public Service Vehicles (PSVs).
- Reduce car journeys within towns and cities and improve sustainable travel options.
- Incentivise the uptake of clean fuels.
- Better controls over biomass burning and installations.
- Requesting low emission strategies for new developments.

3.21 Measures to tackle PM2.5 include:

- Implementation of protocols for PM2.5 reduction through a package of measures such as Low Emission Zones for city/town centres; planning restrictions (i.e. suitable mitigation) on polluting activities such as incinerators upwind of AQMAs; and implementation of sustainable low emission transport
- PM2.5 particularly associated with diesel vehicles and Heavy Goods Vehicles (HGVs), and therefore curbs/controls on HGV through-traffic in town/city centres would help, including weight restrictions on trucks; on the spots emissions testing (at the tailpipe) with fines for the worst polluters.
- A key national measure to control PM2.5 would be for car Manufacturers to reduce particulate matter from diesel vehicles and from vehicle brake and tyre wear.
- Utilisation of the planning process to ensure PM2.5 levels are taken into account in new developments e.g. include special particulate reducing plants, green walls, green roofs, and construction of dust mitigation measures

3.22 Improving health and wellbeing by joining up action including:

- Encouraging active travel i.e. walking or cycling so lowering car travel, encouraging park and ride schemes

- Encouraging 'living streets' by pedestrian schemes, traffic management, public transport interventions, relocation of road space
- Developing urban green spaces that help to improve air quality and have secondary health benefits e.g. mental health, physical activity

3.23 A recent national Conference on air quality hosted by PHE¹⁴ suggested that local initiatives should re-focus on reducing exposure to traffic emissions, and by encouraging behavioural change related to travel modes and routes. These actions could be supported by the promotion of national and local alerting and other local information schemes and interventions tailored to different audiences. This stance is a pragmatic one, but achievable as impact on air pollution is a cross-boundary issue requiring coordination of actions beyond the local level and usually needing to involve a range of players to be effective.

4. Reasons for Recommendation

4.1 That the Health and Wellbeing Overview and Scrutiny Committee notes the evidence regarding health impacts of air pollution and supports actions to mitigate the impact on the people of Thurrock.

4.2 That the Health and Wellbeing Overview Scrutiny Committee supports a cross-directorate response focused predominantly on lowering exposure as well as reduction of emissions to achieve health impact. This would be achieved by establishing an Officer Working Group which would report into Health and Wellbeing Board to help to identify and prioritise joined up action and approaches to improve the health experience of individuals and communities in Thurrock.

5. Consultation (including Overview and Scrutiny, if applicable)

5.1 None

6. Impact on corporate policies, priorities, performance and community impact

6.1 This report should be used by the Council and partners to influence new ways of working and supporting policies and actions that minimise impact of air pollution and impact on health and wellbeing.

¹⁴ Birmingham, 02.02.15

7. Implications

7.1 Financial

Implications verified by: **Mike Jones**
Management Accountant

There are no direct financial costs arising from this report. Costs associated with monitoring of air quality can be retained within the relevant revenue budget for Environmental Protection. The public health budget already funds a number of initiatives to promote active travel and any new proposed such schemes would be subject to the normal budget process.

7.2 Legal

Implications verified by: **Dawn Pelle**
Adult Care Lawyer, Legal and Democratic Services

There are no legal implications for the following reasons:

The report acknowledges the duties imposed upon local authorities by statute. Further you have taken into account the Air Quality Regulations 2000 as well as the UK strategy on Air Quality setting out the standards and objectives. It is noted that Air Quality Management Areas (AQMA) have found in Thurrock and measures being taken to address them accordingly. For example those set out in paragraph 3.17 of the report.

There is a recognition that an assessment has to be submitted every 3 years and a detailed assessment along with a formal action plan when an AQMA has been declared

7.3 Diversity and Equality

Implications verified by: **Rebecca Price**
Community Development Officer

The introduction of measures to reduce air pollution will help to improve the health and wellbeing of some of the more vulnerable members of the local community, including those suffering from health conditions affecting the upper-respiratory system or those with cardiovascular disease.

The implementation and ongoing monitoring of the Air Quality Action Plan will help to tackle existing air quality problems, including a reduction in the levels of nitrogen dioxide and particulate matter, reducing the health impacts for people living and working in and around the AQMAs.

The Council will have due regard to the Equality Act 2010 when there are any major proposed actions or schemes for the reduction of air pollution in Thurrock.

7.4 Other implications (where significant) – i.e. Staff, Health, Sustainability, Crime and Disorder)

The impact of air pollution on health is the topic of the report.

8. Background papers used in preparing the report (including their location on the Council's website or identification whether any are exempt or protected by copyright):

There are a number of reports and research studies cited and can be found in footnotes of relevant sections. The principal reports are:

- Committee on the Medical Effects of Air Pollutants. (2009) Long-Term Exposure to Air Pollution: Effect on Mortality. Health Protection Agency.
- COMEAP: The Mortality Effects of Long-Term exposure to Particulate Air Pollution in the UK, December 2010
- Estimating local mortality burdens associated with particulate air pollution, PHE, April 2014
- Thurrock Interim Air Quality Action Plan for Transport – 2012-2014-2015, March 2013
- Air Quality Progress Report for Thurrock Council, July 2014
- Review of evidence on health aspects of air pollution, REVIHAAP, WHO, Europe, 2013

9. Appendices to the report

None

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