



# Report to the City of London Health & Wellbeing Board on Air Pollution



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## Executive Summary

Air pollution in urban environments, even at the relatively low levels in London, is recognised as a threat to human health, warranting further action to reduce air pollution significantly over coming years. At the levels found across London, and in the City, it is a significant cause of disease and death, especially heart disease and lung cancer, but also respiratory disease and asthma. Department of Health figures suggest it may be as much as the fifth cause of death in London, ahead of communicable disease, passive smoking, alcohol abuse, road accidents and suicide. As the pollution particles pass into the blood and travel throughout our bodies they inflame many organs, and there are now associations with Alzheimer's and Parkinson's diseases, Type 2 diabetes, cognitive impairment and learning problems in children. Air pollution disproportionately affects the elderly, poor, obese, children and those with heart and respiratory disease, but it has effects on everyone exposed to it to some extent. The evidence on air pollution's public health effects supports air pollution reduction being ranked third in the Joint Health and Wellbeing Strategy.

The Health and Wellbeing Board (HWBB) can act to reduce air pollution by assessing the scale of the problem, appraising the air pollution benefits of City policies, helping identify important areas for action, embedding knowledge, providing guidance and encouraging the commissioning of information and other services. Supporting action on air pollution clearly falls under the HWBB remit. In particular, the effects of air pollution in exacerbating health inequalities are relevant, as are the health and financial co-benefits of actions that reduce air pollution, such as active travel, energy efficiency and insulation.

Many City policies support action being taken to reduce air pollution. The Sustainable Community Strategy and the Corporate Plan between them include both a specific goal to improve air pollution and 11 additional goals that support improving air pollution, including promoting the City's competitiveness with cleaner cities like New York, encouraging excellence in building innovation and design, and improving public health.

Actions that can improve air pollution range from small changes that reduce exposure during cyclical improvement to the urban realm, to major regulatory actions that can proscribe all but the cleanest vehicles from the City's highways. Many are cost-effective or cost-beneficial. Other key approaches include encouraging or incentivising cleaner fleets and the development of new and innovative vehicles and services. The many individual area plans in the City can readily be adjusted to assist in reducing air pollution and its effects.

## List of Recommendations

**These recommendations are included throughout the report, together with the rationale for the HWBB considering action:**

- 1. Ensure that the City’s Health and Wellbeing Profile reflects the severity of poor air quality as a public health issue. In particular, ensure that any future application of multi-criteria decision analysis (e.g. the Portsmouth Scorecard system) to prioritise health issues uses accurate evidence on the health effects of air pollution locally, and the scope for a local authority to reduce them.**
- 2. Consider how the City of London Corporation can influence neighbouring authorities and the Greater London Authority (in particular Transport for London) so that more action is taken to reduce the public health effects of air pollution.**
- 3. Consider how the HWBB can help to reinforce, and enforce, Development Control policies on air pollution, and where necessary provide timely comment on new developments.**
- 4. Consider how the HWBB can advise on, and review, Development Control policies as and when new evidence around the best practice for mitigating against the health effects of poor air quality develops.**
- 5. Advocate that changes in the urban realm which could affect people’s exposure to poor air quality, such as the introduction of new public spaces and on street seating, are assessed for changes in the levels of exposure.**
- 6. Consider recommending that air pollution concentrations and effects become a performance indicator in the next review of the Local Implementation Plan.**
- 7. Conduct a rapid Health Impact Assessment on the Local Implementation Plan of the Mayor’s Transport Strategy, similar to the one carried out on the Local Plan.**
- 8. Assess the air quality implications of the proposals contained within the Area Enhancement Strategies and identify which urban enhancement interventions are the most beneficial from a public health perspective.**

## 1. The HWBB can act to reduce the health effects of air pollution

As shown in the next section, air pollution is a serious public health issue across London, and more locally in the City, and there are good reasons for the HWBB to act. There are several ways that the HWBB can act on air pollution by considering the effects of current policies and plans on air pollution. These are:

### **What the HWBB can do...**

- Assess the extent to which air quality is considered within the City's policies and strategies
- Appraise the actions that the City is taking to mitigate against poor air quality, quantifying these from a public health perspective
- Identify geographic areas and specific policies where more needs to be done to tackle air pollution
- Embed knowledge and consideration of the health effects of poor air quality further into City procedures and policies
- Provide guidance from a public health perspective, where there are a range of policy directions or a number of initiatives, as to which may provide the best health outcomes through the reduction of pollution
- Influence the commissioning of health services across the City of London so that they consider the effects of poor air quality effectively

To assist the HWBB in considering such actions, this report has identified:

- Evidence for the public health effects of air pollution and what causes these effects
- The broad policy and legislative case for the HWBB to act on air pollution
- How City policies support the case for action on air pollution locally
- How local planning and transport plans are likely to reduce air pollution's effects (or can be improved to reduce them)
- The specific types of actions local authorities can take to reduce the effects of air pollution
- How the City's Area Enhancement Strategies can be improved to reduce the effects of air pollution

Where there are specific recommendations for the HWBB to consider these are boxed and in **bold**.

## **2. Air pollution is a serious public health issue in London and in the City**

In recent years, thousands of studies have been conducted on the health aspects of air pollution. Taken together, these have established that, even though air pollution has reduced a great deal in the last few decades, it is nevertheless the fifth major cause of disease and subsequent death [PHE, 2013]. This is despite air quality meeting the legal limits for air pollution in many respects. Although people generally think of air pollution as causing asthma, the strongest evidence is that it is a major cause of heart disease and death [WHO, 2013]. This happens because most of the very tiny particles of soot, metal and other detritus (known as PM<sub>2.5</sub>) that we inhale stick to the inside of our lungs, then cross into the blood. There they cause inflammation, leading to thickening of the arteries, blood clots and high blood pressure, which can ultimately lead to heart attacks and strokes. These effects can happen after only 6-24 months of daily exposure to the pollution [Brooke et al, 2010].

### *2.1 Air pollution causes heart disease and lung cancer, and is strongly related to vehicle movement*

It is established that PM<sub>2.5</sub>, and the larger PM<sub>10</sub> particles, are a cause of lung cancer and, as people generally understand, respiratory problems and asthma, especially in young children [WHO, 2013]. This seems to be linked not only to the fine particles that pass into the organs causing inflammation, but to bigger particles that come from tyre, brake and road wear. More of these bigger particles are formed and swept into the air as vehicles travel faster, increase in weight, stop and start frequently or increase in number. Air pollution going up for even a few hours can increase hospital admissions measurably for asthma or heart attacks, by 10%, 20% or more [WHO, 2013].

### *2.2 Air pollution causes more harm than many other common diseases*

The HWBB has prioritised action on air pollution in the Joint Health and Wellbeing Strategy (JHWS) and evidence on the health effects of air pollution supports this prioritisation. Public Health England has conducted a Health Impact Assessment of the effects of PM<sub>2.5</sub> on health for every local authority area in England [PHE, 2013]. This shows that, at the levels experienced in London, air pollution is the 5th of 12 ranked causes of mortality risk, ahead of preventable heart disease, road accidents, communicable diseases, respiratory disease in the under 75s, liver disease and suicide. It also contributes to the bigger causes of death, cancer and heart disease.

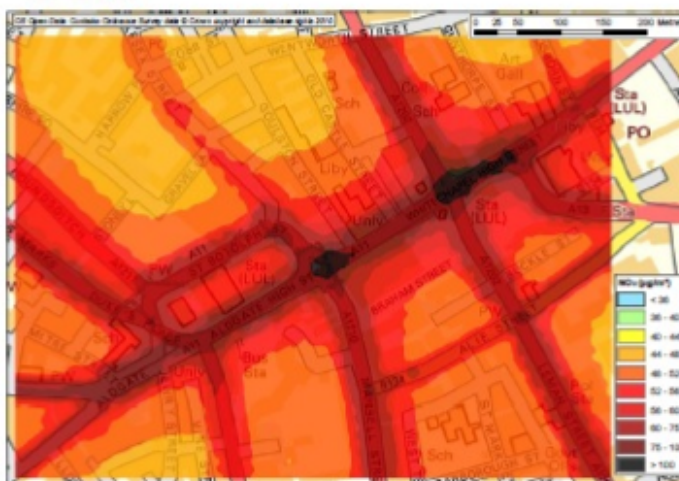
### *2.3 Air pollution in the City is mainly from traffic movements*

Although around half of the PM<sub>2.5</sub> in the City of London comes from outside Greater London, on average 40%-50% of the air pollution that people can breathe in the City is produced within the City boundary [CERC, 2011], with a higher proportion from local sources when people are close to roads. The map below, obtained from a computational model of how air pollution flows in the street, suggests that air pollution is much higher closer to roads. This effect has been proven by measurement experiments in which pedestrians on the footpath and in nearby streets were

found to be exposed to lower air pollution than passengers in black taxis and cars on main roads [Kaur et al, 2007]. Of the pollution generated within the City, most comes from traffic (73%) and buildings (18%), with black taxis accounting for 29% of the PM<sub>2.5</sub>, cars 26%, vans 18%, lorries 16%, and buses 8% [CERC, 2011]. The pollution comes not only from vehicle and boiler exhausts but also from wear of the tyres, brakes and road surfaces.

#### *2.4 Air pollution varies strongly with location, creating both threats and opportunities*

As pollution varies strongly with location, this can create opportunities to reduce exposure. People who are close to the kerbside of a busy road experience more pollution than people who are further away, while people in an adjacent, quiet street often experience half the pollution or less. Buildings and other physical barriers can redirect or concentrate pollution, and good air conditioning can remove most or all of the pollution from ambient air. An individual's level of exposure is also



important for the effects they are likely to experience. An elderly resident housebound all day in a well-ventilated home next to a busy road will receive 10-20 times more air pollution than a worker moving quickly from a railway carriage into a well-air conditioned office.

### **3. The HWBB can take a lead role in tackling air pollution in the City**

#### *3.1 The remit of the HWBB supports taking action*

The terms of reference of the City Health and Wellbeing Board are sufficiently broad to justify the board looking at air pollution as a public health issue. The terms of reference enshrine the City of London Corporation's new responsibilities under The Health and Social Care Act 2012.

#### *3.2 Tackling air pollution can help to reduce health inequalities*

Air pollution is a relevant factor in the application of the new duty for local authorities to tackle health inequalities in the discharging of their public health duties. From what is already known about air quality in the City of London, and more generally, those that are exposed to poor air quality suffer from multiple disadvantages and other poor health outcomes:

- Poorer people are more exposed to higher levels of air pollution due to the co-location of social housing and major roadways, such as at Mansell St
- There is also epidemiological evidence that the poor, the elderly, women and the obese are disproportionately affected by poor air quality [Hoek, 2013; WHO, 2013]]

The HWBB can usefully frame and assess action to tackle poor air quality as a way to reduce health inequalities. This is also a useful way to present the case for action to other decision-making bodies.

#### *3.3 Tackling air pollution has significant health, financial and other co-benefits*

Some actions to tackle air pollution have significant health co-benefits. Encouraging modal shift to active travel is a key approach to reducing air pollution, and its public health co-benefits in terms of cancer, heart disease and obesity are so great that the UK Government's National Institute for Health and Clinical Excellence (NICE) issued guidance encouraging the promotion of physical activity and active travel [NICE, 2008] in local transport planning. Studies by the Department of Health (DH) have shown that projects to increase active travel have very high benefits-costs ratios, with benefits typically outweighing costs by a factor of 13-19 [DH, 2010]. Active travel has low or no capital or running costs compared to cars, taxis and buses, and so can address both health inequalities and poverty [Kilbane-Dawe, 2012]. Building insulation can improve the health of the fuel poor [Green & Gilbertson, 2008] as well as reducing use of heating which causes air pollution.

Other actions, such as improving the urban realm with green space, vegetation and larger pedestrian areas, reduce air pollution impacts somewhat, and have also been shown to improve mental health and wellbeing (see for example White et al, 2013). Finally, many air pollution-reducing actions also reduce carbon dioxide emission or the cost of wasted or expensive fuels [Kilbane-Dawe, 2012]. Examples of this include replacing diesel use with Liquefied Petroleum Gas, or 'ecodriving' (fuel-efficient driving).

### 3.4 Prioritisation of air quality through the JSNA/JHWS process

The HWBB has an important role in the assessment of the health needs of the local population in order to inform and guide the commissioning of health, well-being and social care services within the City. This is done through the JSNA, which in the City of London is referred to the Health and Wellbeing profile, and has historically been completed in conjunction with Hackney Council. The City utilised a public consultation event as the prioritisation framework to identify those issues which would form the priorities in the Health and Wellbeing Strategy in 2011-2012. Through public consultation, air pollution was ranked as the third highest public health concern for City residents. Prioritisation is supported by the evidence reviewed for this report.

This contrasts with the prioritisation of air quality in Hackney - where it came out as the joint 28th ranked health priority. Hackney employed a system of prioritisation based on multi-criteria decision analysis (MCDA), which evaluated air quality alongside other determinants of health outcomes, based on the following criteria:

- Is this an issue which affects a significant proportion of the population (directly or indirectly)?
- Is this an issue which significantly affects vulnerable groups?
- Is this issue a significant contributor to inequalities in health and wellbeing?
- Are there significant unmet needs?
- Are needs amenable to intervention by the Local Authority, NHS and partners?
- Where the criteria is a London/national health priority.

In reaching its conclusion on air pollution, Hackney identified that:

- There was little scope for local authority intervention
- There was only an effect on those who were already ill, and a lack of local evidence of air quality affecting vulnerable groups
- There is no evidence of poor air quality contributing to health inequalities
- There is no unmet need on tackling air quality, as for most pollutants legal limits are not exceeded.

However, as this report states, the health effects of poor air quality are manifested at pollution levels well below the legal limits; local authorities control or influence traffic patterns and developments; and there is established evidence that air pollution contributes to health inequalities. The Hackney case demonstrates the high risk that the MCDA approach can evaluate a lack of known *evidence* as being indicative of a lack of *need* to prioritise a health issue, with the result that issues are not prioritised based on accurate evidence.

#### **HWBB Recommendation 1:**

**Ensure that the City's Health and Wellbeing Profile reflects the severity of poor air quality as a public health issue. In particular, ensure that any future application of multi-criteria decision analysis (e.g. the Portsmouth Scorecard system) to prioritise health issues uses accurate evidence on the health effects of air pollution locally and the scope for a local authority to reduce them.**



## 4. The City's strategic priorities support action being taken on air pollution

Both City and national policies support action by the HWBB on air pollution. City policies are, for the most part, extremely well-harmonised and cohesive. Support for action on air pollution comes both from the Sustainable Community Strategy (SCS) and the Corporate Plan. The SCS has five themes, which include a number of goals, and a specific goal to improve air quality:

- **To continue to minimise noise, land and water pollution and improve air quality where this is possible**

There are five other goals that can address the effects of poor air quality. We have ranked these in the order in which they are most likely to contribute to the goal of reducing air pollution, and added commentary on relevant actions and possible threats.

### I. **To encourage sustainable forms of transport**

The greatest scope for rapid action on air pollution concentrations comes from sustainable travel. Actions such as encouraging modal shift to active travel, promoting or requiring uptake of low-emission vehicles, tighter enforcement of current standards, lower speed limits, lower weight limits, will all help reduce pollution emissions. Transport that maximises active travel, low-emission vehicles, lighter vehicles, lower vehicles speeds and, ultimately, fewer vehicles, is the most effective way to reduce the air pollution concentrations at kerbsides, where most air pollution exposure occurs.

### II. **To ensure high standards of energy and resource efficiency in the design and implementation of the built environment and to encourage reduced carbon emissions across all sectors**

Ensuring buildings are designed to be as energy-efficient as possible over the long term reduces demand for heating which causes pollution.

### II. **To protect and enhance the built environment of the City and its public realm**

This has the effect of encouraging active travel and encouraging people to use open spaces. However, more use of open spaces can encourage people to occupy areas in air pollution hotspots, so green space development should be complemented by reducing air pollution close to that green space.

### III. **To advance sustainable procurement and consumption**

This can be used to promote low-emission procurement, such as using low-emission or active travel-based deliveries

### IV. **To conserve and enhance biodiversity**

Improving biodiversity often involves improving green space and planting in the urban realm. Increasing vegetation has an established local effect on reducing air pollution concentrations, if appropriate species are chosen. However, the effect is very local and not substantial unless extremely expensive options are chosen. Tree planting of appropriate species is likely to be the most cost-effective approach.

The theme also includes the following goal:

**V. To reduce our impact on climate change and to improve the way we adapt to it**

The City Together Strategy does not quantify the air quality problem under “What we know”, but highlights its importance under “What are the opportunities and challenges ahead?” Here air quality is listed as being both a national and City problem, but is tackled as a subsidiary problem to climate change. It should be emphasised that air pollution policy and carbon mitigation can be at odds, for example in promotion of biomass fuels and Combined Heat and Power. Policies’ actions should aim to deliver both outcomes rather than one at the expense of the other.

Five other goals under other themes also support action on air quality:

- **To improve people’s health, safety and welfare within the City’s environment through proactive and reactive advice and enforcement activities**

Poor air quality is by far the largest environmental factor, with a detrimental effect on the health of the City’s population. Action on information about poor air quality will help meet this goal.

- **To enable the City to continue to flourish and to see the benefits of its success spread across London, the UK and internationally**

- **To ensure that the built environment within the City meets the growth in business needs, whilst minimising the associated disruption caused to all sections of the City’s communities**

In the international competition for financial services, quality of life is an increasing issue. It is no accident that Wall Street has significantly better air quality than most of Central London - US air pollution regulations on PM<sub>2.5</sub> are much stricter than those across Europe and lead to lower concentrations and effects on public health. Acting to reduce air pollution to levels similar to those in New York would help improve the health of workers in the City and improve the City’s competitive offer.

- **To facilitate the provision of an enhanced public transport system that is both sustainable and meets the growing needs of all users including disabled people**  
See previous note on sustainable transport.

- **To facilitate the opportunity for exemplary, innovative, inclusive and sustainable design which respects and enhances the distinctive character of the City**

Innovative design can help reduce air pollution both from buildings and transport, thus reducing exposure to air pollution. It is important that innovation not be seen as a wholly creative activity - 99% of innovation is simply applying designs and approaches that have been proven to work in other markets or locations. Creative innovation is most effectively spurred through competitions and prizes - for example, the City of London could build on its air quality awards by establishing a competition to design a new iconic, affordable and zero emission Black Taxi for London, or a prize for the new building with the lowest air pollution and carbon emission in the square mile.

The Corporate Plan 2013-2017 explicitly refers to air quality, under Key Policy Priority 3:

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- **Engaging with London and national government on key issues of concern to our communities including policing, welfare reform and changes to the NHS**

Further detail is provided on this priority, where air quality is stated as an issue, around which the City of London should engage London partners:

- **Mayor of London Olympic legacy; Transport (investment in the network, ‘keeping London moving’); Promotion (financial services; tourism/visitors); Environment (waste issues; air quality)**

Working with the neighbouring authorities and the GLA (in particular TfL) has the potential to improve air quality in the City significantly, recognising that some air pollution is produced outside the square mile, and the importance of TfL as the strategic transport authority.

### **HWBB Recommendation 2:**

**Consider how the City of London Corporation can influence neighbouring authorities and the GLA (in particular TfL) so more action is taken to reduce the public health effects of air pollution.**

Further support for undertaking action on poor air quality within the SCS and Corporate Plan is included in Appendix 1.

## **5. Ways that the HWBB can strengthen the air pollution aspects of the City’s planning and transport policies**

### *5.1 The Local Plan*

The Local Plan is the spatial manifestation of the Sustainable Community Strategy and provides the development policies that underpin the vision and five themes stated in the SCS. As an updated version of the Local Development Framework, it also includes policies relating to development control and management. Indeed, Policy DM15.6 relating to mitigation of air pollution of new development is exemplary in its approach to minimising air pollution effects.

However, development control policies come under constant pressure from developers. The Local Plan identifies that up to 10% of the new office, retail and hotel floor space in the City could be located around Aldgate, as well as up to 10% of new housing units, in an area where resident populations are already exposed to very high levels of air pollution. With the National Planning Policy Framework stipulating a presumption in favour of sustainable development (assuming other local planning policies are not contravened), the air pollution effects of new developments should be properly considered and mitigated for, where necessary.

#### **HWBB Recommendation 3:**

**Consider how the HWBB can help to reinforce, and enforce, Development Control policies on air pollution and, where necessary, provide timely comment on new developments.**

#### **HWBB Recommendation 4:**

**Consider how the HWBB can advise on, and review, Development Control policies, as and when new evidence around the best practice for mitigating against the health effects of poor air quality develops.**

The Health and Wellbeing Board have considered the Local Plan through a rapid Health Impact Assessment (HIA). This rapid HIA mentions air quality, stating that the Local Plan covers air quality thoroughly, although the health effects from construction need to be taken further into account. The rapid HIA discusses the proposed changes to the Aldgate gyratory from a disabled access point of view, but does not take into consideration that the positioning of street furniture and creation of public spaces can increase people’s exposure to air pollution.

#### **HWBB Recommendation 5:**

**Advocate that changes in the urban realm, which could affect people’s exposure to poor air quality, such as the introduction of new public spaces and on-street seating, are assessed for changes in the levels of exposure.**

## 5.2 *The Local Implementation Plan*

The Local Implementation Plan (LIP) is the strategy which outlines how the City of London intends to implement the London-wide Mayor's Transport Strategy. As a consequence there is a strong synergy between the suite of mayoral transport documents and the City of London's LIP. It is particularly important for the City of London's LIP to reflect the importance of action to tackle poor air quality, as 73% of fine particles and 67% of oxides of nitrogen emitted in the City are from motor vehicles [CERC, 2011].

The LIP contributes to meeting both the Mayor's transport goals and the challenges identified in the Central London Sub-Regional Transport Plan. There are two goals in the Mayor's Transport Strategy, which can be used to justify action to improve the health of residents of the City of London:

- Enhance the quality of life for all Londoners
- Reduce transport's contribution to climate change, and improve its resilience

'Improving air quality' is also specifically identified as a challenge to be tackled in the Central London Sub-Regional Transport Plan. The LIP, which came into force in 2011, builds upon the goals and challenges stated in the Mayor's transport strategy, and aims to:

- Reduce the pollution of air, water and soils, and excessive noise and vibration caused by transport in the City

The LIP has two objectives which directly relate to tackling poor air quality. These are:

LIP 2011.1: To reduce the pollution of air, water and soils, and excessive noise and vibration caused by transport in the City

LIP 2011.4: To reduce the adverse effects of transport in the City on health, particularly health effects related to poor air quality and excessive noise, and the contribution that travel choices can make to sedentary lifestyles

There are a number of other LIP objectives that support action on tackling the effects of poor air quality - these are included in Appendix 1.

The LIP states that there will be on-going monitoring against the Mayor's statutory targets to move towards a cleaner local authority fleet of vehicles, as well as targets to increase the number of journeys being undertaken in the City through walking and cycling, labelled as 'reporting outputs' in the LIP. The LIP recognises the importance and urgency of action within these objective areas, and states that the focus of improvement will be in the first part of the LIP period. However, there are no targets contained in the LIP related to the direct measurement of the health effects of poor air quality.

**HWBB Recommendation 6:**

**Consider recommending that air pollution concentrations, and effects, become a performance indicator in the next review of the Local Implementation Plan.**

A sustainability appraisal has been undertaken of the LIP. It is based on ensuring that the ‘three pillars’ of sustainability are met: economic, environmental and social sustainability. In the context of this appraisal, different levels of action under thematic headings are assessed against different headline objectives, linked to these three pillars of sustainability. The sustainability appraisal includes headline objectives to ‘Improve the health of city workers, residents and visitors’ and ‘Improve air quality’. The appraisal summarises that the actions contained within the LIP will overall contribute positively to the environmental sustainability of the City, including reducing air pollution. Transport remains one of the most important policy areas for improving air quality. Recognising this, the HWBB may wish to undertake a Health Impact Assessment to supplement this sustainability appraisal.

**HWBB Recommendation 7:**

**Conduct a rapid Health Impact Assessment on the Local Implementation Plan of the Mayor’s Transport Strategy, similar to the one carried out on the Local Plan.**

## 6. Specific actions that the City can take to improve air quality

All local authorities, including the City of London, have the power to make interventions to address air pollution. Many save money, some with short payback times. These range in scale from minor adjustments to policies, that will, over time, accumulate to decrease public health effects (such as requiring all footways to be wider), to major regulatory actions that would require several years of development and consultation, such as imposing a Low Emission Zone (LEZ). There are also opportunities for innovation and promotion of innovation, both by applying tested approaches from other cities or domains, to encouraging genuinely new innovations. We have loosely classed the actions that can be taken as follows, although some fall into several classes.

- A. Those that reduce the exposure of individuals to pollution
- B. Those that reduce the concentrations of pollutants
- C. Those that reduce the emissions of pollutants

In general, measures to reduce exposure and concentrations (Types A & B) are the least controversial, but address only the symptoms of the problem. There are very few measures in the Type B category - once air pollution is emitted there is very little that can be done to remove it except encouraging urban design that facilitates ventilation of the street. Type C actions address the sources of the problem, but tend to be more controversial, as they often require changes of habit or technology, challenges to conventional wisdom or ingrained perception, or rigorous application of current rules and regulation against vested economic and bureaucratic interests. In some cases they even require action to remedy strategic mistakes made in regional, national or EU strategies.

### *6.1 Type A - Actions that reduce the exposure of individuals to pollution*

#### *6.1.1 Reducing the proximity of people to vehicles*

A rule of thumb is that anything that increases the distance between the most intense local sources of the most harmful pollution (usually traffic) and the people who breathe it in will dilute the pollution, and thus its effects. A few metres' difference can reduce exposure by 20%-50% compared with the concentrations close to vehicle exhausts. Wider footpaths, redirecting heavy traffic away from parks, shopping streets or other areas of high pedestrian footfall, pedestrianised streets, vehicle-only streets without footways, positioning entrances and foyers of attractions to minimise the proximity of gatherings to major roads, placing cycle tracks or parking between pedestrians and vehicles, are all options.

It also includes measures such as vertical exhausts, or stacks, on buses, Light Goods Vehicles or Heavy Goods Vehicles, tall chimneys on buildings, or requiring CHP or kitchen exhausts to be at roof level or higher. The effect of chimneys varies strongly with the local urban form and in complex terrain may require expert modelling to ensure the pollution does not fall to the ground.

#### *6.1.2 Placing physical barriers between people and pollution sources*

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Physical barriers increase the effective distance between the air pollution sources and the people who breathe in the pollution. These could comprise new buildings, redirecting traffic, screens or vegetation. The key point is to ensure that a physical barrier encourages the polluted air to vent to the free atmosphere instead of diffusing towards people.

### *6.2 Type B - Actions that reduce the concentrations of pollutants*

#### *6.2.1 Designing streetscapes in which air pollution does not accumulate*

Air pollution tends to build up in streets that are narrower than the buildings are tall, known as the canyon effect. Reducing canyon effects will encourage pollution to blow away. This can be done by ensuring that streets do not comprise extended terraces of buildings that are higher than the street is wide, as a rule of thumb.

#### *6.2.2 Encouraging good quality air conditioning and air infiltration from cleaner locations*

Air conditioning can remove most air pollutants if the correct equipment is used. Ensuring buildings in hot-spots have air conditioning with the correct filters and intakes from the cleanest locations, especially if they are occupied by children, people with CVD (Cardiovascular disease), respiratory disorders or asthma, the elderly or the less well-off will help reduce their exposure.

#### *6.2.3 Massively increasing vegetation in the urban realm*

There is good evidence that trees and plants in general encourage air pollutants to be deposited out of the air onto their leaf surfaces, instead of in people's lungs. The evidence also suggests that the effectiveness of this depends enormously on the species of vegetation. For it to have a significant effect, the entire available surfaces of the street (both horizontal and vertical) would need to be carpeted with vegetation. This tends to be extremely expensive and not cost-effective. Trees alone make only a very small impact, even at relatively high density, but are somewhat more cost-effective.

### *6.3 Type C - Actions that reduce the emissions of pollutants*

#### *6.3.1 Reduce the demand for heat in buildings*

Buildings cause pollution directly through heating systems in which fuel is burned locally. By enforcing building controls on energy efficiency, building management systems and insulation, and requiring more insulation and take up of insulation grants, demand for heat is reduced. Good practice in building operations will also reduce emissions and fuel costs.

#### *6.3.2 Reduce exhaust emissions from vehicles*

This could mean creating an (Ultra) Low Emission Zone in which only the cleanest vehicles are permitted, switching Council fleets to Liquefied Petroleum Gas (LPG) and encouraging this amongst taxis or other major polluters, incentivising development of clean fleets by operators and low-emission service companies. In general, the Euro standards have proved unreliable at reducing some air pollution emissions from vehicles, so such approaches need to be planned



with care. Diesel use, especially biodiesel, should be discouraged due to its potential carcinogenic and particle-forming properties [WHO, 2013].

Lobbying TfL to clean up the fleets they control - black taxis, hackney cabs and buses - is also a key action. Black taxis are subject to rules that prevent competition from cleaner, cheaper vehicles, while London's bus fleet, although cleaner than it was, is still responsible for significant amounts of pollution.

### *6.3.3 Reduce the brake and tyre wear by the vehicles*

Brake and tyre wear contributes to coarse PM particles, which cause respiratory and other problems. These can be mitigated by reducing average vehicle speeds and encouraging smoother driving, introducing more vehicle weight limits, removing humps or excessive traffic lights that encourage brake-accelerate behaviour, and ultimately reducing vehicle numbers.

### *6.3.4 Reduce the emissions from building's heating plant*

By encouraging clean fuels (e.g. gas), ultra-low NO<sub>x</sub>, lean burn and condensing boilers, both energy efficiency and clean air are promoted. CHP (Combined Heat and Power) should be deployed very carefully as the plant can emit 5-10 times more pollution than equivalent gas boilers, and much more if biomass or diesel fuels are used. In many cases CHP is not cost-effective.

### *6.3.5 Promote modal switch to mass transit and active transport to reduce vehicle numbers*

The most highly developed and richest cities in the World - even very large cities like Tokyo - have progressed past their 'age of the motor' and pushed down vehicle use in favour of mass transit and active transport. These approaches allow congestion to be reduced, encourage physical activity and reduce many of the air pollution problems due to vehicle movements.

### *6.3.6 Innovation prizes and awards for clean vehicles, buildings and services*

Some of the actions listed above may take years to plan or enact. Research has shown that substantial prizes and awards - for example the X-Prizes - are disproportionately effective at encouraging new innovation. The City could consider awarding prizes for low pollution developments, low-polluting service companies or cleaner taxi and bus technologies to encourage corporate, architectural and engineering innovation.

## 7. Specific alterations to Area Enhancement Strategies can help reduce the health effects of air pollution

The City is covered by sixteen Area Enhancement Strategies (AESs) at various stages of development and adoption. The AESs are useful to assess from an air quality point of view because:

- The AEAs contain proposed micro-level improvements, often along single streets - a scale of intervention which is complementary to the highly localised distribution of air pollution in the City
- The AEAs cover improvements to the urban landscape and localised transport initiatives, which can be highly effective in reducing both emissions and exposure to emissions
- The majority of proposals contained within the AEAs do not contain any indication of the effects of the intervention on air quality
- The AEAs provide a 'longlist' of potential interventions to improve the urban environment at localised levels - some have identified funding streams but many of the suggested improvements do not, allowing prioritisation of proposals based on air quality effect to be considered

Appendix 2 contains a table which lists the urban enhancement initiatives contained within the Aldgate and Tower AES, to illustrate how small-scale plans can be used to reduce air pollution exposure. The HWBB may want to consider the following general points when reviewing the proposed improvements contained within Area Enhancement Strategies:

- The role that reducing emissions and reducing exposure to emissions plays in improving health outcomes at a very local level
- Improvements that reduce emissions should be prioritised, including changes that keep traffic to single carriageways, reduce the speed of traffic, and improve accessibility for pedestrians and cycling
- Many of the actions listed in the AESs are useful for reducing exposure to emissions - not only widening footpaths and creating new green public spaces away from traffic directly, but also improving lighting and planting, and making walking and cycling easier and more desirable overall
- Prioritising improvement in those areas with resident populations exposed to detrimental levels of poor air quality, i.e. around The Minories and the Mansell Street Estate, and the routes connecting these

Of the projects listed, urban environment improvements that propose widening footpaths and reducing traffic volume and speed, through a range of measures (reduction of number of traffic lanes; changes to vehicle entry into main thoroughfares), will facilitate the greatest reduction in air pollution and exposure to pollution. It is noted that these are *proposed* enhancements, that could improve the urban environment in the majority of locations identified in the AESs. This suggests that, beyond the larger strategic priorities, such as the transformation of the Aldgate gyratory, consideration should be given to where such improvements can have the most impact.

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In considering the health effects of air pollution, the following approaches can help identify the locations with the greatest need of such enhancements:

- Targeting areas where the footfall is greatest, i.e. reducing the exposure to pollution to the largest numbers of people
- Targeting areas where the pollution is greatest, i.e. where the traffic is heaviest and there may be little work already to reduce emissions and/or exposure to these pollutants
- Targeting areas where residents live and the streets they are most likely use, i.e. reducing the exposure to pollution of those individuals that receive high levels of exposure from residing in the City

The cost-effectiveness of actions should also be taken into consideration, and this should include the potential health co-benefits from improving air quality.

Careful consideration needs to be given to the location of green spaces and street seating areas. Although such enhancements are desirable from the point of view of creating an urban environment that is attractive to pedestrians, the location of such enhancements in relation to emissions sources (such as major roads) needs to be considered, to ensure that prolonged exposure is minimised. This is not addressed within the AESs.

### **HWBB Recommendation 8:**

**Assess the air quality implications of the proposals contained within the Area Enhancement Strategies, and identify which urban enhancement interventions are the most beneficial from a public health perspective.**

## References

- [Atkinson, 2011] *Local city report for London*, APHEKOM Project, <http://www.aphekom.org/web/aphekom.org/publications>, 2011
- [Brook et al, 2010] *Particulate Matter Air Pollution and Cardiovascular Disease: An Update to the Scientific Statement From the American Heart Association*, *Circulation*, Vol 121, pp 2331-2378, 2010, doi: 10.1161/CIR.0b013e3181d8e1
- [DH, 2010] *Value for Money: An Economic Assessment of Investment in Walking and Cycling*, UK Dept of Health, London, 2010
- [DH, 2011] *Impact Assessment of the Public Health Outcomes Framework*, UK Dept of Health, London, 2011
- [Green & Gilbertson, 2008] Green, G. & Gilbertson, J., *Evaluation of Warm Front Scheme*, Sheffield Hallam U., ISBN 978-1-843872757, 2008
- [Fann et al, 2012] *Estimating the National Public Health Burden Associated with Exposure to Ambient PM<sub>2.5</sub> and Ozone*, *Risk Analysis*, Vol. 32, Issue 1, pp 81-95, 2012, DOI: 10.1111/j.1539-6924.2011.01630.x
- [Hoek et al, 2013] *Long-term air pollution exposure and cardio-respiratory mortality: a review*, *Environmental Health*, Vol. 12, 2013, doi:10.1186/1476-069X-12-43
- [Kaur, 2007] S. Kaur, M.J. Nieuwenhuijsen, R.N. Colvile, *Fine particulate matter and carbon monoxide exposure concentrations in urban street transport microenvironments*, *Atmospheric Environment*, Volume 41, Issue 23, July 2007, pp. 4781-4810, ISSN 1352-2310, doi: 10.1016/j.atmosenv.2007.02.002
- [Lim et al, 2012] *A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010*, *The Lancet*, 29 December 2012, Vol. 380, pp 2224-2260, 2012
- [NICE, 2008] *Promoting and creating built or natural environments that encourage and support physical activity*, NICE Public Health Guidance 8, 2008
- [Pascal et al, 2011] *Guidelines for assessing the health impacts of air pollution in European Cities*, APHEKOM Project, <http://www.aphekom.org/web/aphekom.org/publications>, 2011
- [PHOF, 2013] *The Public Health Outcomes Framework Observatory*, <http://www.phoutcomes.info/public-health-outcomes-framework#gid/1000044>, 2013
- [Raaschou-Nielson, 2013] Ole Raaschou-Nielsen et al., *Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses from the European Study of Cohorts for Air Pollution Effects (ESCAPE)*, *The Lancet Oncology*, 1 August 2013, Vol. 14, Issue 9, Pages 813-822, DOI: 10.1016/S1470-2045(13)70279-1
- [Shah et al, 2013] Anoop S V Shah et al, *Global association of air pollution and heart failure: a systematic review and meta-analysis*, *The Lancet*, 21 September 2013, Vol. 382, Issue 9897, pp 1039-1048, DOI: 10.1016/S0140-6736(13)60898-3
- [WHO, 2013] World Health Organisation: *Review of Evidence of the Health Aspects of Air Pollution* - Technical Report
- [White, 2013] M. White, I. Alcock, B. Wheeler, M. Depledge, *Would You Be Happier Living in a Greener Urban Area? A Fixed-Effects Analysis of Panel Data*, *Psychological Science*, June 2013, 24, pp. 920-928, doi:10.1177/0956797612464659

## **Appendix 1 - Detailed policies supporting action on air pollution**

This report comments on the main policies within City of London strategies that can provide support for action on air pollution. As stated within the report, there are numerous other policies contained within City of London strategies that can be utilised to justify specific actions. This appendix will list the most important of these, comprising:

- Further Key Priority Policy from the Corporate Plan
- Policy DM15.6 of the Local Plan, which covers air quality from a development control perspective
- Further policies from the City of London LIP for the Mayor's Transport Strategy

### **Corporate Plan**

Further support for undertaking action on poor air quality can be found within the Corporate Plan's key policy priority 1:

- Supporting and promoting the international and domestic financial and business sector

In particular, we note that air pollution regulations are much tighter in the USA, and air pollution measurements are much lower near Wall St in New York.

### **Local Plan**

#### **Policy DM 15.6 Air quality**

- 1) Developers will be required to consider the impact of their proposals on air quality and, where appropriate, provide an Air Quality Impact Assessment
- 2) Development that would result in deterioration of the City's nitrogen dioxide or PM<sub>10</sub> pollution levels will be resisted
- 3) Major developments will be required to achieve maximum points for the pollution section of the BREEAM, or Code for Sustainable Homes assessment relating to NOx emissions
- 4) Developers will be encouraged to install non-combustion low- and zero-carbon energy technology. A detailed air quality impact assessment will be required for combustion-based low- and zero-carbon technologies, such as CHP plant and biomass or biofuel boilers, and necessary mitigation must be approved by the City Corporation
- 5) Demolition, construction and the transport of construction materials and waste must be carried out in such a way as to minimise air quality impacts
- 6) Air intake points should be located away from existing and potential pollution sources (eg busy roads and chimneys). All chimneys should terminate above the roof height of the tallest building in the development in order to ensure maximum dispersion of pollutants.

### **Local Implementation Plan**

There are further LIP objectives which can be used to justify action to tackle poor air quality:

LIP 2011.2: To reduce the contribution of transport in the City to climate change and improve the resilience of the City's transport to its effects

LIP 2011.5: To increase permeability, connectivity and accessibility in the City.

LIP 2011.6: To smooth traffic flow and reduce journey-time variability and traffic congestion in the City

LIP 2011.7: To facilitate the efficient and economic construction of Crossrail and other major public transport improvements, while minimising the disruption and environmental impacts that this construction will cause in the City, including on traffic movement

LIP 2011.8: To plan for a City with an operational Crossrail, a significantly increased total public transport capacity and significantly increased numbers of pedestrians and cyclists

Many of the actions identified in section 2 of this report can be framed under these LIP objectives and would also improve air quality.

As the LIP identifies, these objectives have a significant role to play in reducing poor air quality and meeting the targets established in the City of London Air Quality Strategy 2011-2015. The LIP also identifies work towards these objectives which contributes to the 'improving air quality' challenge identified in the Central London Sub-Regional Plan of the Mayor's Transport Strategy.

## Appendix 2 - Possible improvements to air quality from planned urban realm improvements

This appendix details which urban realm enhancements from the many listed within the Tower & Aldgate Area Enhancement Strategy can help to reduce air pollution and its effects.

Area	AES	Suggested improvements	Effect on AQ	Comment
The Minories	Aldgate & Tower	Widen footpath, add greenery, install side road entry treatments, consider loading and waiting requirements, consider table and chair licenses, possibility for two-way traffic, consider adding elements of play and public art	Potentially positive - along a street with a resident population	As an area with a resident population there should be an effort to reduce emissions and exposure to emissions. Widening the footpath would be the most desirable policy, whilst any attempts to add greenery should look at the location and species of any planting to maximise the positive impact.
Crutched Friars & Jewry Street	Aldgate & Tower	Widen footways, tree planting, insert parking and waiting, seating on street, raised entry treatments to reduce speed	Potentially positive	Widening footways will increase the distance of the majority of pedestrian foot flow from source of emissions. Similarly, improvements aimed at reducing the speed of vehicles along the thoroughfare could reduce the TBW and exhaust emissions.
Little Somerset Street	Aldgate & Tower	Rebalance the carriageway and footway to match the function, planting trees, approach third parties about installing green walls, ensure adequate lighting, improve access at northern end for pedestrians, add elements of play and public art	Potentially positive - along a street connecting Aldgate tube with the Mansell Street Estate	Improving pedestrian access should be encouraged.

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Area	AES	Suggested improvements	Effect on AQ	Comment
Vine Street & Crescent Green	Aldgate & Tower	Create space that encourages people to spend time, consider planting, consider art, provide seating, introduce green walls, consider reopening-up of the southern end of the Crescent to change footfall between the underground and the Tower of London	Generally positive	<p>Further work to 'reduce traffic volumes and encourage cycling and walking' should be implemented - tying into the priorities developed in other strategies. Any proposal that changes the flow of pedestrians away from the traffic, such as reopening the Crescent, will reduce exposure. It would be worthwhile to make this an integral part of any future enhancement plans for this area.</p> <p>Consideration should be given to the exposure of individuals in newly created public spaces - these should not increase an individual's exposure to air pollution due to proximity to emission sources. Additional planting at America Square will reduce pollution somewhat.</p>
Aldgate Gyratory	Aldgate & Tower	Create green public space, remove barriers to pedestrian movement, increase cycling provision, plant the area, introduce sustainable urban drainage, provide seating and a pleasurable environment, two-way traffic provision, bus services retained, improve signage, improve the high street spine	Overall extremely positive - air quality modelling of the effects of this project have been undertaken	Provides a pedestrian link from the Aldgate transport hub to the residential areas of the Mansell Street Estate and beyond, reduces traffic flow, increases the distance between the Sir John Cass School and the emission sources. All of this will reduce overall emissions in the area and reduce the exposure of residents and schoolchildren as well.