

City of London

Air Quality Strategy

Delivering healthy air in the City of London

July 2019



For further information contact:

The Air Quality Team
Dept of Markets and Consumer Protection
City of London Corporation
PO Box 270
Guildhall
London, EC2P 2EJ

Tel: 020 7332 3030

cityair@cityoflondon.gov.uk

www.cityoflondon.gov.uk/air

This report will be available on the City of London web site <http://www.cityoflondon.gov.uk/air>

Foreword

Current levels of air pollution in London, particularly central London, have an impact on all of us. Improving air quality is an important issue for the City of London Corporation and I have pleasure in presenting the City of London Corporation's third Air Quality Strategy. It contains actions that we will be taking over the next few years to achieve better air quality in the Square Mile.

Our aim is for over 90% of the Square Mile to meet the health-based limits for nitrogen dioxide by the beginning of 2025. We will also support the Mayor of London to meet World Health Organisation Guidelines for particulate matter by 2030.

Our extensive network of air quality monitors show that air quality has been improving and these improvements are set to continue with the actions proposed in this Strategy. We will also benefit from the Mayor of London's Ultra-Low Emission Zone and the wide package of measures being implemented by the Greater London Authority.

Since the publication of the last Air Quality Strategy, improving air quality has been firmly embedded into our Corporate Plan, new Transport Strategy, Responsible Business Strategy and draft City Plan.

This Strategy outlines how we will improve the way we provide information to the public and make sure that robust air quality data is made available. It also details how we will work with a range of partners to deliver better air quality. We will continue to lead by example and have been moving our own fleet over to electric where possible. We will pilot new technology and require low and zero emission vehicles through our contracts. We will work with our partners to create improved powers for London local authorities to reduce the impact of boilers, generators and combined heat and power plant on local air quality.

Following the success of our award-winning achievements at Sir John Cass's Foundation Primary School we propose to develop specific action plans for City schools. We will build on our close relationships with City businesses through our CityAir engagement programme to encourage cleaner vehicles on our streets.

I hope you will support us in the delivery of this Air Quality Strategy so that we can achieve air quality that reflects the needs and aspirations of everyone who lives, works in or visits the City of London.

Jeremy Simons CC
Chair, Port Health and Environmental
Services Committee



Air Quality Strategy 2019 – 24: Delivering healthy air in the City of London

Our definition of healthy air:

Concentrations of nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}) that meet health-based Limit Values and World Health Organisation (WHO) Guidelines.

Why us:

The City of London Corporation has a statutory obligation to take a wide range of action to improve air quality and protect public health. Improving air quality and ensuring good health and wellbeing is an organisational priority outlined in our Corporate Plan (CP) for 2018-23, through which we aim to contribute to a flourishing society, support a thriving economy and shape outstanding environments.

Who we will work with:

Residents, workers, schools, businesses, Barts Health NHS, the Greater London Authority, Transport for London, London Councils, London Boroughs, the Government, the Environment Agency, London's Universities, the Third Sector, Port of London Authority, Cross River Partnership.

Our Vision

The Square Mile has air that is healthy to breathe.

Our Aim

For nitrogen dioxide to meet health-based Limit Values and WHO Guidelines in over 90% of the Square Mile by 2025 and support the Mayor of London to meet WHO Guidelines for PM₁₀ and PM_{2.5} by 2030

Our Outcomes

The Square Mile has clean air

People enjoy good health through reduced exposure to poor air quality

We are a leader for air quality policy and action and inspire collaboration across London

Links to CP Outcome 11

Links to CP Outcome 2

Links to CP Outcome 11

Our Activities

- Reduce emissions of air pollutants from our fleet, buildings and through our contracts
- Ensure new developments, transport and public realm schemes have a positive impact on local air quality
- Pilot innovative measures

- Provide robust and reliable information and data
- Make use of public health networks to disseminate information
- Develop tailored action plans for City of London schools
- Further develop the free smartphone App, CityAir

- Develop a Private Member's Bill to improve air quality
- Work closely with a wide range of stakeholders on air quality policy
- Facilitate collaboration across London's air quality community

Demonstrating success

A measure of success for the Strategy will be consistent compliance with health-based air quality Limit Values and WHO Guidelines measured using a network of robust air quality monitoring equipment. Over the next five years we will also continue to be recognised as a leading and highly regarded authority in the field of air quality.

Contents

1. Introduction.....	2
1.1 Source of air pollution in the City of London.....	5
1.2 Health impacts of air pollution	5
2. Air Quality Monitoring	7
2.1 Nitrogen dioxide	8
2.2 Particulate matter (PM ₁₀).....	14
2.3 Particulate matter (PM _{2.5}).....	16
3. Leading by Example	19
4. Collaborating with Others	23
5. Reducing Emissions from Road Transport	29
6. Reducing Emissions from Non-Transport Sources	40
7. Public Health and Raising Awareness	46
 Appendix 1: Further details on the delivery of actions	51
Appendix 2: Legal Position.....	69
Appendix: 3 Sources of Air Pollution	71
Appendix 4: Health Effects of Air Pollution	75
Appendix: 5 Further analysis of monitoring data	76
Appendix 6: Mayor of London Policies	77
Appendix 7: Air Quality Policies in the Draft City Plan.....	81
 Glossary	84
References.....	86

1. Introduction

The City of London, also known as the Square Mile, is the historic heart of London. It is home to approximately 7,500 permanent residents and 24,000 businesses. There is a working population of over 510,000 people. This is projected to increase to 640,000 by 2036. In addition to workers and residents, each year the City of London welcomes over 10 million tourists, along-side people who visit for business. The City of London Corporation (City Corporation) is the governing body for the Square Mile. It manages a wide range of functions including 11,000 acres of open space which provide green lungs for the Capital.

Like much of central London, the City of London can experience high levels of air pollution. The pollutants of current concern are nitrogen dioxide (NO₂), a colourless and odourless gas that is a product of fuel combustion, and particulate matter, of which there are a wide range of sources, including combustion. These particles are referred to as PM₁₀ and PM_{2.5}. and are below 10 and 2.5 micrometres in diameter respectively.

The City Corporation is required by statute to measure air pollution and develop and implement an improvement plan, or action plan, if health-based air quality limits are not met. Following detailed air quality monitoring, the whole of the Square Mile was declared an Air Quality Management Area (AQMA) in January 2001 for nitrogen dioxide and PM₁₀. This was due to levels of these pollutants being higher than the required limits. These limits were set in European Directives and transposed into domestic legislation.

The framework for air quality policy and action by London local authorities is called London Local Air Quality Management (LLAQM). It is overseen by the Mayor of London who provides templates and tools to assist with action planning and monitoring.

The City Corporation has had an air quality action plan in place since 2002. In 2011, the action plan was incorporated into an Air Quality Strategy outlining steps that would be taken to both improve local air quality and reduce the impact of air pollution on public health. The Strategy was updated in 2015, detailing further measures that would be taken through to 2020¹. This Strategy builds upon previous action and details measures that will be taken to 2024. A complete table of actions, with expected outcome, is outlined in Appendix 1. The current legal framework for improving air quality is in Appendix 2.

Despite the implementation of a wide range of action by the City Corporation to improve air quality, the health-based limits for nitrogen dioxide are still not met everywhere in the Square Mile. Extensive monitoring, however, demonstrates that

¹ City of London Air Quality Strategy 2015 – 2020

levels of nitrogen dioxide are reducing year on year, particularly away from busy roads.

The limits set in European Directives for particulate matter (PM₁₀ and PM_{2.5}) are generally met everywhere in the City of London. The only exception is adjacent to the busiest roadsides in unfavourable weather conditions. The World Health Organisation (WHO) has set its own Guidelines² for concentrations of PM₁₀ and PM_{2.5}. These are tighter than the limits set in European Directives. Particulate pollution has health impacts even at very low concentrations. No threshold has been identified below which no damage to health is observed. Therefore, the WHO Guidelines aim to achieve the lowest concentrations of particulate matter possible. Reducing levels of air pollution to meet the tighter WHO Guidelines will therefore continue to improve health outcomes.

The aims of this Strategy are to ensure that:

- **the City Corporation fulfils its statutory obligations for London Local Air Quality Management and improving public health**
- **air quality in over 90% of the Square Mile meets the health-based Limit Values and World Health Organisation Guidelines for nitrogen dioxide by the beginning of 2025**
- **the City Corporation supports the Mayor of London to meet World Health Organisation Guidelines for particulate matter (PM₁₀ and PM_{2.5}) by 2030**

These aims will deliver three main outcomes:

- the Square Mile has clean air
- people enjoy good health through reduced exposure to poor air quality
- the City Corporation is a leader for air quality policy and action and inspires collaboration across London

The outcomes will be met by a range of action across six areas:

² Air Quality Guidelines - Global Update 2005 Particulate matter, ozone, nitrogen dioxide and sulfur dioxide



City Corporation Corporate Plan 2018 – 23

This Strategy supports the delivery of the City Corporation Corporate Plan 2018 - 2023. The Corporate Plan sets out the over-arching strategic direction for the organisation. It has been shaped around three areas of public value - economy, environment and society. This Air Quality Strategy supports two Corporate Plan outcomes:

- Outcome 2: People enjoy good health and wellbeing
- Outcome 11: We have clean air, land and water and a thriving and sustainable natural environment

Other Corporate strategies that support the aims of this Air Quality Strategy are:

- Health and Wellbeing Strategy and Joint Strategic Needs Assessment
- Responsible Business Strategy
- Transport Strategy
- Local Plan and City Plan (draft)
- City Tree Strategy
- Open Spaces Strategy
- Procurement Strategy (in development)
- Climate Action Strategy (in development)

1.1 Source of air pollution in the City of London

The quality of the air in the City of London is influenced by a range of factors. Being at the heart of London, it is heavily influenced by emissions generated across Greater London and further afield. Over 75% of PM₁₀ and PM_{2.5} particle pollution measured in the City of London originates from outside the City of London boundary. This is because particles can travel very long distances. This highlights the importance of London-wide and national action to support the local action being taken by the City Corporation. Under certain weather conditions particles can be brought to London from the European continent, and even from as far as Africa.

The most recent estimate of the amount of nitrogen dioxide in the City that originates from outside the Square Mile is about 40%. For sources of pollution generated within the Square Mile itself, the main contributors are stationary and mobile combustion, largely associated with buildings and road traffic.

The Greater London Authority produces an Atmospheric Emissions Inventory for London. It is known as the LAEI. It is a large database of emission sources that contribute to air pollution in the capital. Information on the source of emissions of oxides of nitrogen (NO_x) and particulate matter is detailed in Appendix 3. The latest version of the inventory, issued in 2019, is referred to as the LAEI 2016. It contains emissions across London with 2016 presented as a baseline. The previous version of the inventory, the LAEI 2013 which was published in 2016, includes forecasts for 2020. The forecasts reveal that NO_x emissions from buildings in the City of London will be over twice that from road transport. This is a significant change from previous inventories where traffic pollution was the dominant source. This change is due to the wide range of action being taken to reduce emissions from vehicles. Whilst the absolute values should be treated with caution, it demonstrates that action increasingly needs to focus on emissions from non-road sources of pollution as well as road transport.

Diesel vehicles, particularly taxis, buses, vans and lorries, are the dominant source of emissions from road transport in the City of London. Many of these vehicles are servicing business needs. Pollution from demolition and construction sites also impact on local air quality. Further detail can be found in Appendix 3.

1.2 Health impacts of air pollution

Exposure to air pollution has a range of impacts on health. Short term exposure mainly affects people who are already classed as 'vulnerable', which means they have an existing condition which is aggravated by high levels of air pollution. Children and the elderly can also be vulnerable to short term exposure to high levels

of air pollution. Air pollution can exacerbate asthma and affect lung and heart function. There is evidence that both PM_{2.5} and PM₁₀ cause additional hospital admissions on high pollution days for those suffering from respiratory or cardiovascular disease.

Long-term exposure to high levels of pollution affects the whole population, not just the vulnerable. This is particularly the case for long-term exposure to PM₁₀ and PM_{2.5}.³ Nitrogen dioxide has also been associated with adverse effects on hospital admissions, a decrease in lung function and growth, increase in respiratory disease and incidences of asthma. Further information, including the estimated impact on life expectancy, is outlined in Appendix 4.

³ Fine Particulate Matter (PM_{2.5}) in the United Kingdom 2012 Air Quality Expert Group for Defra

2. Air Quality Monitoring

Commitment: The City Corporation will monitor air quality to assess compliance with Air Quality Limit Values and World Health Organisation Guidelines. Data will also be used to support research, evaluate the effectiveness of policies to improve air quality and to provide alerts when pollution levels are high.

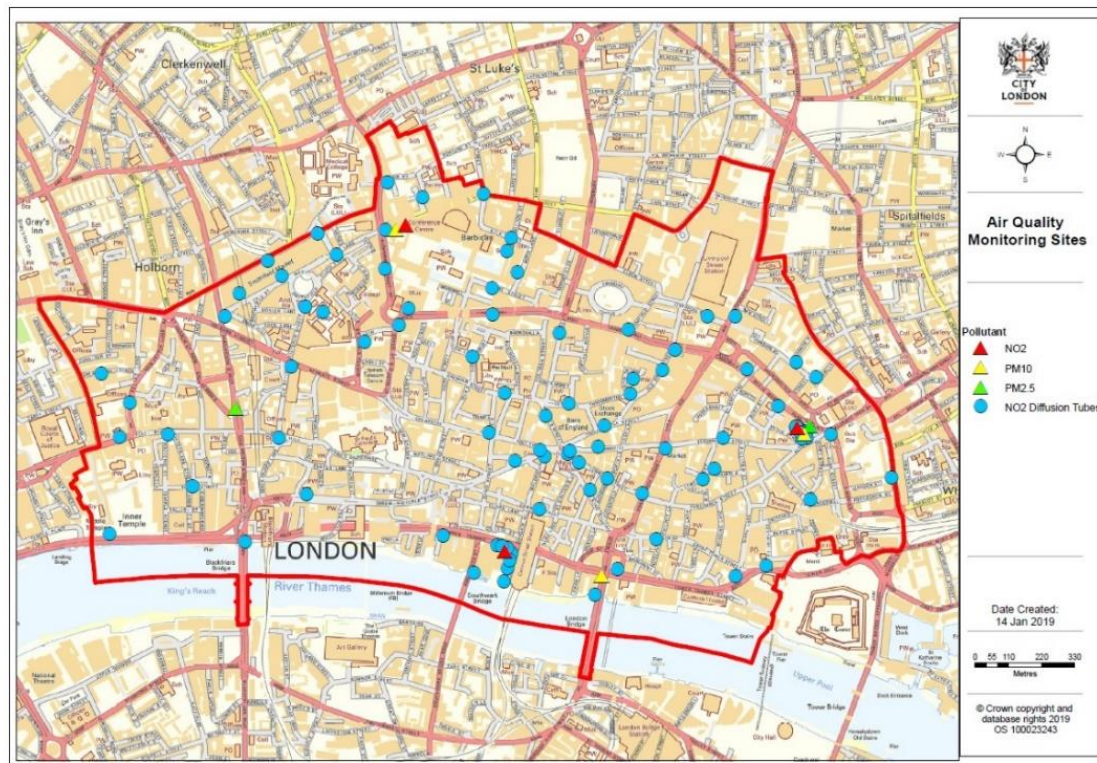
The City Corporation has been monitoring air quality for many years at a range of locations across the Square Mile. Monitoring is a vital component of air quality management and fulfils the following functions:

- to check compliance against air quality objectives, Guidelines and Limit Values, and consequently the impact on health
- to assess long term trends and the effectiveness of policies and interventions to improve air quality
- to raise awareness and provide alerts to the public when air pollution levels are high

The focus of monitoring in the City of London is to obtain reliable, accurate data for nitrogen dioxide, PM₁₀ and PM_{2.5} as these are the pollutants of concern. Data collected shows that levels of air pollution across the City of London, particularly levels of nitrogen dioxide, are decreasing. Given the substantial interest in air pollution, and the importance placed on it by the City Corporation, the amount of monitoring has increased significantly in recent years.

The air quality monitoring requirements in the City of London are under constant review. Figure 2.1 shows locations where air quality was monitored during 2018. The triangles represent the continuous monitoring sites and the circles are where diffusion tube monitoring was carried out. In addition to the locations shown on the map, diffusion tube monitoring was carried out by the Cheapside Businesses Alliance in the Cheapside area. These sites are not represented on the map.

Figure 2.1: Continuous and diffusion tube monitoring sites in 2018



2.1 Nitrogen dioxide

Measuring nitrogen dioxide

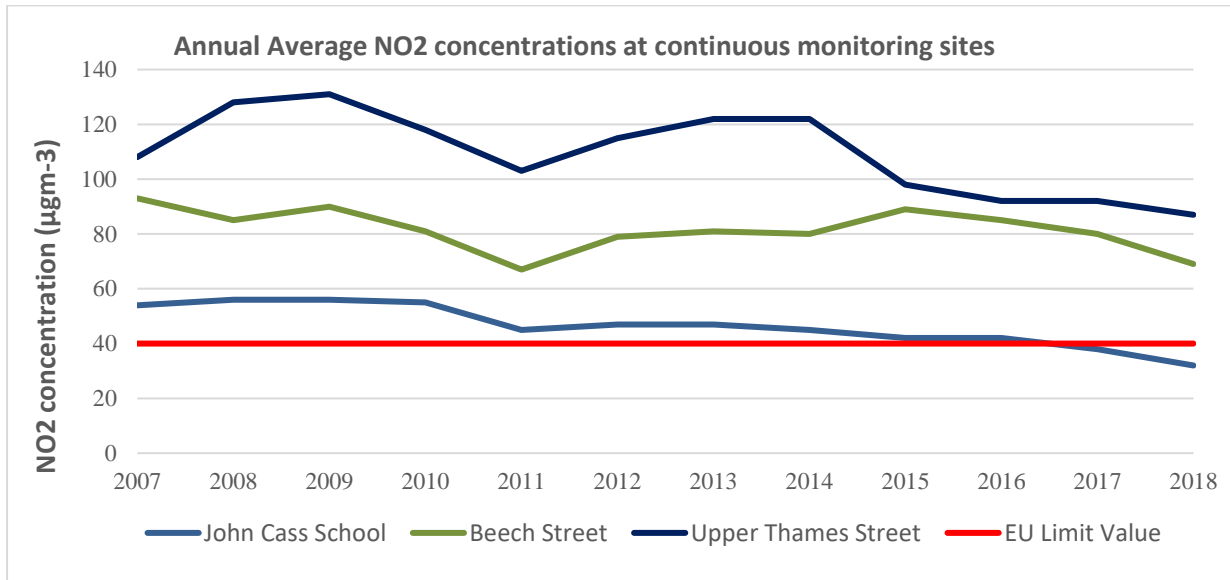
Continuous monitoring

Air quality monitoring is undertaken using different types of equipment depending on the purpose. One method of measuring nitrogen dioxide is with a continuous analyser. They are called continuous analysers as they take a measurement every minute. These are the most accurate instruments available and provide hourly average readings. The instruments are calibrated regularly and audited twice a year. The instruments are used to measure nitrogen dioxide in Beech Street, Upper Thames Street and Sir John Cass's Foundation Primary School. The data is subject to very detailed checks by Kings College London and made available to the public on the web site www.londonair.org.uk.

Figure 2.2 details the data collected at these three sites from 2007 to 2018. The high concentrations seen at Upper Thames Street and Beech Street are associated with the monitoring taking place at busy roadsides. Upper Thames Street is a 3-lane narrow road with tall buildings either side and Beech Street is a covered road. At Sir John Cass's Foundation Primary School, nitrogen dioxide is measured in the rear

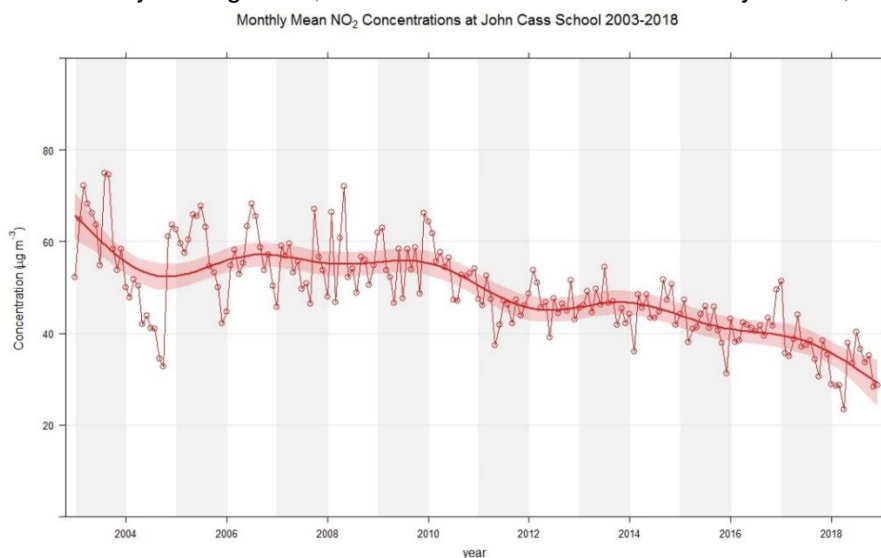
playground and the site is relatively open, so concentrations are lower. This site is classed as an 'urban background' site. The reduction in concentrations at all sites in 2011 was due to the weather conditions that year. The reduction in concentrations at Upper Thames Street from 2015 followed the installation of the cycle super highway when the lanes of traffic reduced from 4 to 3.

Figure 2.2 Annual Average NO₂, 2007 to 2018



Data collected at Sir John Cass's Foundation Primary School reveals that background concentrations of nitrogen dioxide have been reducing year on year. Since 2017, concentrations have been below the annual average EU Limit Value of 40µg/m³. Figure 2.3 shows the monthly average data for Sir John Cass's Foundation Primary School from 2003 to 2018. It reveals continuous improvement over this time period.

Figure 2.3: Monthly Average NO₂, Sir John Cass's Foundation Primary School, 2003 - 2018

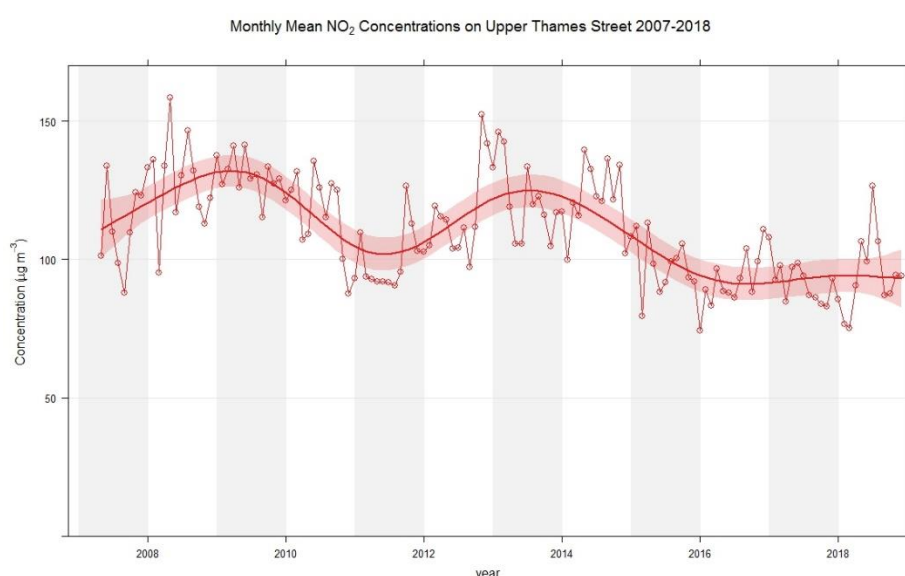


Concentrations of nitrogen dioxide at roadside are also reducing, although they remain high. Figures 2.4 shows the monthly average nitrogen dioxide in Upper Thames Street from 2007 to 2018.

The ongoing high levels of nitrogen dioxide at roadside are due to a range of factors, most significantly the failure of vehicle Euro Standards to meet the required reduction in emissions of oxides of nitrogen (NO_x) in diesel vehicles. There has also been an increase in the use of diesel in the fleet, partly due to national policy to encourage lower carbon fuels.

Further charts showing the variation of pollution over different days of the week and months of the year are presented in Appendix 5.

Figure 2.4: Monthly Average NO₂ in Upper Thames Street, 2007- 2018.



The profile of air quality, and interest in data, has increased in recent years. As a result, there are many air quality sensors on the market that vary in terms of accuracy and reliability. Good quality data is essential to support air quality management and for people to be able to make sound choices if they want to avoid high levels of air pollution. The City Corporation will therefore support trials of new sensors to establish their accuracy. This will include working with partners to try and develop a standardised framework to improve comparability of results and ensure proper use and maintenance.

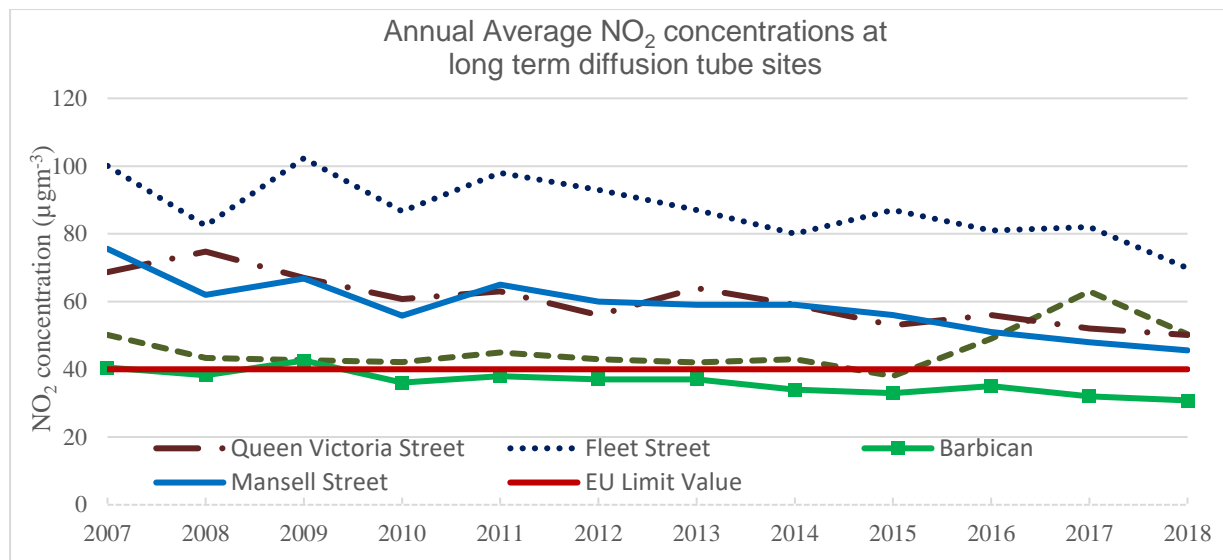
Non-continuous monitoring

Data collected from continuous analysers is supplemented by data collected using diffusion tubes. Diffusion tubes are low cost, low maintenance samplers. They are less accurate than continuous analysers and their use is limited as they provide data averaged over a month. The data is very useful however for comparing levels to the annual mean Limit Value, revealing long term trends and detecting hot spots. Due to

the increased interest and concern about air pollution, diffusion tubes are currently in place at approximately 100 locations across the Square Mile.

Concentrations of nitrogen dioxide measured over 12 years at five sites using diffusion tubes are presented in Figure 2.5. A similar pattern to that in Figure 2.2 is observed. Roadside sites have the highest concentrations and the overall trend is downwards. A significant increase in concentrations was measured at St. Bartholomew's Hospital in 2016 due to an energy centre being introduced down wind of the equipment.

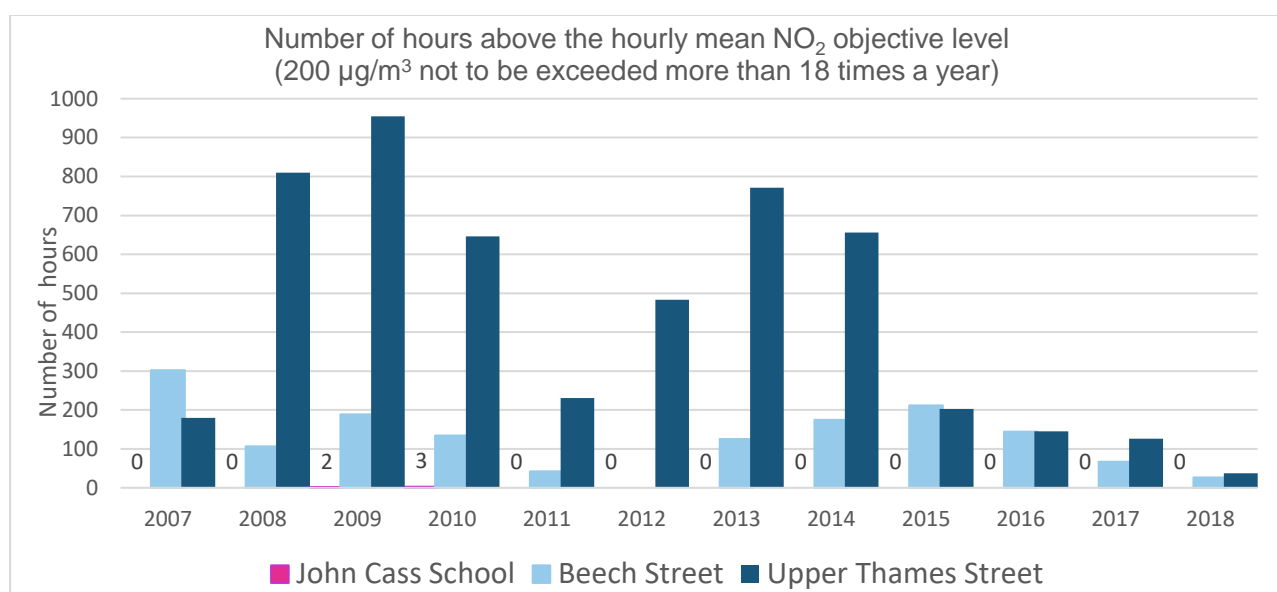
Figure 2.5: Annual Average NO₂ Measured with Diffusion Tubes, 2007 to 2018



Hourly average concentrations of nitrogen dioxide

In addition to an annual average limit for nitrogen dioxide, there is also an hourly average that should not be breached. This hourly limit is 200 $\mu\text{g}/\text{m}^3$. Eighteen breaches of this limit are acceptable in a year to allow for unusual weather conditions. This can only be evaluated using continuous analysers although it is assumed that if the annual average nitrogen dioxide is above 60 $\mu\text{g}/\text{m}^3$ the hourly average may be breached. This 18-hour limit is breached every year at Upper Thames Street and Beech Street. It is also likely to be breached in Fleet Street given the very high annual average concentration. The number of hours above 200 $\mu\text{g}/\text{m}^3$ has dropped significantly since 2015 at the Upper Thames Street monitoring site, see Figure 2.6.

Figure 2.6: Breaches of the hourly average NO₂, 2007 to 2018



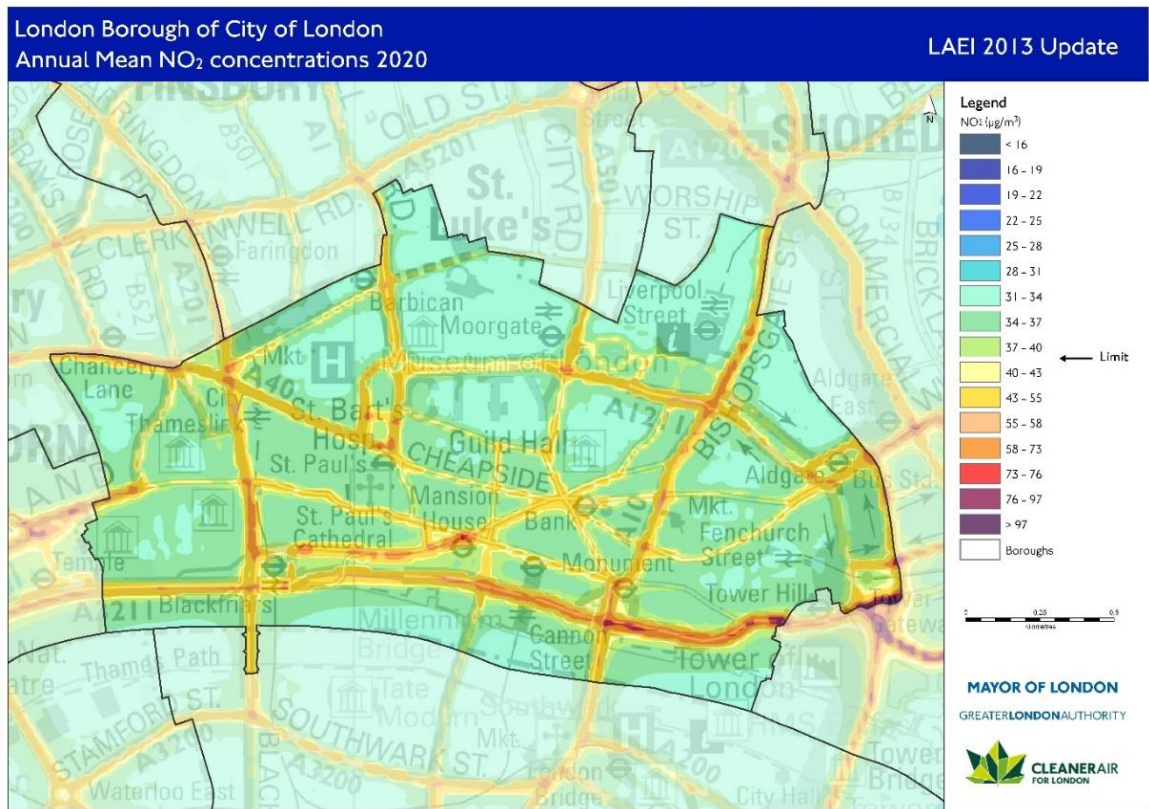
Note: the number of hours above 200µg/m³ at Sir John Cass's Foundation Primary School are shown numerically.

Computer modelling

Air quality monitoring provides data for specific locations. This data is supplemented by computer modelling. Modelling is also used to predict future concentrations of air pollution. Computer model maps, particularly forecast maps, should not be viewed as an accurate representation of concentrations. Instead they are used as a tool to establish where air pollution may be a problem or may continue to be a problem in the future.

Figure 2.7 shows computer modelled concentrations of annual average nitrogen dioxide for 2020 using data from the 2013 London Atmospheric Emissions Inventory. The computer model predicts that the Limit Value for annual average nitrogen dioxide, 40µg/m³, will continue to be breached along all main roads. Monitoring data supports this assumption.

Figure 2.7: Modelled concentrations of annual average nitrogen dioxide forecast for 2020

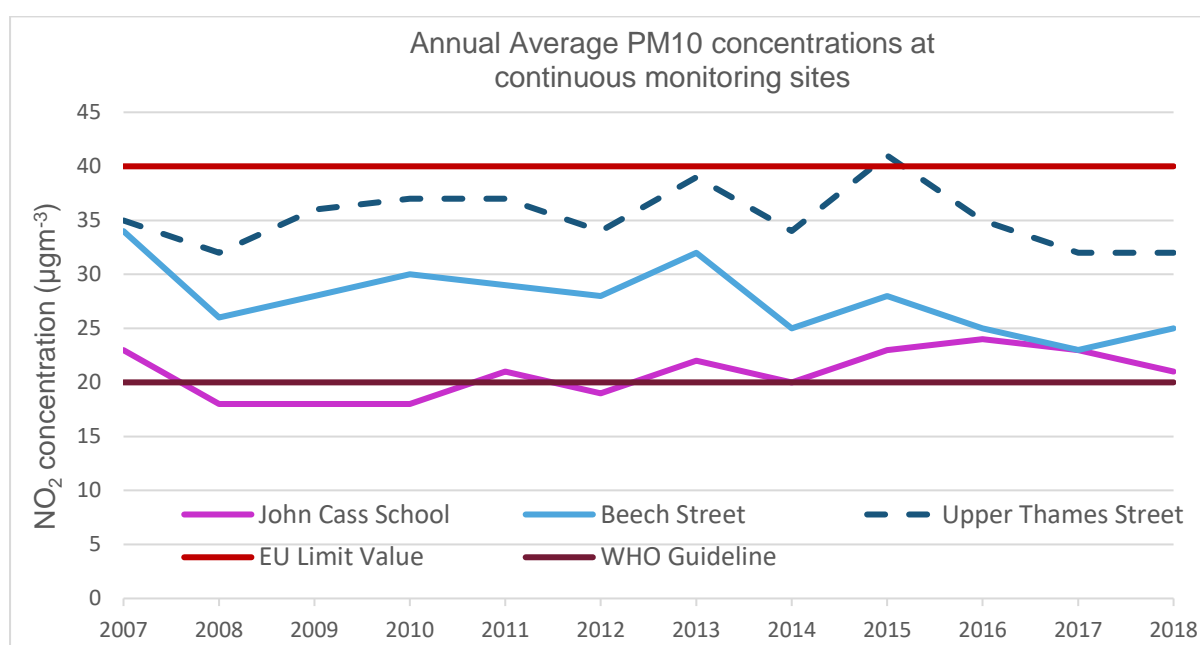


2.2 Particulate Matter (PM₁₀)

Particulate matter (PM₁₀) is measured using continuous analysers in Upper Thames Street, Beech Street and at Sir John Cass's Foundation Primary School. The data is available on the web site londonair.org.uk

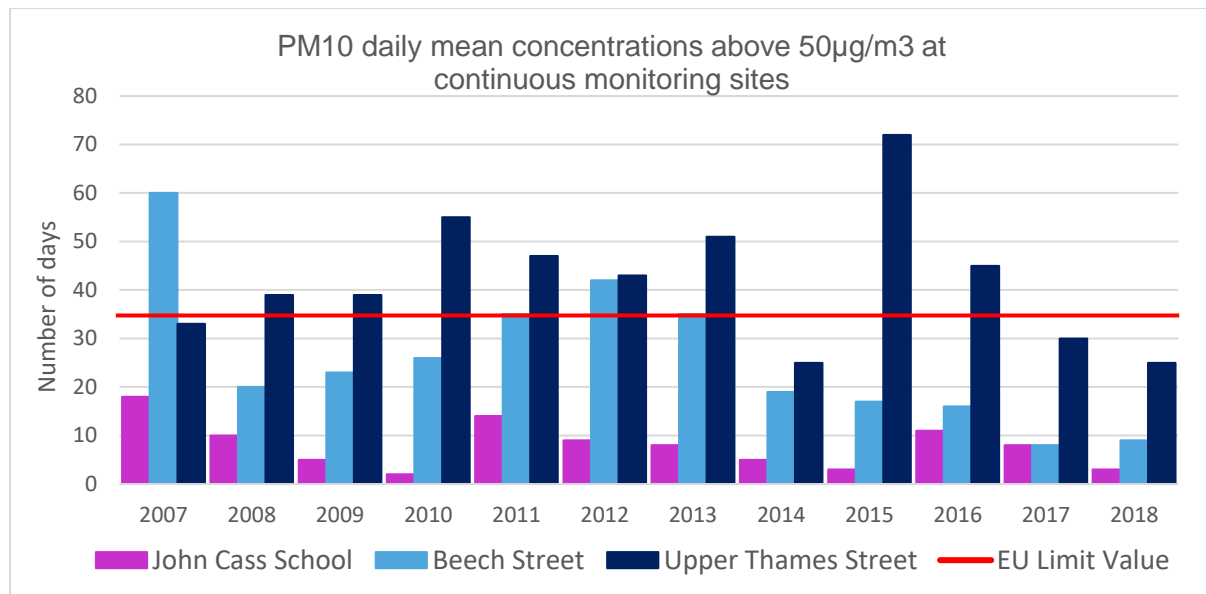
Annual average concentrations of PM₁₀ meet the Limit Value of 40 µg/m³ at all monitoring sites. Since 2007, the Limit Value has only been breached once in Upper Thames Street. This is thought to be associated with the construction of the cycle superhighway. Although the Limit Value is met, the World Health Organisation Guideline for PM₁₀ level of 20 µg/m³ as an annual average is breached at all sites.

Figure 2.8: Annual Average PM₁₀, 2007 to 2018



The Limit Value for daily average PM₁₀ is 50 µg/m³. PM₁₀ is made up of a range of materials including metals, carbon, minerals, sulphates, nitrates and ammonia. Concentrations are highly influenced by the weather and sources outside the Square Mile. Little can be done locally and in isolation that will have a measurable impact on this pollutant. This highlights the need for collaborative action. The regulations allow the daily Limit Value to be breached up to 35 days in any given year. This tends to happen in Upper Thames Street. Beech Street has met the daily Limit Value since 2013. Daily average PM₁₀ at Sir John Cass's Foundation Primary School has never breached the Limit Value.

Figure 2.9: Number of days the Daily Average PM₁₀ was breached, 2007 to 2018



When compared to nitrogen dioxide, there is less variation in modelled annual mean concentrations of PM₁₀ as there are a greater range of sources that contribute to the problem, not just road traffic.

Figure 2.10 shows the modelled concentrations of annual average PM₁₀ for 2020. The limit is set at 40 µg/m³. The map suggests that this could be breached in just a small area along Byward Street and Tower Hill.

Figure 2.10: Modelled concentrations of annual average PM₁₀, forecast for 2020

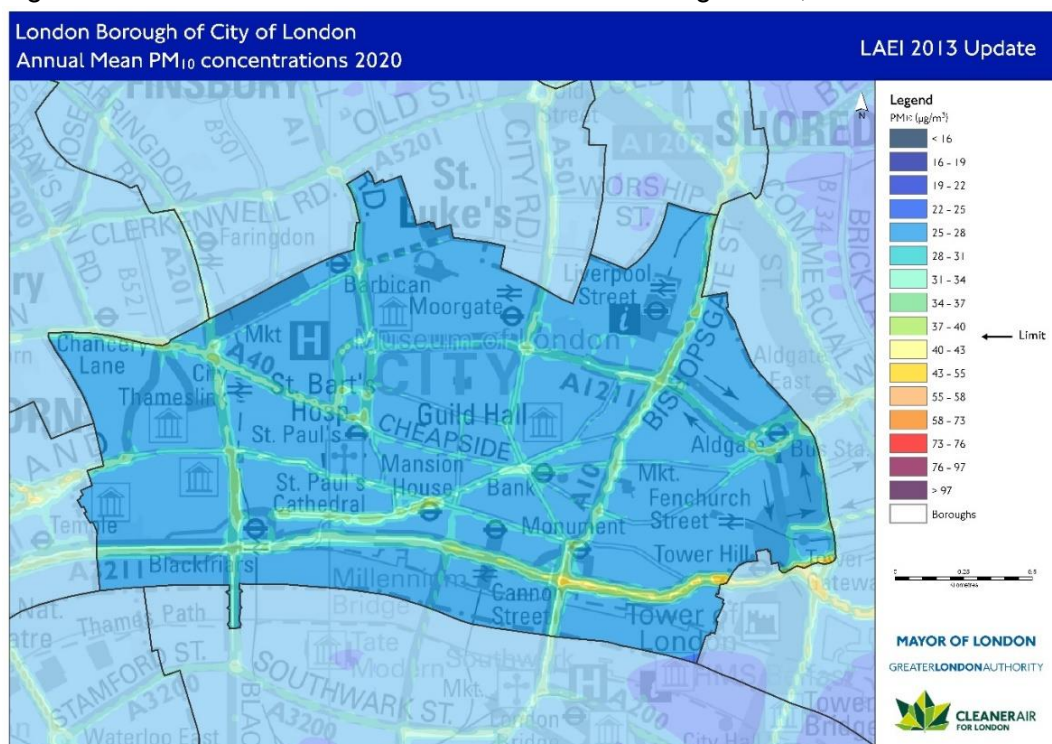
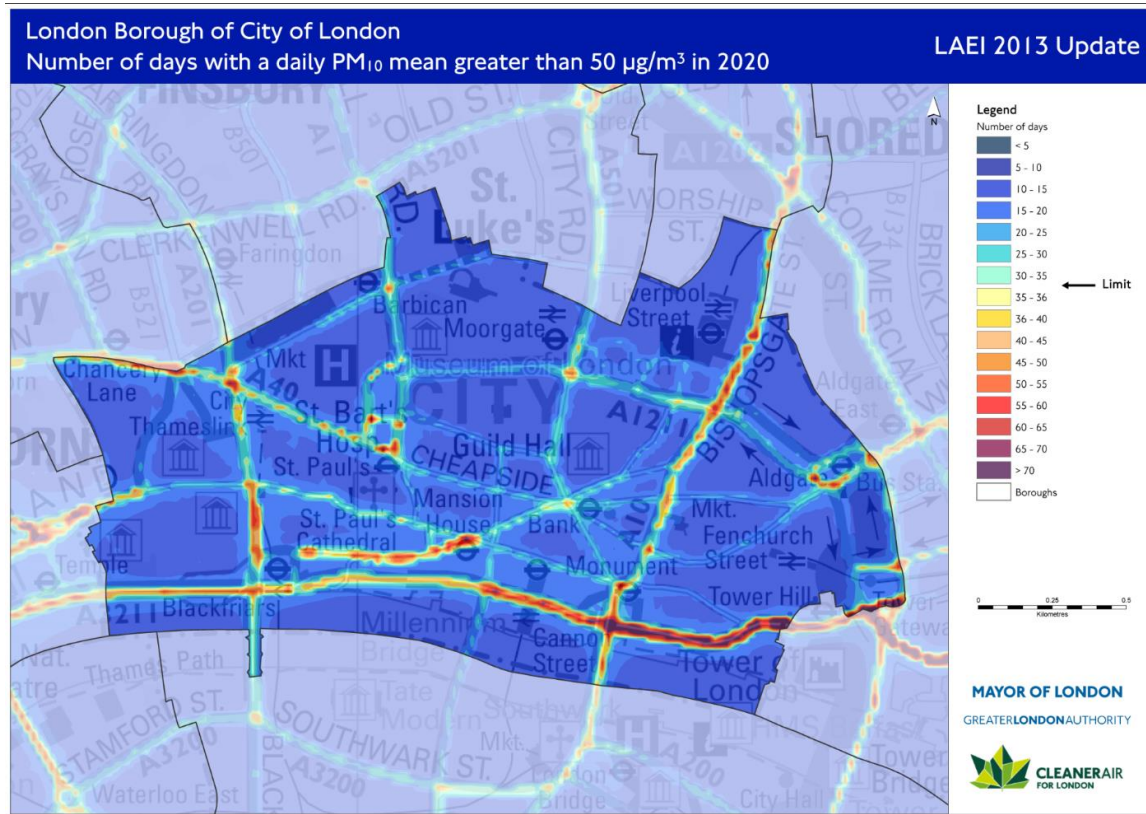


Figure 2.11 shows the number of days the daily average PM₁₀ level is likely to be breached in 2020. The map suggests this may occur at and adjacent to the busiest roads.

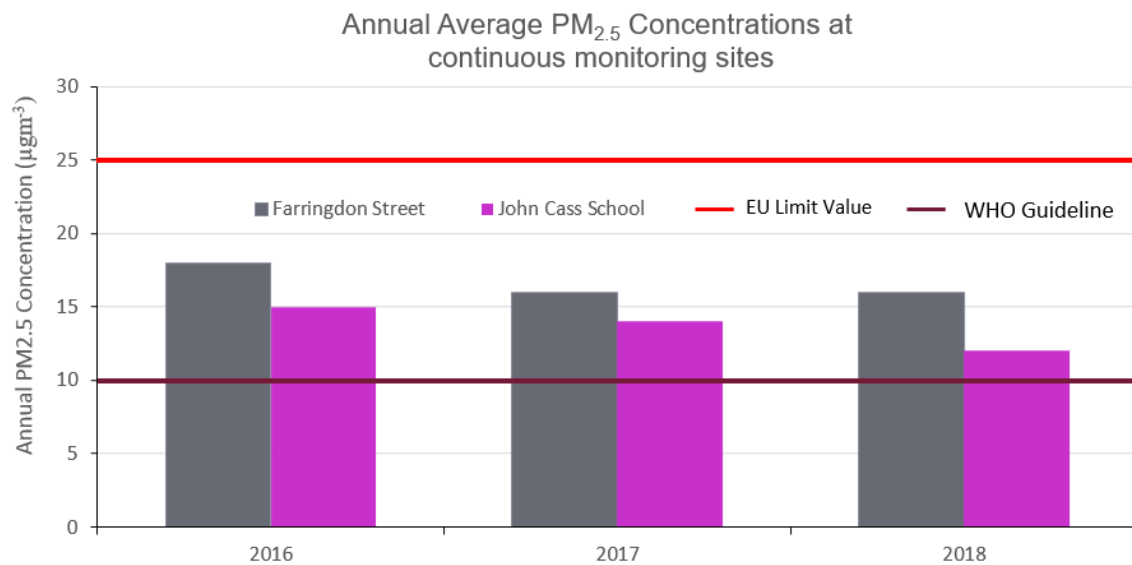
Figure 2.11: Number of days above the daily average PM₁₀, forecast for 2020



2.3 Particulate Matter (PM_{2.5})

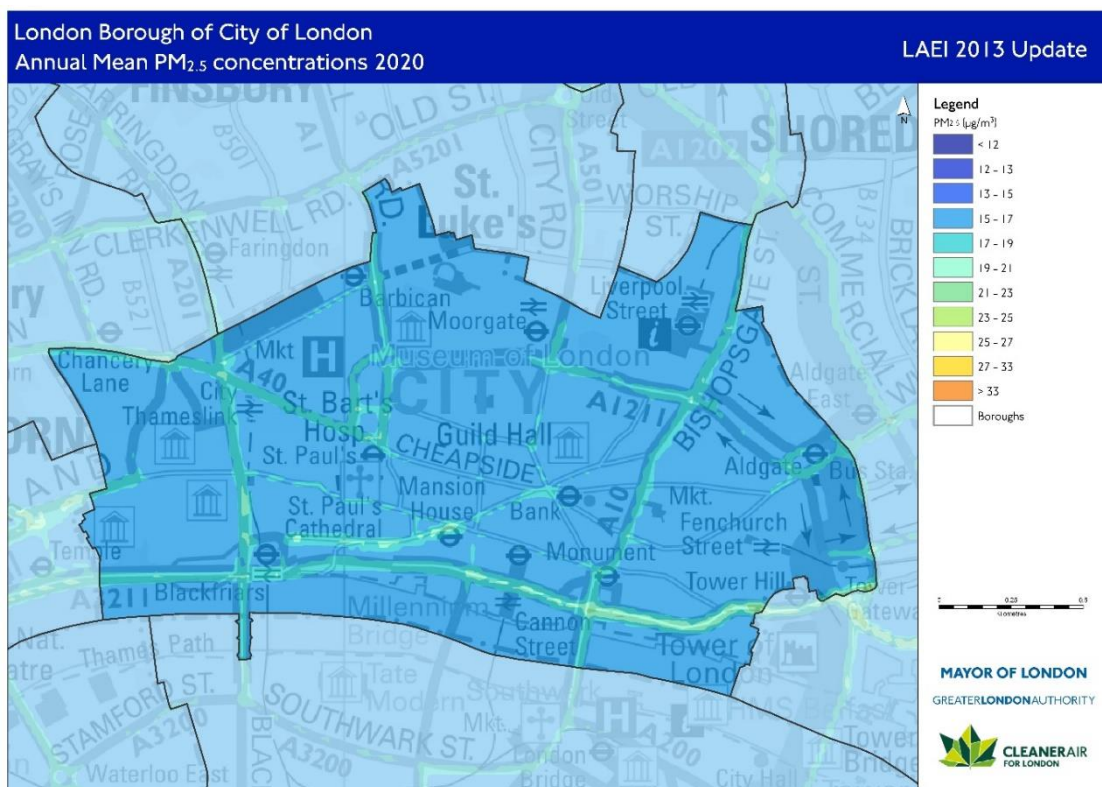
PM_{2.5} is measured in Farringdon Street and at Sir John Cass's Foundation Primary School. Figure 2.12 shows the annual average PM_{2.5} concentrations since 2016. The results indicate that PM_{2.5} meets the Limit Value of 25 µg/m³ at these two locations. However, concentrations are above the WHO Guideline, which is set at 10 µg/m³.

Figure 2.12: Annual Average PM_{2.5}, 2016 to 2018



Modelled concentrations of annual average PM_{2.5} reveal that levels at all locations across the City of London in 2020 will be below the annual average Limit Value of 25µg/m³. The whole of the City of London is likely to breach the WHO Guideline of 10µg/m³. Like with PM₁₀, there is very little that can be done by the City Corporation in isolation that will have a significant impact on concentrations of this pollutant.

Figure 2.13 Modelled concentrations of annual average PM_{2.5}, forecast for 2020



One of the aims of this Strategy is to ensure that air quality in over 90% of the Square Mile meets the health-based Limit Values and World Health Organisation Guidelines for nitrogen dioxide by the start of 2025. The remaining areas are likely to be at very busy road junctions and in some heavily trafficked streets with narrow carriage ways and tall buildings that act to trap air pollutants. An assessment of air quality policies and interventions will be undertaken annually to ensure that this will be met.

An additional Strategy aim is to take coordinated action to achieve the WHO Guidelines for PM₁₀ and PM_{2.5} in the shortest possible time. This recognises that the City Corporation cannot achieve this in isolation.

Air Quality Monitoring

We will:

Ensure that adequate and appropriate monitoring is undertaken across the City of London to fulfil statutory obligations and make good quality data available to the public.

Use air quality data to generate pollution alerts and messages using a range of media such as the free CityAir Smart Phone App.

Publish an annual report of air quality data on the City Corporation web site.

Continue to make live data from continuous air quality monitors available to the public on the London Air Quality Network web site.

Support the testing of new air quality sensors to establish their degree of accuracy.

Undertake an annual assessment of air quality to ensure levels of nitrogen dioxide in 90% of the Square Mile meet health-based Limit Values and WHO Guidelines by 2025.

3. Leading by Example

Commitment: The City Corporation will seek opportunities to influence air quality policy across London and lead by example to improve local air quality and reduce exposure to air pollution

Improving air quality is a political priority for the City Corporation, for which there is very strong Member interest and support. The Port Heath and Environmental Services Committee oversees the development and implementation of air quality policy, and the Chairman and Deputy Chairman have a keen interest in the issue.

Public Health responsibilities were returned to local authorities in April 2013. This led to the creation of Health and Wellbeing Boards (HWB). The City Corporation HWB supports measures for improving local air quality. The City's Joint Strategic Needs Assessment recognises the significance of air quality. Air quality has been identified by the City Corporation as a Corporate Risk. Management of this risk is overseen by the Audit and Risk Management Committee. Reports are presented to this Committee detailing how the risk is being mitigated.

City Corporation Responsible Business Strategy

The City Corporation's Responsible Business Strategy 2018 is set within the framework of the Corporate Plan. It details how responsible business practices will be put in place across the organisation. One of the main policy areas in the plan is to improve air quality. Box 1 details the specific air quality actions. Many of these actions are referenced elsewhere in this document.

- **Improve local air quality in the Square Mile and reduce exposure to air pollution by continuing to develop and deliver the City of London Air Quality Strategy.**
- **Significantly increase the number of clean vehicles in our fleet and continue to trial new technology.**
- **Encourage and facilitate the uptake of clean alternative vehicles throughout our supply chain.**
- **Increase the number of electric-vehicle charging points across our sites.**
- **Reduce emissions of air pollutants from our building stock.**
- **Provide leadership for air quality policy and action across London.**
- **Encourage businesses to become air quality champions and support our work for cleaner air.**
- **Support research and development into measures to improve air quality with London Universities.**
- **Act as a facilitator for collaborative action on air pollution in London.**

Box 1

City Corporation Fleet

The City Corporation has been reducing emissions from its own fleet for several years. This has been achieved by improved management, a reduction in size of the fleet and the purchase of newer, cleaner vehicles. Since January 2016, a policy has been in place that diesel vehicles cannot be purchased or leased if there are low or zero emission options available. The City Corporation owns or leases 133 vehicles and is in the process of reducing this to 118. These comprise of cars, vans, minibus, tippers, sweepers, pick-up trucks, gully tankers and a range of vehicles associated with open spaces. Most of these vehicles do not operate in the Square Mile. The City Corporation regularly trials new electric vehicle technology such as an all-electric refuse collection vehicle. Eight new electric vehicles were trialled in 2018.

The City Corporation is working towards replacing its vehicles used in the Square Mile with electric or hybrid to comply with the Mayor of London's Ultra-Low Emission Zone. A fuel hierarchy is in place for new vehicles:

- a) Full electric
- b) Plug-in hybrid
- c) Petrol hybrid (regenerative braking)
- d) Petrol
- e) (Euro 6/ VI) Diesel

100% of the electricity used by the City Corporation is from renewable sources so electricity used to charge Corporate vehicles isn't contributing to air pollution outside the City of London boundary.

City Corporation Responsible Procurement Strategy

The City Corporation Responsible Procurement Strategy requires that, for large contracts over £250k, at least 10% of the qualitative contract evaluation criteria must address responsible procurement. Large contracts include a 'no vehicle engine idling' policy. Contracts that require the use of vehicles are required to put additional measures in place to help reduce air pollution.

There is a flexible approach with the following menu of options:

- a. **Targets for the reduction of NOx and PM10 over the life of the contract**
- b. **Develop a plan for reducing the air quality impact on days of 'high' and 'very high' air pollution**
- c. **Develop a logistics approach that avoids deliveries during peak congestion and pedestrian footfall times**
- d. **Regular green driver training**
- e. **Retrofit and trial a new technology**
- f. **Trial a zero-emission vehicle with the support of the City of London Corporation**
- g. **Another innovative action to support the Air Quality Strategy that would reasonably deem to be an equivalent level of ambition**

In April 2019, the City Corporation commenced a new waste collection, street cleansing and ancillary services contract. This new contract will deliver the first low and zero emission fleet in the UK which also consists of the UK's first fully electric fleet of dustcarts.

City Bridge Trust

The City Bridge Trust is the funding arm of Bridge House Estates. It was established to make use of funds surplus to bridge requirements and provides grants towards charitable activity benefitting Greater London. The City of London Corporation is the sole trustee of the Bridge House Estates.

The City Bridge Trust has awarded a grant to Client Earth, a non-profit environmental law organisation, to engage with businesses to tackle the effects of air pollution & encourage behaviour change towards greener ways of doing business. The Trust also funds a programme of Eco-Audits for voluntary sector organisations. This reviews energy use, waste and travel patterns. The aim is to make the organisations more sustainable, lower their carbon footprint, and save money by reducing energy bills.

Proposal for New Regulatory Powers

Whilst there is a great deal of action underway to reduce emissions from road traffic there is a lack of effective controls to deal with emissions from combustion plant (boilers, generators, non-road mobile machinery and combined heat and power plant). Close monitoring has revealed that there can be a significant local impact on levels of air pollution from some combustion plant. The City Corporation has identified the need for a practical, local authority focused piece of legislation to deal with emissions from combustion plant and is working with London Councils to develop a Private Members' Bill to tackle this source of pollution.

Leading by Example

We will:

Continue to place air quality as an important political priority and support the outcomes of the City Corporate Plan and local and London-wide action

Provide information on reducing emissions from buildings for City Corporation facilities managers and investment property managers

Reduce emissions of air pollutants from buildings owned by the City Corporation

Review the provision of electric vehicle charging across City Corporation sites including residential estates

Ensure that, subject to operational requirements, 100% of vehicles owned or leased by the City Corporation are electric or hybrid by 2025

Continue to trial low and zero emission technology

Continue to encourage zero emission vehicles through the supply chain

Require electric or hybrid vehicles as a default for the Corporate taxi contract, together with annual emission reduction targets

Require zero emission and electric or hybrid vehicles as a default for courier contracts, together with annual emission reduction targets

Continue to ensure that all relevant Corporate strategies and policies reflect the importance of improving local air quality and reducing exposure

Work with London Councils and other stakeholders to develop proposals for legislation to help improve air quality across London

4. Collaborating with Others

Commitment: The City Corporation will work with a wide range of external organisations on air quality policy and action in order to improve air quality in the Square Mile and across London.

As a significant amount of air pollution in the Square Mile is not generated within its boundary, the City Corporation works with a wide range of organisations on actions to improve air quality and raise awareness. This collaborative work is an essential component of air quality management in the City of London.

Mayor of London

The Mayor of London has a duty to develop an Air Quality Strategy in support of the National Air Quality Strategy. The Mayor also has a duty to achieve legal limits for air quality across London. The City Corporation, along with other London Boroughs, must have regard to the Mayor's Air Quality Strategy when exercising its own responsibilities for London Local Air Quality Management (LLAQM)⁴. The key requirements of LLAQM are:

- Monitor and assess air pollution
- Ensure an Air Quality Management Area is in place for any areas that exceed the air quality objectives and Limit Values
- Ensure that a current and relevant Action Plan is in place. This should be updated at least every five years
- Publish annual monitoring and action plan update reports

The City Corporation works very closely with the Greater London Authority and Transport for London.

The Mayor of London is implementing a wide range of action across London to improve air quality. Air quality in the City of London will benefit from all policies, however those anticipated to have the greatest impact are cleaning the London bus fleet, cleaning London taxis and the implementation of the Ultra-Low Emission Zone (ULEZ). The City of London is within the ULEZ. Further details on policies and programmes being implemented by the Mayor of London are in Chapter 5 and Appendix 6.

Mayor's Air Quality Fund

The Mayor of London awards London Boroughs and the City of London Corporation funding through the Mayor's Air Quality Fund for air quality improvement projects. The City Corporation has previously received funding to roll out its successful anti-

⁴ <https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/working-london-boroughs>

vehicle engine idling programme, for a 3-year air quality programme with Barts Health NHS and for research into the impact of using diesel generators for electricity generation at times of peak demand.

In June 2019, the City Corporation received notification that it has been awarded funding for additional air quality improvement projects to be implemented between 2019 - 2022. The projects are for continuation of the pan London anti-vehicle engine idling programme, to be jointly managed with the London Borough of Camden; a contribution towards the implementation of the City Cluster Zero Emission Zone and funding towards a Clean Air Thames project. The latter project will be managed by Cross River Partnership. The City Corporation is also part of a London wide programme to manage emissions from construction site equipment which receives funding from the Mayor of London.

Low Emission Neighbourhood

The Mayor of London also awarded the City Corporation £1 million over 3 years, from 2016 - 2019 to pilot a range of measures as part of a Low Emission Neighbourhood programme. A range of activities and projects took place over three years, some of which are detailed below.

- The installation of 30 electric vehicle charging points in Barbican Estate car parks.
- Cargo bike delivery service pilot
- Provision of cargo bikes for use by City Corporation Gardeners
- Engagement with schools, businesses and residents
- Development of business best practice
- Delivery and service case studies
- Best practice document for construction activity
- Idling engine training with St Barts Ambulance Services
- Greening projects such as Moor Lane and support for the Clean and Green for Seventeen City in Bloom competition
- Air quality grants for businesses
- Air quality monitoring
- Barbican art installation

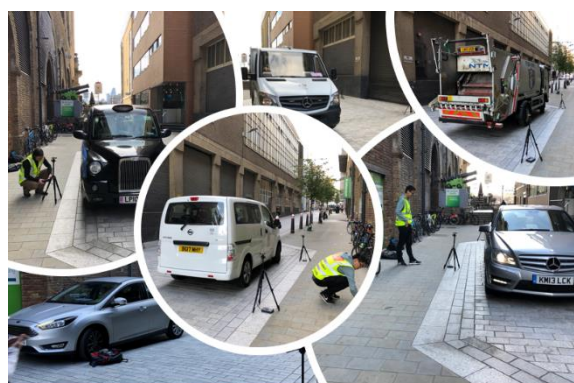


London Boroughs and London Councils

The City Corporation works closely with London Boroughs and London Councils. The City Corporation and seven neighbouring authorities form the Central London Air Quality Cluster Group. This group meets regularly at the City Corporation offices to discuss best practice. The City Corporation also provides the chairman for the London Air Quality Steering group which also meets regularly at the City Corporation offices. This group was established to direct and influence strategic air quality policy across London. Members include London Boroughs, the Environment Agency, Greater London Authority, Transport for London and London Councils.

London Universities

The City Corporation has worked very closely with Kings College London (KCL) for many years. The City Corporation commissions KCL to independently check air quality data and make it available to the public on the KCL web site www.londonair.org.uk. The City Corporation has also commissioned KCL to deliver a range of projects including:



- the development of the free smartphone App CityAir;
- undertake real world vehicle emission testing on streets in the City of London;
- assess the impact of washing Beech Street on levels of particle pollution;
- independent tests to assess the effectiveness of dealing with idling vehicle engines.

In 2018, City Corporation drivers took part in a study called DEMiST – The Driver Diesel Exposure Mitigation Study. The aim of the study is to quantify the exposure of drivers to diesel exhaust in order to develop cost-effective risk reduction strategies. The City Corporation supports dissertations and research projects. The latest was a study of the impact of messages provided by smartphones during air pollution episodes. This research was published in Environment International, Volume 124, March 2019, and used the City Corporation's CityAir App.

The City Corporation provides the co-chair for the APRIL Committee (Air Pollution Research in London). The City Corporation has also commissioned research to look at the impact of urban form on air pollution in the Square Mile.

Third Sector

The Third Sector is comprised of non-government and non-profit-making organisations. This includes charities, voluntary and community groups. The City

Corporation works with a range of third sector organisations on air quality projects including Environmental Protection UK, Global Action Plan, London Sustainability Exchange and Friends of City Gardens. An event to celebrate 120 years of Environmental Protection UK was hosted by the City Corporation in September 2018.

Port of London Authority

The Port of London Authority (PLA) is the Statutory Harbour Authority for the Tidal Thames between Teddington and the Thames Estuary. In 2018, the PLA published its Air Quality Strategy, outlining its ambitions to reduce emissions of air pollutants from river activities to 2041, in line with the Thames Vision. The 2018 publication proposes 19 actions over the first phase of the Strategy from 2018 to 2023, including broadening of its evidence base through technical studies, establishing standards and best practice guidelines for the use of the river, and investigating means to develop and implement green technology. The City of London Corporation supported the development of the Strategy and is assisting the PLA in monitoring emissions from the river, as detailed in Action 15 of the 2018 publication.

Cross River Partnership

Cross River Partnership (CRP) is a public-private partnership that has been delivering regeneration projects in London since 1994. Its membership includes local authorities, business organisations and other strategic agencies relevant to London. The City Corporation provides the Public Sector Co-chair for CRP and works with the organisation on pan London projects.

Environment Agency

The Environment Agency is public body with responsibilities for the protection and enhancement of the environment. The City Corporation has been working with the Environment Agency to support the implementation of the Medium Combustion Plant Directive (MCPD). The MCPD is a regulatory mechanism for controlling emissions of pollutants from combustion plant between 1 megawatt thermal (MWth) and 50 MWth in size. The emission limits set in the MCPD are applied in the United Kingdom from 20 December 2018 for new plant, and from 2025 or 2030 for existing plant, depending on size. It is anticipated that there are many plant in the City of London that meet this criterion. They can be a significant source of emissions of nitrogen oxides (NOx) and particulate matter, particularly plant fuelled by diesel.

Businesses in the City of London

The City Corporation has been engaging with the City of London business community for over eight years to get their support for improving local air quality and raising staff awareness through the CityAir programme. Regular lunchtime workshops for business representatives are hosted by the City Corporation. Best Practice Guides have been produced with input from City of



London businesses and industry representatives. This includes a Building Engineer Toolkit, which provides advice for Facilities Managers on reducing emissions of air pollutants from buildings. A Low Emission Supply Chain Guide, originally developed in 2012, was improved and updated to incorporate latest best practice in 2018. It provides guidance on reducing the impact on freight transport emissions. There are several Business Air Quality Champions who provide invaluable support and lead the way in action to reduce their impact on local air pollution.

The CityAir business engagement model has been replicated across Greater London and further businesses are engaged in the Square Mile as the opportunity arises.

Collaborating with Others

We will:

Continue to work closely with the Greater London Authority and Transport for London on policies to improve air quality and ensure that all actions support the aims and objectives of the Mayor's Environment Strategy

Continue to collaborate with London Boroughs and London Councils on action to improve air quality

Support Universities with research into the health impacts of air pollution, to increase understanding of the sources of pollution and the effectiveness of interventions to reduce pollution

Continue to support the Third Sector to deliver air quality improvement projects and raise awareness amongst London's communities

Support the Port of London Air Quality Strategy through air quality monitoring and in taking wider action to reduce emissions from vessels on the river Thames

Continue to support the Cross-River Partnership in its delivery of air quality projects in central London.

Continue to support the Environment Agency with action to improve air quality, including the implementation of the Medium Combustion Plant Directive

Continue to engage with and support the City of London Business Community to become Air Quality Champions and reduce their impact on local air pollution

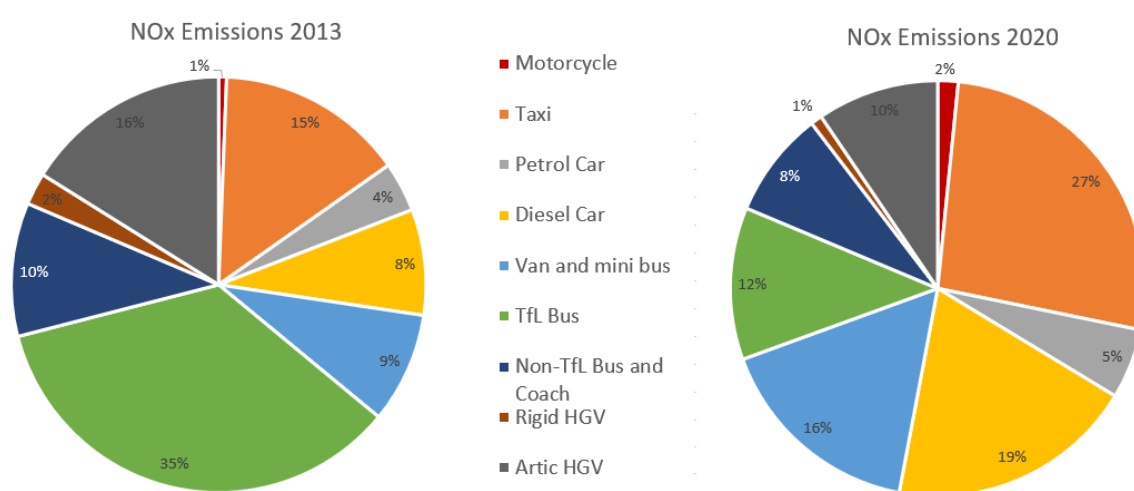
5. Reducing Emissions from Road Transport

Commitment: The City Corporation will implement a range of measures to reduce emissions of air pollutants associated with road traffic in the Square Mile

How people and goods travel to and around the City of London has a significant impact on air quality. The road network in the City of London is used intensively; particularly during the working week as vehicles support the needs of businesses. The Square Mile is located within the Congestion Charge Zone and Ultra-Low Emission Zone. The City of London is very well served by public transport and has 54 bus routes, six mainline railway stations and 12 underground and District Light Railway stations. The number of people who commute into the Square Mile by private car is low.

The London Atmospheric Emissions Inventory suggests that in 2013 road transport accounted for 57% of NO_x; 56% of PM₁₀, and 69% of PM_{2.5} emissions from within the Square Mile. Estimates have been made for 2020 but these were made some time ago and are uncertain, see Appendix 3. Diesel vehicles account for approximately 96% of these emissions, the majority of being buses, taxis and lorries. Figure 5.1 shows the proportion of NO_x emissions for different vehicle types in 2013 together with forecasts for 2020. The main contributor to air pollution from traffic in 2013 was the bus fleet. By 2020 this is expected to change to taxis as the bus fleet becomes progressively cleaner.

Figure 5.1: Proportion of NO_x emissions from vehicles in the City of London in 2013 and 2020



Source GLA LAEI 2013

Figure 5.2 compares the total amount of NOx emitted in tonnes per vehicle type in the City of London in 2013 and 2020. It clearly shows large reductions in emissions for all vehicles, particularly Transport for London buses.

Figure 5.2: Change in emissions of NOx from different vehicle types in 2013 and 2020

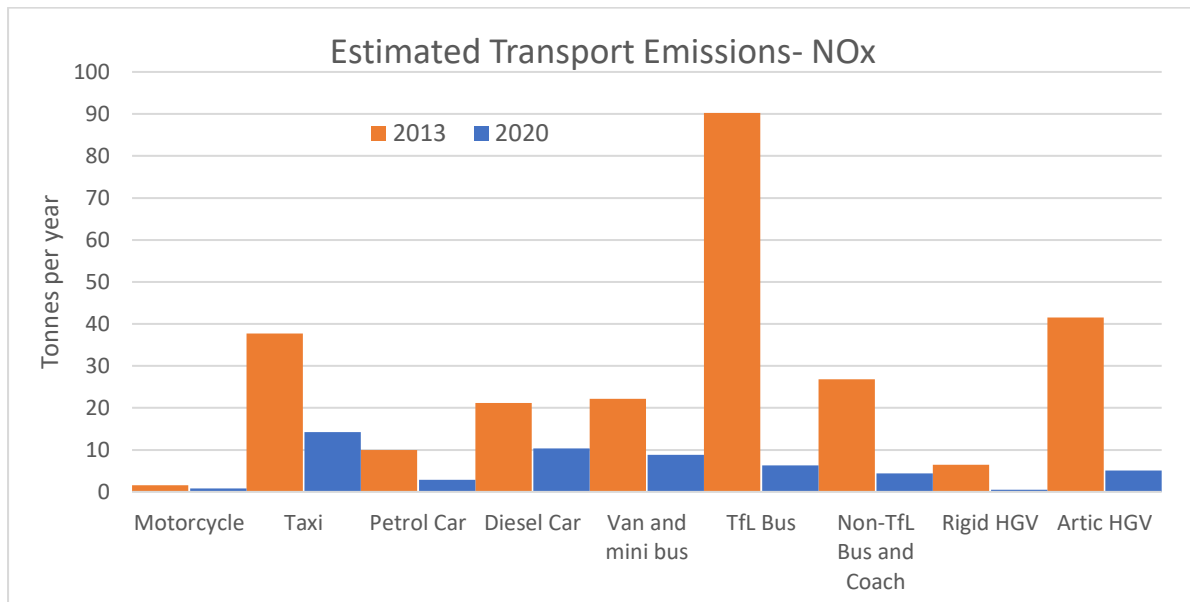
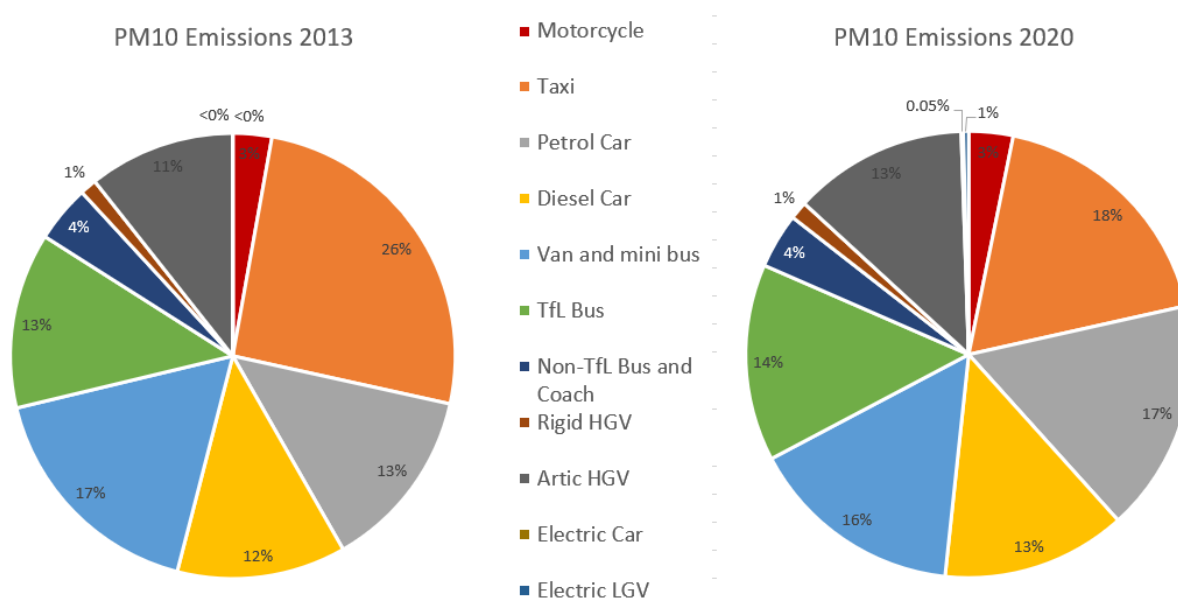


Figure 5.3 shows the relative proportion of PM₁₀ emissions for different vehicle types in 2013, with forecasts for 2020. The most noticeable difference between 2013 and 2020 is anticipated to be a reduction in emissions from taxis as they start to move over to electric. The PM₁₀ attributed to electric vehicles is from tyre and brake wear.

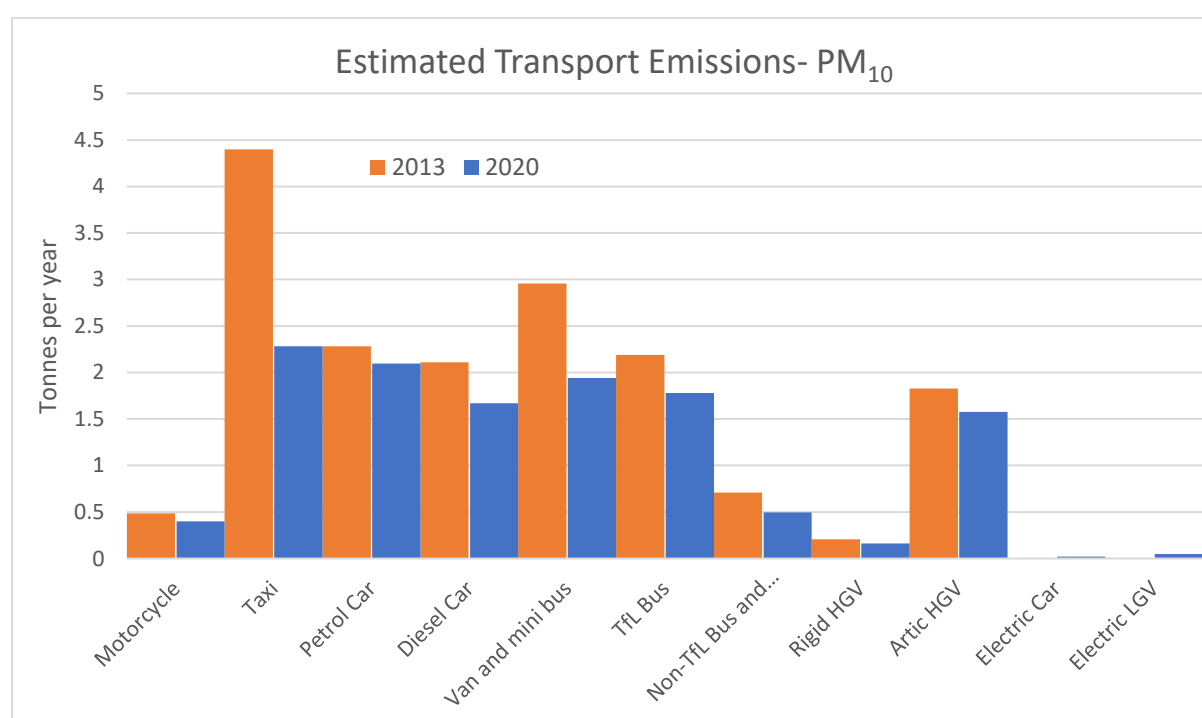
Figure 5.3: Proportion of PM₁₀ emissions from vehicles in the City of London in 2013 and 2020



Source GLA LAEI 2013

Figure 5.4 compares the total amount of PM₁₀ associated with different vehicle types in 2013 and 2020. The difference isn't as great as for NO_x with the notable exception of taxis.

Figure 5.4: Change in emissions of PM₁₀ from different vehicle types in 2013 and 2020



Mayor of London Transport Policies

The Mayor of London is delivering a wide range of policies to reduce air pollution from road transport.

Ultra-Low Emission Zone

The Ultra-Low Emission Zone was introduced in central London in April 2019. The Square Mile is completely within the zone. The ULEZ requires diesel vehicles to meet the Euro 6/VI emission standard or pay a daily charge to enter the zone. Petrol vehicles must meet the Euro 4 emission standard. The emission requirements are in place 24 hours a day, seven days a week. From 2021, the Mayor proposes to extend the zone to encompass the North and South Circular boundaries.

Taxis and Private Hire Vehicles

Transport for London (TfL) appoints and regulates Taxi drivers. It is also responsible for setting the emission limits for taxis and Private Hire Vehicles (PHVs). There is a 15-year age limit for London taxis and all new taxis must now be zero emission capable (ZEC). The age limit for PHVs is 10 years. All PHVs licensed for the first time must have a Euro 6 petrol or diesel engine, or a Euro 4 petrol-hybrid engine. New zero emission capable requirements for PHVs will be phased in from 2020.

Further details of the Mayor's emission controls for taxis are included in Appendix 6.

The City Corporation has published a Transport Strategy. The overarching aim is to reduce the amount of traffic in the Square Mile in order to reallocate street space to pedestrians. A reduction in all types of traffic will be required to meet the aim of achieving a 25% reduction in traffic by 2030 and 50% by 2044. The City Corporation will therefore support TfL's efforts to reduce the number of PHVs operating in central London and work with the taxi industry to reduce empty running. This will have a positive effect on local air quality.

Buses

London buses have been a significant source of air pollution in the City of London. The Mayor of London is in the process of cleaning the fleet. He has made a commitment that all single deck buses operating in London will be zero emission by the end of 2020. All new double deck buses are now hybrid, electric or hydrogen. All double deck buses operating in the Square Mile are at least Euro VI, which is the latest Euro Standard. Zero emission double deck buses will be gradually introduced to achieve an entirely zero emission fleet by 2037 at the latest.

Transport for London has undertaken a review of its central London bus network. Following a decline in bus use, TfL is examining ways to tackle bus journey times and reliability. The City Corporation, through its Transport Strategy, will work with TfL to identify opportunities to reduce the number of buses travelling through the City

of London without compromising public transport accessibility. The City Corporation will also request an accelerated roll out of zero emission capable buses on routes through the Square Mile.

City Corporation Transport Strategy

The City Corporation, through its Transport Strategy, is committed to making streets in the Square Mile great places to walk by prioritising the needs of people on foot.

Traffic management measures will be identified through Area Based Healthy Street Plans. The first three plans will cover Barbican and Smithfield; Bank and Guildhall and the City Cluster and Fenchurch Street.

The Transport Strategy, and corresponding Delivery Plan, is fully integrated into this Air Quality Strategy. It contains a wide range of proposals that will lead to better air quality in the City of London. Many of these policies will deliver additional benefits such as reduced levels of noise, improved road safety and reduced congestion. The most significant are:

- Support and champion a central London Zero Emission Zone (ZEZ) within the next Mayoral term. Seek a phased introduction of ZEZ restrictions with the aim of ensuring that 90% of motor vehicles entering the Square Mile are zero emission capable by 2030.
- Introduce local ZEZs covering the Barbican and Golden Lane Estates and City Cluster by 2022

There is also a commitment to:

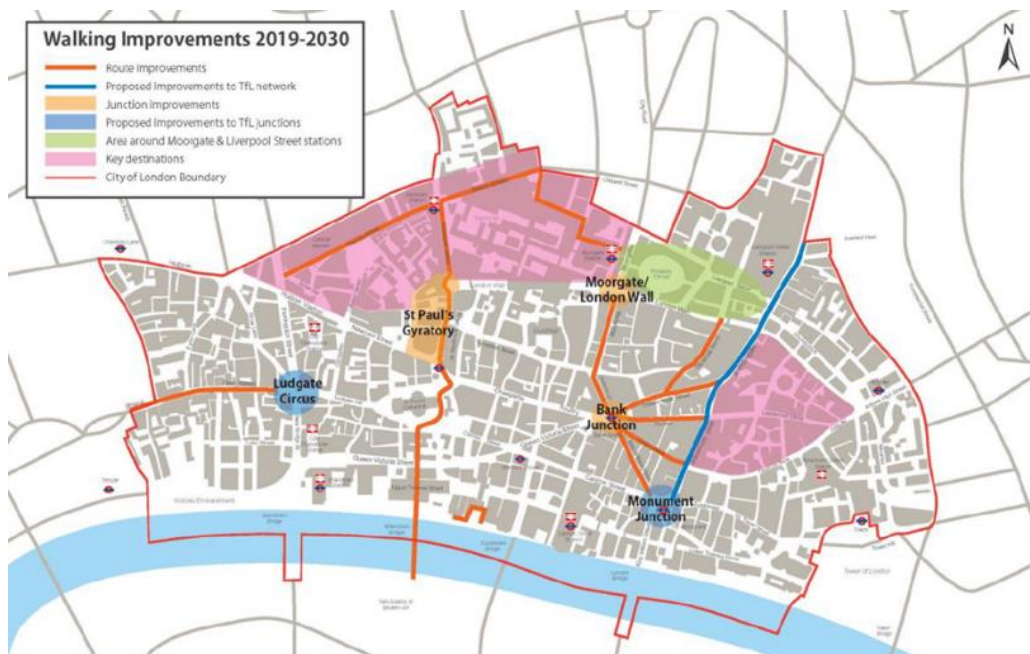
- Support small businesses to accelerate the transition to zero emission capable vehicles
- Discourage private vehicle use and provide no additional on street parking
- Introduce car free days from 2019

Further detail on action to be taken with timescales can be found in the Transport Strategy.

The Transport Strategy also contains a range of proposals to reduce the exposure of pedestrians to pollution. Many involve improving the pedestrian environment which can have added health benefits of encouraging greater outdoor exercise and social interaction:

- Increase the number of pedestrianised, or pedestrian priority streets
- Widen pavements
- Reduce the amount of time people wait for a green signal to cross the road.
- Complete the riverside walkway and improve the quality of the public realm along the river front.

- Enhance the Barbican high walk making it easier to navigate.
- Improve awareness of traffic free walking routes to take people away from areas of poor air quality
- Timed and temporary street closures including a Lunchtime Streets programme
- Support and facilitate street closures by third parties
- Complete the roll out of Legible London maps and directional signs across the Square Mile by 2022



Ultra-Low Emission Vehicle Street

The City Corporation is considering options for an Ultra-Low Emission Vehicle (ULEV) access restriction. ULEVs are vehicles that emit less than 75g of CO₂/km from the tailpipe and can operate in zero tailpipe emission mode. It is a cleaner emission standard than that required to meet the Mayor of London Ultra Low Emission Zone. ULEVs include pure electric vehicles, some plug-in hybrids and 'range extended' electric vehicles, such as the new taxi for London.

Freight

Freight vehicles i.e. those involved in the movement of goods and services, account for around 17% of the traffic in the Square Mile. They tend to be diesel fuelled and so have relatively high emissions of air pollutants.

The City Corporation Transport Strategy proposes a range of actions which will assist in reducing emissions of air pollutants associated with freight, and will be implemented in conjunction with the City of London Local Plan:

- Reduce the number of freight vehicles in the Square Mile
- Establish a freight consolidation service for the Square Mile
- Support zero emission last mile deliveries
- Identify opportunities to increase the use of the river for freight
- Work with freight operators to ensure their fleets meet Port of London Authority air quality standards
- Explore the use of Blackfriars and Tower Piers and reinstate Swan Lane Pier as points to transfer freight to zero emission last mile delivery
- Require all development in the City of London to consider the use of the river for the movement of construction material and waste

The City of London Freight and Servicing Supplementary Planning Document (SPD), published in February 2018, provides guidance on the interpretation of policies in the City of London Local Plan in relation to freight and servicing movements in the Square Mile.

The SPD sets out potential measures for managing freight through the planning process by minimising trips, matching freight demand to network capacity, and mitigating the impact of essential freight trips.

Cycling

The City Corporation supports and encourages cycling as a mode of transport. Cycling in the City of London increased by 292% between 1999 and 2017. All other forms of transport reduced over the same period.

The City Corporation Transport Strategy and City Local Plan supports and encourages cycling by:

- Increasing the amount of cycle parking in the City of London
- Ensuring new developments contribute to improving the experience of cycling in the City of London
- Promoting and celebrating cycling
- Improving cycle hire provision
- Apply a minimum cycling level of service to all streets

Electric Vehicle Charging Infrastructure

Fifty electric vehicle charge points are currently available in City Corporation public car parks, which are served by electricity from renewable sources. A further 30 have been installed in Barbican residents' car parks. A taxi only rapid charge point has been installed at Noble Street taxi rest rank and a rapid charging hub for taxis is planned for Baynard House car park.



The City Corporation Transport Strategy details a commitment to install additional publicly accessible rapid electric charge points to support the transition to zero emission and zero emission capable vehicles. This includes exploring the potential for a charging hub with priority access for commercial vehicles. The City's Local Plan requires electric vehicle charging points to be installed within the service areas of new buildings for freight vehicles. An Electric Vehicle Charging Action Plan will be published by December 2019. This will identify how many charge points, including charging hubs, are required up to 2022, as well as longer-term forecasts

Transport and Public Realm Schemes

The City Corporation has implemented several transport and public realm schemes that have been closely monitored for air quality impact, for example Aldgate public realm and changes to Bank Junction.

Work is underway for two major transformation projects in the City of London that will also deliver measurable improvements in local air quality. The first is the Beech Street Transport and Public Realm project and the second is the St. Paul's Gyratory Transformation Project. The initial stage of each project is to assess the feasibility of reducing traffic dominance which will enhance the public realm and improve air quality locally. Air quality improvements will be integrated into both schemes.

Green Infrastructure

The City Corporation Transport Strategy includes a proposal to incorporate more greenery into the City's streets and public spaces. This will be achieved by working with a range of partners to incorporate greenery and planting when making changes to streets and the public realm. The result will be an increase in green infrastructure in the Square Mile.

Dealing with Idling Vehicles

The City Corporation takes a wide range of action to deal with unnecessary vehicle engine idling. This includes:



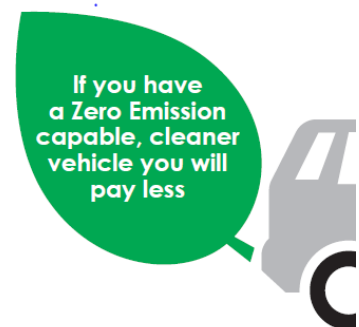
- Responding to complaints and engaging directly with drivers with a view to issuing Fixed Penalty Notices or Penalty Charge Notices if appropriate
- Letter drops to businesses regarding delivery drivers
- Distributing information leaflets
- Installing street signs and place signs on lamp posts if appropriate
- Writing directly to coach and taxi companies
- Incorporating no engine idling into the City Corporation Construction and Street Works Code of Practice and enforce around construction sites
- Holding no engine idling action days where staff and volunteers speak to drivers with view to changing behaviour. This model has been rolled out to 28 additional London Boroughs with the support of the Mayor of London.
- Working with businesses, including Cheapside Business Alliance and Barts Health NHS Trust to support targeted action for no engine idling



Parking Charges

In August 2018, the City Corporation introduced on street parking charges based on vehicle emissions. Older, more polluting vehicles pay a higher charge to park on street in the City of London.

The charge for vehicles which are Zero Emission Capable is £4 per hour. Petrol vehicles that meet Euro 4 emission criteria and diesel vehicles that meet Euro 6/VI are charged £5.20 per hour. Older vehicles are charged £6.80 per hour. The charging framework supports the Mayor of London Ultra Low Emission Zone scheme.



Reducing Emissions from Road Transport

We will:

Urge Transport for London to prioritise Zero Emission Capable buses on routes through the City of London

Support the Mayor of London with the effective implementation of the Ultra-Low Emission Zone

Work with the taxi industry to reduce empty running of taxis within the Square Mile

Ensure that Healthy Street Plans have air quality improvement targets and that the air quality impact of major transport and public realm schemes are measured

Introduce a Zero Emission Zone around the Barbican and Golden Lane Estates and City Cluster by 2022

Implement a wide range of action through the City Corporation Transport Strategy to reduce the exposure of pedestrians to transport generated air pollution in the Square Mile

Pilot an ultra-low emission vehicle street

Assess the suitability of rolling out LEN pilot projects at other locations across the Square Mile

Implement a wide range of action, through the City Local Plan and City Corporation Transport Strategy and Freight and Servicing SPD to reduce emissions from freight vehicles in the Square Mile

Implement a range of action through the City Corporation Transport Strategy and City Local Plan to support and encourage cycling

Install additional publicly accessible electric vehicle (EV) rapid charge points by 2025

Through the City Local Plan require the installation of rapid charge points in new developments

Ensure that improving air quality and reducing exposure is an integral part of all major transport and public realm schemes and that all schemes incorporate greening where possible.

Continue to take a wide range of action to discourage unnecessary vehicle engine idling in the Square Mile.

Ensure City Corporation parking charges favour low and zero emission vehicles in the City of London

6. Reducing Emissions from Non-Transport Sources

Commitment: The City Corporation will take a range of action to significantly reduce emissions associated with non-transport sources in the Square Mile

Non-transport sources make a significant contribution to air pollution in the City of London. In the past, action has focussed on emissions of pollution from traffic. However, as emissions from vehicles reduce over time, non-road combustion sources are becoming more significant. Combustion plant covers a range of appliances used for heat and energy generation. It includes boilers, Combined Heat and Power Plant (CHP), generators and Non-Road Mobile Machinery (NRMM) used for construction, road repairs, film and street events.

Planning Policy

The Square Mile is in a constant state of redevelopment therefore spatial planning is important for improving air quality in the long term. The City Corporation has been using planning policy for several years to reduce the impact of new developments on local air quality.

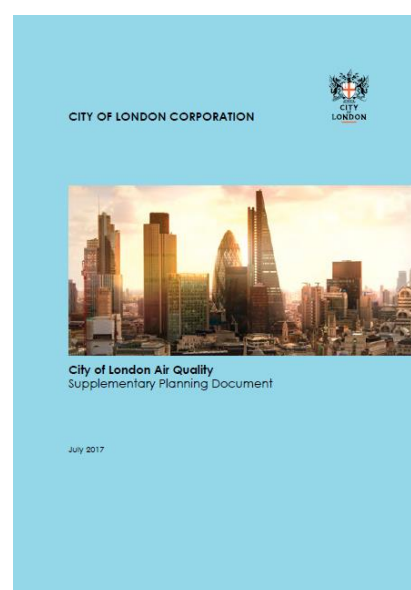
The City Corporation is developing a new Local Plan. It is called the City Plan 2036 and it sets out the organisation's vision, strategy and objectives for planning, together with policies that will guide future decisions on planning applications. Once adopted, the Plan will replace the current City Corporation Local Plan adopted in January 2015.

The draft City Plan supports the City Corporation's drive to improve local air quality. The draft policies and proposals relating to air quality are detailed in Appendix 7.

The City Corporation published its first Air Quality Supplementary Planning Document (SPD) in July 2017. It provides guidance on the interpretation of policies in the City Local Plan. The SPD is available on the City Corporation web site. It details how development activity can reduce its impact on air quality through:

- Building design
- Heating and energy supply
- Reducing dust and air quality impacts during construction

The Air Quality SPD encourages the use of non-combustion technology and recommends emission limits for combustion plant.



Air Quality Assessments and Air Quality Neutral Assessments are used to assess the impact of new developments on local air pollution. Air Quality Assessments are required for all major developments.

The emerging London Plan⁵ introduces the concept of Air Quality Positive Assessments for the development of large-scale redevelopment areas and those subject to an Environmental Impact Assessment. The draft London Plan also updates the energy hierarchy with Heat Network Priority Areas. This includes the City of London, see Appendix 6 for further information.

Construction and Demolition

At any given time, there are many active demolition, construction and refurbishment sites in the Square Mile. There are also a large number of street works. Refurbishment and new developments are essential for the City of London to maintain itself as a world class business and financial centre. The City Corporation has a Code of Practice for construction and demolition⁶, detailing environmental standards that it expects the industry to work to. The Code is enforced through development management.



Minimising emissions to air is integral to the City Corporation's Code of Practice. The guidance, which is available on the City Corporation web site, reflects the best practice guidance issued by the Mayor of London: The Control of Dust and Emissions from Demolition and Construction⁷. The City of London Code of Practice is updated regularly to reflect best practice in the industry and is now in its 9th edition. There are regular checks on all large construction sites to ensure that they adhere to the code. The use of mains electricity is promoted in the City code but not all generators can be powered this way.

Non-Road Mobile Machinery (NRMM)

Engines used in NRMM over a certain size are subject to emission controls called Euro Standards. Like with road vehicles, emissions of pollutants from NRMM reduce over time with each Euro Standard. The Mayor of London has introduced a NRMM Low Emission Zone which sets a standard for NRMM used on building sites in the City of London. The standards are Stage IIIA for generators and Stage IIIB for mobile

⁵ Draft New London Plan showing Minor Suggested Changes, 13th August 2018, Mayor of London

⁶ The City of London Code of Practice Deconstruction and Construction Sites Ninth Edition, January 2019

⁷ Mayor of London: The Control of Dust and Emissions from Demolition and Construction, Supplementary Planning Guidance, July 2014

plant (excavators, dumper trucks, hoists etc). The plan is to tighten the standard to Stage IV in 2020.

Diesel-powered equipment used on demolition and construction sites in the City of London is inspected for compliance with the required emission standard. Through its local Code of Construction practice, the City Corporation encourages Stage IV or zero emission equipment, where available. The City Corporation is working towards a requirement for a Stage V emission limit for NRMM by 2025.



Table 6.1: Emission Standards for Non-road Diesel Engines

Net Power kW	NOx g/kWh	PM g/kWh
Stage IIIB		
37–55 kW (50–74 hp) ¹	-	0.025
56–74 kW (75–99 hp)	3.3	0.025
75–129 kW (100–173 hp)	3.3	0.025
130–560 kW (174–750 hp)	2	0.025
Stage IV		
75–129 kW (100–173 hp)	0.4	0.025
130–560 kW (174–750 hp)	0.4	0.025
Stage V		
8-19 kW ²	-	0.4
19-37 kW ¹	-	0.4
37–74 kW (50–99 hp) ¹	-	0.015
75–129 kW (100–173 hp)	0.4	0.015
130–560 kW (174–750 hp)	0.4	0.015

¹ Emissions limits are 4.7 g/kWh for HC+NOx

² Emissions limits are 7.5 g/kWh for HC+NOx

NRMM is also used in road works, to support filming and to provide power for equipment and catering etc. The City Corporation commissioned an assessment of the contribution of NRMM to total emissions of air pollutants in the Square Mile. Estimates are provided in Table 6.2. Due to the volume of street works in the City of London at any given time, this has the potential to be a significant source of emissions. Air quality monitoring in the City of London has shown that street works can have a significant local impact, however, given its transient nature, the overall contribution to local levels of air pollution is unknown.

Summary of Emissions (2017) Sector	NOx (kg)	PM (kg)
NRMM (Construction)	38,594	924
NRMM (Events)	528	28
NRMM (Road Works)	Unknown	Unknown
CHP/boilers	87,700	-

Table 6.2

Heat and Energy Plant

Combustion plant including Combined Heat and Power (CHP) plant and generators are a significant source of emissions in the Square Mile. This is an area which traditionally has been poorly controlled. Recent studies^{8,9} commissioned by the Greater London Authority show that CHP has the potential to lead to very high localised levels of nitrogen dioxide. CHP plant in new developments has previously been encouraged through the London Plan. The emerging London Plan is moving the emphasis away from CHP plant unless it supports the delivery of an area wide heat network.

Diesel generators installed in buildings as emergency back-up power sources can be used to meet peak electricity demand and for demand side response. Research commissioned by the City Corporation revealed that this has a potential for significant local air quality impact.¹⁰

Chimneys

The Clean Air Act 1993 stipulates that a gas boiler of 366.4 kilowatts or more is required to have a chimney height approval from the local authority. The City Corporation approves chimney heights to ensure that fumes from chimneys are not prejudicial to health or a nuisance. The approvals are designed to maximise the dispersion of pollutants. Subject to other constraints, chimneys should terminate a minimum of 2m above the height of the nearest building. Appliances less than 1MW are required to achieve a discharge velocity of 10 m/sec to aid dispersion. Appliances that are 1MW or greater in size, are required to achieve a discharge velocity of 15 m/sec.

Prescribed Processes

The Environmental Permitting Regulations (EPR) deal with emissions of pollutants from industrial processes. The processes are categorised under the regulations as Part A1, Part A2 or Part B processes. Part A1 processes are regulated by the Environment Agency. The City Corporation regulates Part A2 and Part B processes. Three dry cleaners in the Square Mile are currently regulated under this regime.

Smoke Control Area

The whole of the Square Mile is a smoke control area which means it is an offence to emit smoke from any premises in the City of London. This has been in place since the City of London (Various Powers) Act 1954 was enacted. In a smoke control

⁸ Urban air pollution from combined heat and power plants - A measurement-based investigation, Kings College London, April 2018

⁹ Pilot study on the air quality impacts from Combined Heat and Power in London, Report for Greater London Authority, Ricardo Energy and Environment 17/09/2018

¹⁰ Ricardo Energy & Environment (2016) London STOR and Triad Management Study, ED62693

area, only fuels that are on the list of authorised fuels or 'smokeless' fuels, can be burnt unless an exempt appliance is used. In the latter case, the fuel used must be the one specified for that exempt appliance. Authorised fuels, smokeless fuels and exempt appliances are listed on the Defra Website. There has been a great deal of concern recently over emissions of particulate pollution from domestic wood burning stoves. This is not a major issue for the City of London.

Reducing Emissions from Non-Transport Sources

We will:

Continue to assess all planning applications for air quality impact

Encourage the use of non-combustion technology during construction and in the operation of new developments

Apply stringent emission standards for combustion plant where non-combustion plant is not feasible in new developments

Ensure that where possible chimney stacks terminate above the height of the nearest building

Require all new developments to be air quality neutral as a minimum and developments subject to an Environmental Impact Assessment to be Air Quality Positive in line with the requirements of the emerging London Plan

Update the City Corporation Supplementary Planning Document for Air Quality to reflect new policies and requirements of the City Local Plan and London Plan

Ensure emissions from construction sites are minimised through close management and control

Regularly update the City Corporation best practice guidance on minimising emissions from construction and demolition in order to reflect best practice.

Enforce the Mayor of London NRMM requirements on construction sites as a minimum

Introduce a Stage V emission limit for NRMM on construction sites by 2025 where available

Investigate options for reducing emissions from NRMM used in street works, filming and other events

Examine options for reducing emissions from existing combustion plant in the Square Mile

Improve the understanding of the use of emergency generators in City of London buildings being used for Demand Side Response and Short-Term Operating Reserve

Continue to ensure that emissions from chimneys are dispersed as far as possible using the provisions of the Clean Air Act 1993

Ensure the City Corporation's prescribed processes comply with emission control requirements

Promote and enforce smoke control provisions detailed in the City of London Various Powers Act 1954 and 1973 and the Clean Air Act 1993

7. Public Health and Raising Awareness

Commitment: The City Corporation will continue to raise awareness about air pollution and provide information on how to reduce exposure to pollution

Although air quality is improving in the City of London it remains at a level that has a detrimental impact on health. The City Corporation therefore takes a wide range of action to increase public understanding about air pollution. This includes its causes, effects and how concentrations vary both spatially and from day to day. Armed with the right information, people can take steps to avoid high levels of air pollution to reduce the impact on their health.

The City of London Joint Health and Wellbeing Strategy (JHWS) has identified improving air quality as a key priority to improve the health and wellbeing of residents and workers.

A Public Health Outcomes Framework (PHOF) has been introduced and consists of a set of indicators compiled by Public Health England. One of these indicators is Air Pollution and this is measured against levels of particles (PM_{2.5}). This size of particle can penetrate deep into the lungs. Nitrogen dioxide is not an indicator in the PHOF, but it does have impacts on health, independently of PM_{2.5}. The City of London Health profile for 2017 shows that the City of London has the highest proportion of mortality attributable to particulate air pollution at 7.1%. This is higher than both London as a whole (6.5%) and England (5.1%).¹¹

The City Corporation commissioned a report bringing together the latest papers on the health impacts of air pollution. This report confirms that, of all the pollutants, particulate matter has the greatest impact on health. However, particulate matter, nitrogen dioxide and ozone have all been found to be 'certain' causes of death and disease, rather than 'probable' causes as previously understood. Since this report was produced further studies have been published. More information on the health effects of air pollution is detailed in Appendix 4.

The Department for Community and Children's Services have effective networks for disseminating information about public health. Key channels include: The Business Healthy network; the Libraries Service and other communications channels with residents; the City & Hackney Clinical Commissioning Group; the Neaman Practice (GP) and Healthwatch City of London.

Providing Information

The City Corporation uses a range of methods to inform businesses, workers and residents about air pollution. This includes social media, the City Corporation website and providing information at events. An e-newsletter is produced every 2 months.

¹¹ <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework>

The City Corporation has an active Twitter account @_CityAir. This helps to raise awareness about air pollution and support campaigns such as anti-vehicle idling and National Clean Air Day.

Overall levels of air pollution in the Square Mile vary from day to day according to weather conditions. Levels of air pollution on each day are either 'low', 'medium', 'high' or 'very high' which reflects banding devised by the government.¹² High levels of air pollution occur in the City of London on a small number of days in any year. Very high levels of air pollution are rare.



The City Corporation's free Smart Phone App 'CityAir' provides advice to users when pollution levels are high or very high. People can sign up and receive tailored messages to help them avoid high levels of air pollution. The App includes a map of current pollution levels and has a function to guide users along low pollution routes. There have been over 27,000 downloads to date. In addition, the City Corporation supports the provision of the AirText messaging service with an annual financial contribution towards running costs. AirText is also promoted to residents and workers who can use the service to receive alerts by email, text and voicemail messages.

The Mayor of London provides information about moderate, high and very high levels of pollution. Alerts are displayed at many public locations across London including 2,500 bus stops, all Tube stations, river piers, and on digital signs along major roads. Information is also sent to schools, hospitals and care homes across London. Alerts and guidance are available via social media, a smart phone App and a text alert service providing information and guidance on the alert level. The Mayor has recently appointed a duty forecaster to co-ordinate alerting services.

Working with Residents

In 2013/14 a citizen science project was undertaken where residents in the Barbican and Mansell Street Estates measured air pollution outside their properties over the course of a year. Residents also measured particle pollution as they moved around the City of London streets. This monitoring enabled participants to see how air pollution varies on different routes they take enabling them to take a low pollution route and reduce the amount of pollution they breathe in on a day to day basis. Following the monitoring, residents from the Barbican Estate engaged with local businesses to get their support for action to improve air quality locally.

¹² Defra Update on Implementation of the Daily Air Quality Index Information for Data Providers and Publishers April 2013, Emily Connolly, Gary Fuller, Timothy Baker and Paul Willis

Various engagement events have been held with residents through the Low Emission Neighbourhood programme such as the launch of Electric Vehicle Charging Points at the Barbican Estate.



Other work with residents includes improving local cycle parking facilities, installing green infrastructure, providing information at residents' meetings and supporting the work of Friends of City Gardens (FOCG). FOCG is a community group based in the City of London whose aim is to enhance biodiversity, improve access to green spaces and create new gardens in the Square Mile.

National Clean Air Day

National Clean Air Day is held in the June of each year. A range of activities are carried out nationally to raise awareness of air pollution and inspire behaviour change. National Clean Air Day is supported by the City Corporation.



Working with Schools

The City Corporation has worked with Sir John Cass's Foundation Primary School since 2003 to both improve local air quality and work with the school children to raise awareness. Extensive greening has taken place at the school with green screens on all perimeters, green roofs and movable green screens in the playground. A wide range of activities have taken place with the children such as a garden club, air quality assemblies and air quality focussed lessons and competitions. In 2018 the City Corporation was awarded a National Air Quality Award for Best Local Authority Initiative for long term collaborative action at the school.





Air quality awareness events have been undertaken with the City of London Girls School in association with the Friends of City Gardens Moor Lane garden project.

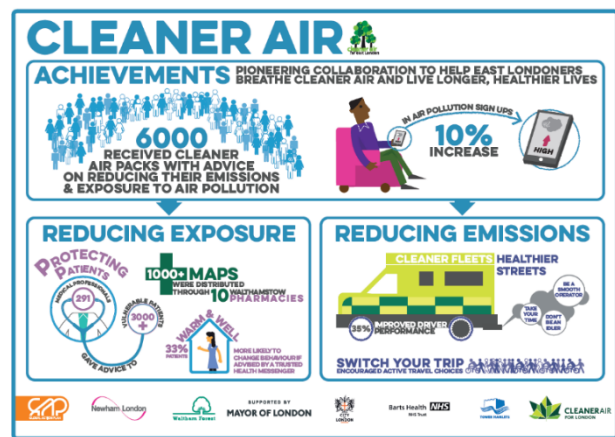
The City Corporation is working with St Pauls Cathedral Choir School. This includes supporting extensive air quality monitoring at the school and the provision of information to staff and parents. Air quality monitoring is also undertaken at Charterhouse Square School and nursery and St Pauls Cathedral Choir School.

Barts Health NHS Trust

Barts Health NHS Trust runs St Bartholomew's Hospital in the City of London. It is London's oldest hospital and is a regional and national centre of excellence for cardiac and cancer care.

The City Corporation worked with Barts Health NHS Trust on a three-year programme from 2013 to 2016. Seven projects were piloted to tackle air pollution and reduce exposure to pollution for Barts Health patients, staff and visitors.

The overall aim of the programme was to increase the understanding of how to approach air quality as an issue; engage with the hospital's health professionals and to engage with those most at risk of the negative effects of air pollution. The programme was cited as an important example of best practice and cross-sector collaboration in an air quality report 'Every Breath We Take' by the Royal College of Physicians and Royal College of Paediatrics and Child Health. The City Corporation has also worked with the Barts HealthTrust on idling engine awareness programmes for their drivers.



Working with businesses

Around 510,000 people work in the City of London. Through the CityAir business engagement programme, the City Corporation has been raising awareness of air pollution with workers. This includes supporting events, providing information for internal dissemination and promoting the use of the CityAir smartphone App.



Public Health and Raising Awareness

We will:

Make greater use of Public Health Networks to disseminate information about air quality

Assess options to improve and further develop the free CityAir Smart Phone App and continue to support and promote the AirText service

Disseminate information about air quality through various channels such as social media, the City Corporation web site and an e-newsletter

Develop an action plan, in support of the Mayor of London's air pollution forecasting service, to reduce exposure on days of high and very high levels of air pollution

Increase awareness of air pollution amongst the City of London's residential community

Run events in support of National Clean Air Day

Develop focussed plans for improving air quality and reducing the exposure to pollution of children who attend schools and nurseries in the City of London

Continue to support Barts Health NHS, and other health care facilities, to reduce their own impact on local air pollution and assist vulnerable patients in reducing their exposure to pollution

Continue to engage with businesses to raise awareness of air pollution amongst workers

Appendix 1: Further details on the delivery of actions

Table Key:

Dept. = Department responsible

M&CP = Markets and Consumer Protection

DBE = Department of Built Environment

CHB = Chamberlain's

CCS = Community and Children's Services

CS = City Surveyor's

REM = Remembrancer's

OS = Open Spaces

TC = Town Clerk's

Approximate cost to the organisation per annum:

✓ = <£5,000, ✓✓ = £5,000 - £40,000, ✓✓✓ = >£40,000

Action			Detail	Timeline	Outcome	Dept.	Cost
Air Quality Monitoring	1	Ensure that adequate and appropriate monitoring is undertaken across the City of London to fulfil statutory obligations and make good quality data available to the public.	<p>NO₂, PM₁₀ and PM_{2.5} monitoring will continue using continuous analysers at 4 locations as a minimum.</p> <p>NO₂ diffusion tube monitoring will take place at 50 locations as a minimum.</p> <p>Support monitoring by our collaborators</p>	Review monitoring requirements at least annually.	To ensure that the City has an effective and appropriate monitoring network with robust data.	M&CP	✓✓
	2	Use air quality data to generate pollution alerts and messages using a range of media such as the free CityAir Smart Phone App.	Monitoring data will be used effectively to generate alerts for the smart phone app and tailored alerts for vulnerable people.	Present to 2024	Better informed public who can make decisions based on receiving pollution alerts	M&CP	✓
	3	Publish an annual report of air quality data on the City Corporation web site.	Annual reports will be produced for compliance with statutory obligations, demonstrating how air pollution compares to health-based Limit Values and WHO Guidelines and demonstrating how pollution has changed over time.	Annually	Check compliance with air quality Limit Values and WHO Guidelines. Check effectiveness of policies to improve air quality.	M&CP	✓
	4	Continue to make live data from continuous air quality monitors available to the public on the London Air Quality Network web site.	KCL will be commissioned to undertake independent checks of air quality data and make the data freely available to the public, consultants and academics as part of a London wide resource.	Ongoing	Local data will form part of a London-wide network and be available for measuring London wide trends and predicting episodes of high air pollution.	M&CP	✓✓
	5	Support the testing of new air quality sensors to establish their degree of accuracy.	Support the testing of one new sensor per year. Work with partners on a standardised framework to improve comparability of results	2019 - 2024	Reliable air quality data from emerging technology.	M&CP	✓
	6	Undertake an annual assessment of air quality to ensure levels of nitrogen dioxide in 90% of the Square Mile meet health-based Limit Values and WHO Guidelines by 2025	<p>Source funding to undertake annual air quality forecasts to ensure Limit Values and WHO Guidelines will be met by 2025.</p> <p>If it looks like limits won't be met, develop additional action plan for approval.</p>	<p>2020</p> <p>As required</p>	Air quality in the City of London that meets health-based standards for nitrogen dioxide in at least 90% of the area.	M&CP	✓✓

Action		Detail	Timeline	Outcome	Dept.	Cost	
Leading by Example	7	Continue to place air quality as an important political priority and support the outcomes of the City Corporate Plan and local and London-wide action.	Host at least one London wide event per year for relevant air quality organisations.	Annually	Encourage collaboration and develop best practice solutions to improve air quality across London.	M&CP	✓✓
			Arrange meetings with relevant policy and research bodies.	Biannually			
	8	Provide information on reducing emissions from buildings for City Corporation facilities managers and investment property managers.	Develop on-line resource	2020	Increased awareness amongst facilities managers on how to support the City Corporation's Air Quality Strategy.	M&CP CS	✓
			Deliver annual lunchtime workshops for at least 80% of Facilities Managers.	Annually			
	9	Reduce emissions of air pollutants from buildings owned by the City Corporation.	Undertake energy audits of City Corporation buildings.	2019 – 2022	Reduction in emissions from Corporate building stock.	CS	✓✓
			Reduce emissions of NOx from large buildings by at least 3% per year.	Annually			
	10	Review the provision of electric vehicle charging across City Corporation sites including residential estates.	Assess the requirement for electric vehicle charge points.	2019	Support for electric and plug in hybrid vehicles.	M&CP DBE C&CS	✓✓
		Make recommendations for the installation and use of charge points to meet residents' requirements.	2019				
		Source funding for additional charging infrastructure.	2020 - 2022				
	11	Ensure that, subject to operational requirements, 100% of vehicles owned or leased by the City Corporation are electric or hybrid by 2025.	Use the Responsible Procurement Strategy and Transport Coordination Group to ensure this target is met subject to suitable vehicle availability.	2024	Reduced emissions from the City Corporation fleet.	CHB	✓✓✓
	12	Continue to trial low and zero emission technology.	Take all opportunities to trial and evaluate at least one new low and zero emission vehicle per annum.	Ongoing	Ensure that the City Corporation is using the latest zero emission technology.	DBE OS	✓

Action		Detail	Timeline	Outcome	Dept.	Cost
13	Continue to encourage zero emission vehicles through the supply chain.	Apply the menu of options in the Responsible Procurement Strategy to assist in reducing air pollution to major contracts. Review the menu of options biannually.	2019 – 2024 Biannually	Reduced impact on air pollution in London from City Corporation contracts	CHB	✓
14	Require electric or hybrid vehicles as a default for the Corporate taxi contract, together with annual emission reduction targets	When the Corporate taxi contract is renewed, stipulate a requirement for low and zero emission vehicles as default, with emission reduction targets applied.	2020/ 2021	Reduced impact on air pollution in London from City Corporation contracts. Leading by example.	CHB	✓
15	Require zero emission and electric or hybrid vehicles as a default for courier contracts, together with annual emission reduction targets	When the courier contracts are renewed, stipulate a requirement for zero and low emission vehicles as default, with emission reduction targets applied.	2020 - 2024	Reduced impact on air pollution in London from City Corporation contracts. Leading by example.	CHB	✓
16	Continue to ensure that all relevant Corporate strategies and policies reflect the importance of improving local air quality and reducing exposure.	All existing strategies will be assessed for actions to assist in improving air quality and reducing exposure. Further measures will be included in Corporate strategies when they are reviewed.	2020 2019 - 2024	Corporate wide action to improve air quality and reduce exposure. Staff across the organisation with an improved understanding of issues surrounding air quality and how they can support this Air Quality Strategy.	M&CP DBE CHB CS OS	✓
17	Work with London Councils and other stakeholders to develop proposals for legislation to help improve air quality across London.	Agree proposals for a Private Members Bill with London Councils. Coordinate proposals with the Greater London Authority and other bodies. Support the passage of the Bill through the House of Lords.	2019	Improved regulatory powers to improve local air quality.	M&CP REM	✓✓

Action		Detail	Timeline	Outcome	Dept.	Cost	
Collaborating with others	18	Continue to work closely with the Greater London Authority and Transport for London on policies to improve air quality and ensure that all actions support the aims and objectives of the Mayor’s Environment Strategy.	Ensure actions within this Strategy support the Mayor of London’s activities and the requirements of LLAQM. Undertake air quality improvement projects with the support of the Mayor’s Air Quality Fund. Support the activities of the Mayor of London Air Quality Department.	2019 2019 – 2022 Ongoing	A Strategy and work programme that supports the aims of the Mayor of London. Collaboration and the development of cross London policies for improving air quality.	M&CP	✓✓
	19	Continue to collaborate with London Boroughs and London Councils on action to improve air quality.	Provide air quality advice to London Councils. Chair four meetings per annum of the London Air Quality Steering Group. Host four meetings per annum of the central London Air Quality Cluster group.	Ongoing Quarterly Quarterly	Facilitate and support collaboration. Ensure a strategic approach to air quality policy across London.	M&CP	✓
	20	Support Universities with research into the health impacts of air pollution, to increase understanding of the sources of pollution and the effectiveness of interventions to reduce pollution.	Support research on impact of building form on wind patterns and pollution concentrations. Support an air quality dissertation through Dissertations for Good. Support other research projects as and when required. Source funding to support London Universities with research for dealing with air pollution in urban areas.	2019 2019 – 2024 2020 - 2024	Improve understanding of how air pollution behaves in a complex urban environment. Increase understanding and support for new technologies and other solutions for reducing air pollution in urban areas.	M&CP	✓✓

Action		Detail	Timeline	Outcome	Dept.	Cost
21	Continue to support the Third Sector to deliver air quality improvement projects and raise awareness amongst London's communities.	Judge the Sustainable Transport Category of the Sustainable City Awards.	Annually	Facilitate collaboration and the dissemination of air quality knowledge and awareness.	M&CP	✓✓
		Support the work of Environmental Protection UK with events, meeting space and administrative support.	Ongoing			
22	Support the Port of London Air Quality Strategy through air quality monitoring and in taking wider action to reduce emissions from vessels on the river Thames.	Monitor air pollution along the river.	2019 -2024	Greater understanding of pollution levels along the river.	M&CP	✓✓
		Source funding to support the PLA to pilot measures to reduce emissions from vessels using the river.		Understanding cost effective measures to reduce emissions from vessels on the river.		
23	Continue to support the Cross-River Partnership in its delivery of air quality projects in central London.	Provide the co-chair for CRP and take part in joint projects.	2019 - 2024	Support collaborative cross borough work to improve air quality.	M&CP DBE	✓
24	Continue to support the Environment Agency with action to improve air quality, including the implementation of the Medium Combustion Plant Directive.	Source funding to undertake a survey of combustion plant in the City of London.	2019 - 2024	Emissions from combustion plant are minimised.	M&CP	✓✓
		Support the implementation of the Medium Combustion Plant Directive through the provision of information where available and review of permits where required.				
25	Continue to engage with and support the Business Community to become Air Quality Champions and reduce their impact on local air pollution.	One on one business engagement through the CityAir scheme.	2019-2024	Major businesses in the City of London reduce their impact on local air quality as a result of their business operations.	M&CP	✓✓
		Run at least one Air Quality Business event per year.	Annually			
		Engage with intermediary groups who work with small businesses to raise the profile of air quality.		Smaller businesses in the City of London will have increased awareness of air quality.		

Action		Detail	Timeline	Outcome	Dept.	Cost
		Work with the Cheapside Business Alliance (CBA) to raise the profile of air quality and obtain support for action to reduce emissions associated with the CBA member activities.				

Action			Detail	Timeline	Outcome	Dept.	Cost
Reducing Emissions from Transport	26	Support the Mayor of London with the effective implementation of the Ultra-Low Emission Zone.	Publicise the ULEZ amongst local businesses, City Corporation departments and markets. Ensure City Corporation fleet of vehicles meet the ULEZ criteria.	2019 - 2021 2019	Vehicles that comply with the requirements of the ULEZ delivering air quality improvements across central London.	M&CP	✓
	27	Work with the taxi industry to reduce empty running of taxis within the Square Mile.	Explore what practical action can be taken to reduce empty taxi running.	2019 - 2021	Reduced taxi emissions.	DBE	✓
	28	Urge Transport for London to prioritise Zero Emission Capable buses on routes through the City of London.	Work with TfL on their programme of upgrades to cleaner buses and review of routes.	2019 - 2024	Reduced emissions from the bus fleet in the City of London.	DBE	✓
	29	Ensure that Healthy Street Plans have air quality improvement targets and that the air quality impact of major transport and public realm schemes are measured.	Healthy Streets plans will have air quality KPIs. Road schemes will be assessed for local air quality impact when there are proposed changes.	2019 - 2024	Ensure that road schemes have a positive impact on local air quality.	DBE	✓
	30	Introduce Local Zero Emission Zones by 2022.	Introduce local ZEZs covering the Barbican and Golden Lane and Eastern Cluster.	2022	Reduce emissions from vehicles in the City.	DBE	✓✓✓
	31	Implement a wide range of action through the City Corporation Transport Strategy to reduce the exposure of pedestrians to transport generated air pollution in the Square Mile.	Increase in the number of pedestrianised, or pedestrian priority streets. Widen pavements. Reduce the amount of time people wait for a green signal to cross the road.	2020 onwards 2020 onwards 2020 onwards	Reduced exposure to air pollution for people who live in, work in and visit the Square Mile.	DBE	✓✓✓

Action		Detail	Timeline	Outcome	Dept.	Cost
		Improve specific walkways such as the riverside walkway and Barbican High-Walk.	2020 onwards			
		Improve awareness of traffic free walking routes.	Ongoing			
		Timed and temporary street closures	Ongoing			
		Car free days.	2019 onwards			
		Lunchtime Streets – at least 5 to be in operation by 2025.	2019 onwards			
		Complete Legible London maps and directional signs.	2019 - 2020			
32	Pilot an ultra-low emission vehicle street.	Assess the feasibility of piloting an ULEV access restriction to inform the development of Zero Emission Zones as part of the City Corporation Transport Strategy.	2019 – 2020 2021	Trial the concept of a ULEV street in the City of London to see if it's an effective way to encourage zero end low emission vehicles.	M&CP DBE	✓✓✓
33	Assess the suitability of rolling out LEN pilot projects at other locations across the Square Mile.	Commission a legacy report to establish the most cost-effective interventions.	2019	Best practice applied across the City of London.	M&CP	✓✓
		Source funding to roll out cost effective interventions.	2020 - 2024			
34	Implement a wide range of action, through the City Local Plan and the City Corporation Transport Strategy, and Freight and Servicing SPD to reduce	Introducing a freight consolidation service for the City.	2022	Reduce emissions from freight and servicing vehicles.	DBE	✓✓✓
		Delivering two last mile logistics hubs	2022			
		Producing a Servicing Action Plan	2020			

Action		Detail	Timeline	Outcome	Dept.	Cost
	emissions from freight vehicles in the Square Mile.	Identifying opportunities to increase the use of the river for freight including exploring the use of Blackfriars and Tower Piers and a reinstated Swan Lane Pier. Require all development in the City to consider the use of the river for the movement of construction material and waste	2019 - 2020 2019			
35	Implement a range of actions through the City Corporation Transport Strategy and City Local Plan to support and encourage cycling.	Conduct a City-wide cycle parking review and publish a Cycle Parking Delivery Plan that will detail our ambitions for increasing the amount of cycle parking in the City. Ensure new developments provide secure cycle parking facilities including for non-standard cycles, cargo bikes, hand carts and visitor cycle bays. Promote cycling through improving awareness, support London-wide and national campaigns and explore the potential for an annual City Corporation cycling festival. Work with TFL and cycle providers to improved cycle hire provision. Apply a minimum cycling level of service to all streets initially by reducing motor traffic volumes to below 150 vehicles per hour or Protected cycle lanes that are	2020 Ongoing Ongoing Ongoing 2019 onwards	Encourage modal shift away from motorised transport	DBE	✓✓✓

Action		Detail	Timeline	Outcome	Dept.	Cost
		a minimum of 1.5m wide per direction of travel along a core cycling network.				
36	Install additional publicly accessible electric vehicle (EV) rapid charge points by 2025	<p>An EV Charging Action Plan will be published by December 2019. This will identify how many charge points, including charging hubs, are required up to 2022, as well as longer-term forecasts. Locations to be identified through engagement with the Transport for London Electric Vehicle Infrastructure Taskforce.</p> <p>Install a rapid charging hub for taxis in Baynard House car park</p> <p>Install a taxi only rapid charge point in Noble Street rest rank</p>	<p>2019</p> <p>2019</p> <p>2019</p>	Support electric vehicle use in the City.	DBE	✓✓✓
37	Through the City Local Plan require the installation of rapid charge points in new developments.	Apply the requirements of planning policy and the Freight and Servicing Supplementary Planning Document.	Ongoing	Support the uptake of zero emission freight vehicles.	DBE	✓
38	Ensure that improving air quality and reducing exposure is an integral part of all major transport and public realm schemes and that all schemes incorporate greening where possible.	<p>Air pollution will be modelled and measured as part of all major transport and public realm schemes.</p> <p>Incorporating greenery and planting when making changes to streets and the public realm.</p>	<p>2019-2024</p> <p>2019 - 2024</p>	Improved air quality from traffic management and public realm schemes in the City of London.	DBE M&CP	✓✓✓
39	Continue to take a wide range of action to discourage unnecessary vehicle engine idling in the Square Mile.	<p>Run at least 3 Cleaner Air Action Days throughout the year.</p> <p>Review options for enforcement.</p>	<p>3 times / year</p> <p>2020</p>	Reduced emissions from unnecessary engine idling in the Square Mile.	M&CP DBE	✓✓

Action		Detail	Timeline	Outcome	Dept.	Cost
			Jointly lead the Pan London Idling Action project. Respond to complaints and erect signs in hot spot areas.	2019-2022 Ongoing	Coordinated action across London. Raised awareness amongst drivers and support for no engine idling policy.	
	40	Ensure City Corporation parking charges favour low and zero emission vehicles in the City of London.	Differential parking charges applied with the lowest level of charges being applied to zero and low emission vehicles such as electric, hydrogen and hybrid.	On going	Parking policies that favour low and zero emission vehicles.	DBE ✓

Action		Detail	Timeline	Outcome	Dept.	Cost	
Reducing Emissions from Non-Transport	41	Continue to assess all planning applications for air quality impact.	Review all planning applications and make recommendations for conditions as required.	Ongoing	New developments that do not have a negative impact on local air quality.	M&CP	✓
			Require air quality assessments for major developments. This includes all fixed plant, boiler and emergency generators, and transportation sources including delivery and servicing.				
	42	Encourage the use of non-combustion technology during construction and in the operation of new developments.	Developers required to identify suitable non-combustion/zero emission technologies such as heat pumps. BREEAM maximum pollution credits for local air quality to be obtained from non-combustion systems where possible.	2019 - 2024	New developments that do not have a negative impact on local air quality. Reduced emissions from buildings.	M&CP DBE	✓
	43	Apply stringent emission standards for combustion plant where non-combustion plant is not feasible in new developments.	Where non-combustion technologies are not feasible and combustion plant is installed the NOx emissions from Combined Heat and Power (CHP) plant will be required to meet the following emission limits: 50mg/Nm3 (and 25mg/Nm3 for turbocharged CHP) at reference O ₂ . All gas boilers will be required to have a NOx rating of <40mgNOx/kWh at 0% O ₂ as a minimum. Options for tightening these limits by 2020 will be kept under review. The use of oil, biomass, biofuels and wood pellets will be discouraged.	2019 - 2024	New developments that do not have a negative impact on local air quality.	M&CP DBE	✓

Action		Detail	Timeline	Outcome	Dept.	Cost
44	Ensure that where possible chimney stacks terminate above the height of the nearest building.	Where combustion plant is installed good dispersion of emissions will be required by ensuring adequate dispersion. Chimneys should terminate a minimum of 2m above roof height where possible Stack discharge velocity should be at least 10 m/sec. Appliances 1MW or greater will be required to achieve a stack discharge velocity of 15 m/sec.	Ongoing	Emissions from chimney stacks have minimal impact on ground level concentrations.	M&CP DBE	✓
45	Require all new developments to be air quality neutral as a minimum and developments subject to an Environmental Impact Assessment to be Air Quality Positive in line with the requirements of the emerging London Plan.	Evaluate all air quality neutral assessments. Mitigation may be considered but offsetting is not acceptable. Ensure air quality positive assessments are carried out for developments that require an Environmental Impact Assessment.	Ongoing	New developments that do not have a negative impact on local air quality.	M&CP DBE	✓
46	Update the City Corporation Supplementary Planning Document for Air Quality to reflect new policies and requirements of the City Local Plan and London Plan.	Update the Supplementary Planning Document for Air Quality to reflect the latest guidance.	2021	Reduced emissions from new development.	M&CP	✓
	47	Ensure emissions from construction sites are minimised through close management and control.	Regularly inspect sites and respond to complaints. Investigate options for powering tower cranes by mains electricity rather than a diesel generator. Encourage the use of electric excavators and diggers.	Ongoing 2020 From 2020	Reduced emissions from construction activities and plant.	M&CP

Action		Detail	Timeline	Outcome	Dept.	Cost
48	Regularly update the City Corporation best practice guidance on minimising emissions from construction and demolition in order to reflect best practice.	Work with demolition and construction companies to update the best practice guide. Look for further opportunities to reduce emissions with key companies.	Every 2 years	Reduced emissions associated with construction and demolition operations.	M&CP	✓
49	Enforce the Mayor of London NRMM requirements on construction sites as a minimum.	Carry out an inspection programme. Continue with membership of the London Low Emission Construction Partnership (LLECP)	2019 - 2022	Reduced emissions associated with construction and demolition operations.	M&CP	✓
50	Introduce a Stage V emission limit for NRMM on construction sites by 2025 where available.	Incorporate this requirement in the City Corporation Code of Practice.	2024	Reduced emissions associated with construction and demolition operations.	M&CP	✓
51	Investigate options for reducing emissions from NRMM used in street works, filming and other events.	Source funding to undertake a trial of charging facility for street/film events.	2020 - 2022	Reduced emissions associated with street works, filming and other events	M&CP TC	✓
52	Examine options for reducing emissions from existing combustion plant in the Square Mile.	Source funding for trials. Work with the construction industry and equipment suppliers to support and pilot low and zero emission equipment. Work with business to support trials to reduce emissions from combustion plant in buildings.	2020 - 2024	Reduced emissions from existing combustion plant.	M&CP	✓✓

Action		Detail	Timeline	Outcome	Dept.	Cost
53	Improve the understanding of the use of emergency generators in City of London buildings being used for Demand Side Response and Short-Term Operating Reserve.	<p>Source funding to investigate the use of emergency generators in buildings.</p> <p>Work with building owners to investigate alternative means of providing emergency back-up power.</p> <p>Support the Mayor of London to seek reductions in emissions from large scale generators producing power for commercial buildings.</p>	2020 - 2024	Reduced emissions from generators.	M&CP	✓✓
54	Continue to ensure that emissions from chimneys are dispersed as far as possible using the provisions of the Clean Air Act 1993.	Issue authorisations for Chimney Heights for new appliances.	Ongoing	Ensure reduced impact of emissions on ground level concentrations.	M&CP	✓
55	Ensure compliance with emission control requirements for the City Corporation's prescribed processes.	Carry out regular risk-based inspections of prescribed processes in the Square Mile.	2019 - 2024	Regulated operations that comply with the requirements of the legislation.	M&CP	✓
56	Promote and enforce smoke control provisions detailed in the City of London Various Powers Act 1954 and 1973 and the Clean Air Act 1993.	Continue to enforce the smoke control provisions and raise awareness in the City of London. Engage with food premises to ensure the correct appliances and fuels are used and reach out to employees through the business engagement program.	2019 - 2024	A reduction in the amount of smoke emitted in the Square Mile.	M&CP	✓

Action		Detail	Timeline	Outcome	Dept.	Cost	
Raising Awareness	57	Make greater use of Public Health Networks to disseminate information about air quality.	Use Public Health Networks to disseminate information and improve awareness of air pollution and its impact on health	2019 - 2024	Better informed individuals able to take steps to reduce exposure to poor air quality leading to improved public health.	CCS M&CP	✓
	58	Assess options to improve and further develop the free CityAir Smart Phone App and continue to support and promote the AirText service.	Promote exposure reduction techniques and greater uptake of exposure reduction apps, such as CityAir phone app especially amongst vulnerable people and groups.				
			Source funding for improvements to the CityAir Smart Phone App.	2020	Improved information to enable individuals able to reduce exposure to poor air quality.	M&CP	✓✓
			Work with Kings College London to upgrade the App.	2020			
		Continue to support and promote AirText	2019 - 2024				
59	Disseminate information about air quality through various channels such as social media, the City Corporation web site and an e-newsletter.	Use and continue to develop a range of communication methods to reach businesses, workers and residents, including social media, digital and website media, newsletters and events. Specifically: <ul style="list-style-type: none">Daily tweetsBi monthly e newsletterAt least 2 x hard copy articles per yearUpdate the City Corporation web pages at least every fortnightAttend at least 4 events per year to promote air quality	2019 - 2024	Better informed individuals able to take steps to reduce exposure to poor air quality.	M&CP	✓	
60	Develop an action plan, in support of the Mayor of London's air pollution forecasting service,	An action plan focussed on raising awareness on days of high and very high air pollution.	2020	Greater awareness amongst residents, workers and visitors to the City of London leading	M&CP	✓	

Action		Detail	Timeline	Outcome	Dept.	Cost
	to reduce exposure on days of high and very high levels of air pollution.			to a reduction in personal exposure to air pollution.		
61	Increase awareness of air pollution amongst the City of London residential community.	<p>Attend events with an information stall.</p> <p>Provide information for newsletters</p> <p>Attend residents' meetings</p> <p>Support residents who wish to measure air pollution where they live.</p>	2019 - 2024	Better informed residents able to take steps to reduce exposure to poor air quality.	M&CP	✓
62	Run events in support of National Clean Air Day.	Run up to 3 events each year on and around National Clean Air Day.	Annually	Better informed individuals able to take steps to reduce exposure to poor air quality.	M&CP	✓
63	Develop plans for improving air quality and reducing the exposure to pollution of children who attend schools and nurseries in the City of London	An action plan for all City of London schools and nurseries	2020 - 2023	Reduced impact of air pollution on the health of children in the Square Mile.	M&CP DBE	✓
64	Continue to support Barts Health NHS and other health care facilities to reduce their own impact on local air pollution and assist vulnerable patients in reducing their exposure to pollution.	<p>Support hospital events.</p> <p>Liaise with staff to reduce emissions and improve the understanding of air quality.</p> <p>Assess air quality around health care facilities</p>	2019 - 2024	Improved local air quality around the hospital and healthcare facilities and greater awareness amongst visitors and staff.	M&CP	✓
65	Continue to work with businesses to raise awareness of air pollution amongst workers.	<p>Engage with business through CityAir business engagement programme.</p> <p>Working with Heart of the City and Business Healthy on business engagement.</p>	2019 - 2024	Raised awareness of air pollution amongst workers in the City of London	M&CP	✓✓

Appendix 2: Legal Position

The European Union sets health-based Limit Values for several pollutants that are harmful to health and the environment. These Limit Values are legally binding. There are also target values which Member States must take all necessary steps to achieve, not entailing disproportionate costs. The World Health Organisation also sets health-based Guidelines¹³. These are not legally binding. The relevant standards for nitrogen dioxide (NO₂) Particles (PM₁₀ and PM_{2.5}) are shown in table 1.

The European Commission can act against any Member State if the air quality does not meet the European Union Limit Values throughout its territory by a specified date. The UK government is responsible for meeting the EU Limit Values across the UK, with the Mayor of London being responsible for meeting them in London. The City Corporation has a statutory obligation to support this through local action. This obligation is detailed in the Environment Act 1995.

Table A2.1 Summary of EU/UK air quality limits and WHO Guideline values

Pollutant	(UK) Objective /EU Limit Value	Averaging Period	WHO Guideline Values
Nitrogen dioxide - NO ₂	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	200 µg/m ³
	40 µg/m ³	Annual mean	40 µg/m ³
Particles - PM ₁₀	50 µg/m ³ not to be exceeded more than 35 times a year	24-hour mean	50 µg/m ³
	40 µg/m ³	Annual mean	20 µg/m ³
Particles - PM _{2.5}	25 µg/m ³	Annual mean	10 µg/m ³
	Target of 15% reduction in concentration at urban background locations	3-year mean	
		24-hour mean	25 µg/m ³

The Limit Values for nitrogen dioxide are exceeded in large cities across the UK. As a result, in February 2014, the European Commission launched legal proceedings against the UK for its failure to meet the Limit Values. In 2018 further action by the EU followed for failing to respect agreed air quality Limit Values, not taking appropriate measures to keep exceedance periods as short as possible, and for

¹³ Air Quality Guidelines Global Update 2005. Particulate matter, ozone, nitrogen dioxide and sulfur dioxide

disregarding EU vehicle type approval rules¹⁴. The government has produced several plans to deal with nitrogen dioxide within this period. The latest Air quality plan was published in 2017¹⁵ and a supplement in October 2018¹⁶. A Clean Air Strategy was also published in January 2019.

The annual average Limit Value for PM₁₀ has been set at 40 µg/m³. This is largely met everywhere across the United Kingdom. However, PM₁₀ have health impacts even at very low concentrations. A threshold has not been identified below which no damage to health is observed. Consequently, the World Health Organisation has set a Guideline level for annual average PM₁₀ of 20 µg/m³. The European Union has set the annual average Limit Value for PM_{2.5} at 25 µg/m³, with the World Health Organisation setting a Guideline level of 10 µg/m³.

The United Kingdom has voted to leave the EU and there are concerns about what will happen to air quality standards and enforcement following Brexit. A House of Commons briefing paper has been produced on Brexit and air quality¹⁷ to consider these issues. The Government has stated it has no plans to change Limit Values and targets for air quality following Brexit and that in relation to air quality, the Government has said that the 'European Union (Withdrawal) Bill [now Act] is designed to ensure that, as far as possible, the same rules and laws will apply on the day after we leave as on the day before'.

Academics, legal professionals and environment campaign groups are concerned that standards could be changed. In response the Government has published an Environmental Principles and Governance Bill proposing the creation of a new statutory independent environmental watchdog.

¹⁴ Air Quality: Commission takes action to protect citizens from air pollution, European Commission Press Release, Brussels, 17 May 2018

¹⁵ UK plan for tackling nitrogen dioxide concentrations Detailed Plan, July 2017, Defra and DfT

¹⁶ Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations, May 2018, Defra and DfT

¹⁷ Brexit and air quality Commons Library Briefing, Number CBP8195 10 October 2018

Appendix: 3 Sources of Air Pollution

Particulate matter PM₁₀

Particles of varying sizes and sources exist in the air. It is generally considered that smallest particles are most hazardous to health due to their ability to penetrate deep into the lungs and do the most damage.

Particulate matter is defined by its size. PM₁₀ includes any particles that are under 10 micrometers in diameter represented as PM₁₀. Particulate matter of 2.5 micrometers or less in diameter is generally formed by combustion. It is represented as PM_{2.5} and is the main cause of the harmful effects of particulate matter. These particles are not visible to the naked eye.

Where does particulate matter come from?

Concentrations of PM₁₀ consist of primary particles that are emitted directly into the atmosphere from sources such as fuel combustion, and secondary particles which are formed by chemical reactions in the air. Particle matter can be human-made or occur naturally. Natural particles found in the City of London include sea salt and dust from as far away as the Sahara Desert.

In the UK, the biggest man-made source of PM₁₀ is fuel combustion. Road transport gives rise to primary particles from engine emissions and tyre and brake wear. The Greater London Authority holds a database of all emissions across London. It is called the London Atmospheric Emissions Inventory (LAEI). The 2013 LAEI, released in August 2016, estimates emissions of NO_x, PM₁₀, PM_{2.5} including a range of years and projects emissions from 2008 and 2030¹⁸. The LAEI indicates that approximately 37 % of PM₁₀ generated by road vehicles in the City of London is caused by the general wear of tyres and brakes. Secondary PM₁₀ is created from emissions of ammonia, sulphur dioxide and oxides of nitrogen, as well as from emissions of organic compounds from fuel combustion.

Particles can travel long distances and on any given day it is likely that the following particles are in the air in the City of London:

- Black carbon from fuel combustion, particularly diesel
- Trace metals from e.g. from vehicle brake wear
- Minerals from construction
- Sulphates from industrial fuel burning outside London
- Nitrates from fuel burning, industry and traffic

¹⁸ London Atmospheric Emissions Inventory (LAEI) 2013 Mayor of London

- Sea salt
- Desert dust

Primary particles emitted in the City of London

Figure 1A shows the estimated contributions for each source for selected years between 2008 to 2030. The LAEI indicates that the main source of primary PM₁₀ emitted locally is road transport. This equated to 55% (17.2 tonnes/year) of all emissions in 2013 and 48% (12.4 tonnes/year) of emissions in 2020. There is a large reduction expected in the proportion of emissions arising from road transport between these years.

When comparing vehicle types, taxis are the biggest emitters of PM₁₀ in the City of London.

Figure 1A

London Atmospheric Emissions Inventory

PM₁₀ Emissions - City of London

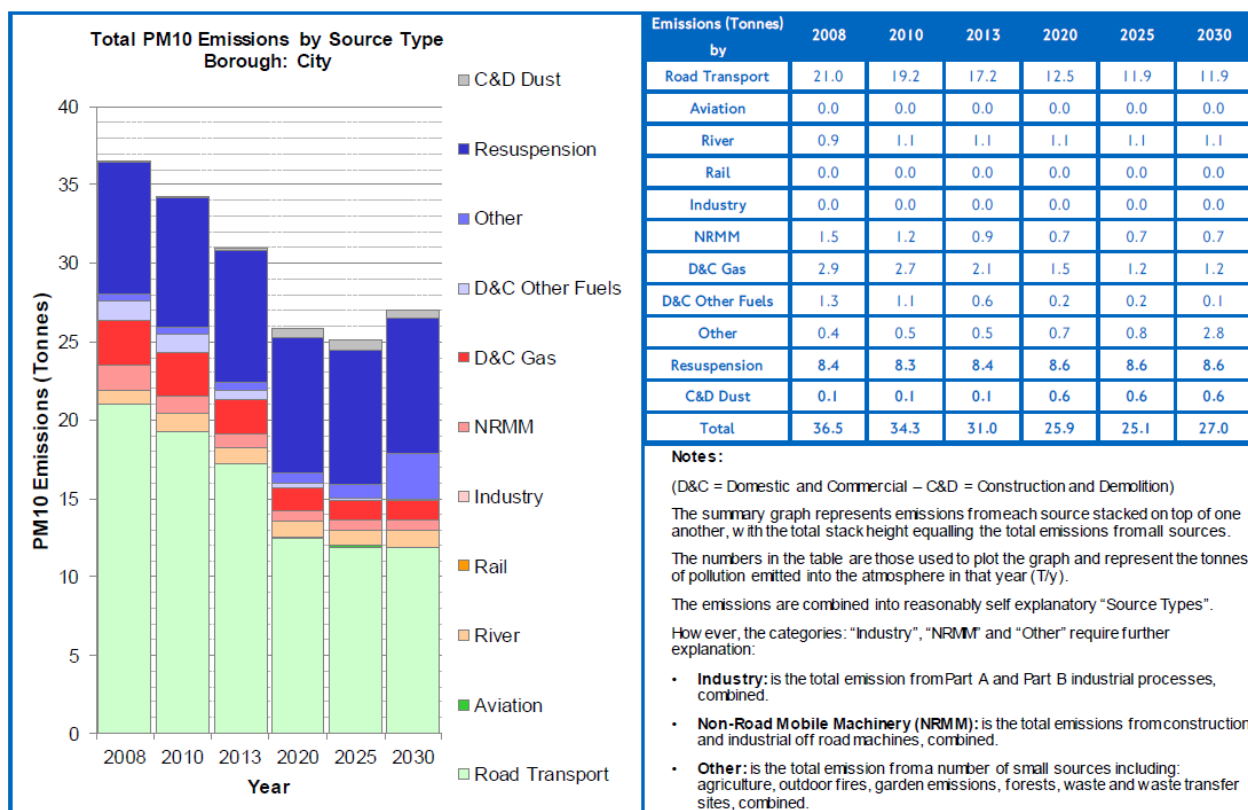
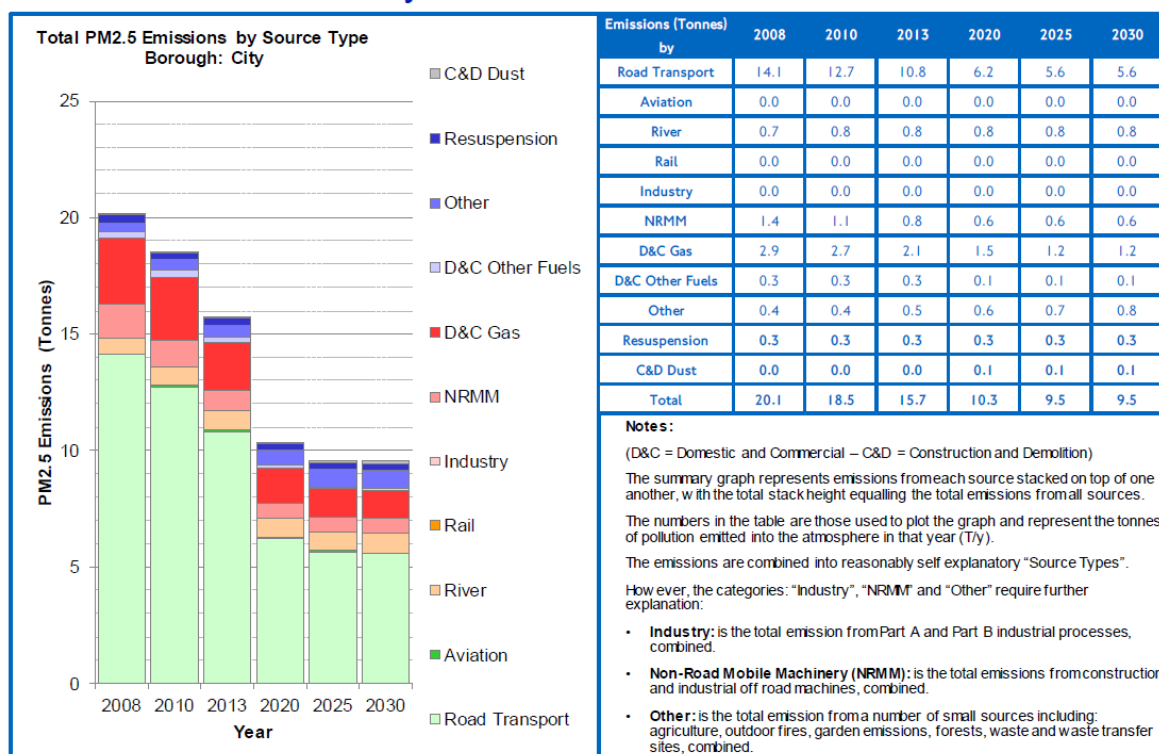


Figure 2A shows the estimated contributions of PM_{2.5}. Road transport makes up the largest single source and again there is a step change expected between 2013 and 2020. However, road transport remains the biggest source of local emissions.

Figure 2A

London Atmospheric Emissions Inventory

PM2.5 Emissions - City of London



Nitrogen dioxide

Nitrogen dioxide is an irritant gas, which at high concentrations causes inflammation of the airways.

Where does nitrogen dioxide come from?

When nitrogen is released during fuel combustion it combines with oxygen atoms to create nitric oxide (NO). This further combines with oxygen to create nitrogen dioxide (NO₂). Nitric oxide is not considered to be hazardous to health at typical ambient concentrations, but nitrogen dioxide can be. Nitrogen dioxide and nitric oxide are referred to together as oxides of nitrogen (NO_x).

NO_x emitted in the City of London

The 2013 LAEI details the approximate proportion of emissions of NO_x from vehicles and combustion plant in the City of London during 2011. This is shown in Figure A3.

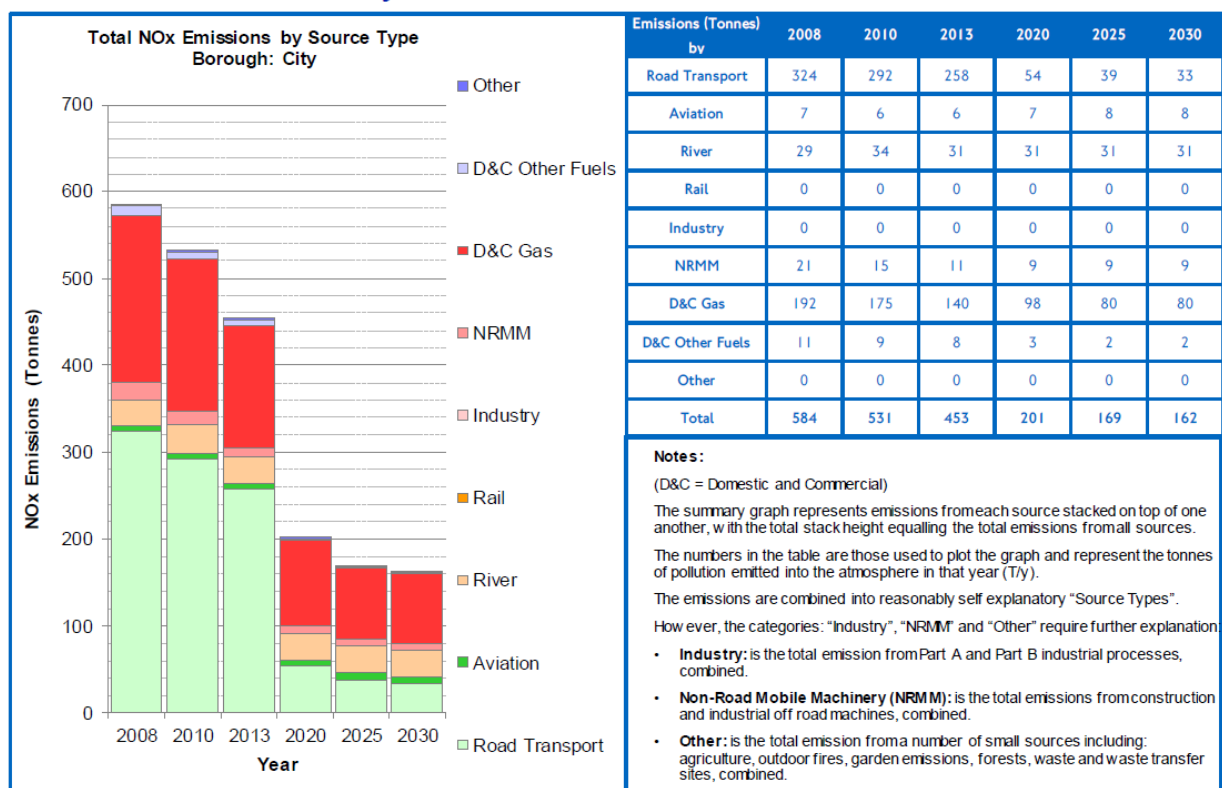
Figure 3A shows the estimated contributions of NO_x. In 2013 road transport is the biggest single source of emissions, emitting 258 tonnes of NO_x, however this is estimated to reduce to 54 tonnes by 2020. This forecast reduction is based on significant improvements to the emissions from vehicles. It implies a reduction of almost 80% over the 7 years.

Emissions from stationary combustion sources such as Combined Heat and Power and boilers are expected to drop from 148 to 101 tonnes

Figure 3A

London Atmospheric Emissions Inventory

NO_x Emissions - City of London



Appendix 4: Health Effects of Air Pollution

Exposure to PM_{2.5} is a significant cause of disease in London. Public Health England (PHE) published a report in 2014 'Estimating Local Mortality Burdens Associated with Particulate Air Pollution'. The report states that:

'current levels of particulate air pollution have a significant impact on health. Measures to reduce levels of particulate air pollution, or reduce exposure of the population to such pollution, are regarded as an important public health initiative.'

In addition to the above, the World Health Organisation has classified diesel exhaust specifically as a Group 1 carcinogen.

A wide range of research into the health impacts of air pollution has been undertaken. A study 'Understanding the Health Impacts of Air Pollution in London' undertaken by Kings College London was published in July 2015¹⁹. The report, commissioned by TfL and the GLA, estimated the mortality burden of 2010 concentrations of PM_{2.5} in London. The total mortality burden of anthropogenic PM_{2.5} for the year 2010 is estimated to be 52,630 life-years lost, equivalent to 3,537 deaths at typical ages. The total mortality burden of long-term exposure to NO₂ is estimated to be up to 88,113 life-years lost, equivalent to 5,879 deaths at typical ages, combined to create a total figure of up to 9,400 equivalent deaths in 2010. There is assumed to be an overlap in effects of about 30%.

More recently COMEAP in 2018²⁰ published estimates of the annual mortality burden of human-made air pollution across the UK. This was estimated to be between 28,000 to 36,000 deaths. The range is based on two approaches to consider the differing views of experts.

The WHO Guidelines for PM are the lowest levels at which total cardiopulmonary and lung cancer mortality have been shown to increase with more than 95% confidence in response to PM_{2.5} in a long-term exposure to particulate air pollution study.²¹

¹⁹ Understanding Health Impacts of Air Pollution in London King's College London 15 July 2015

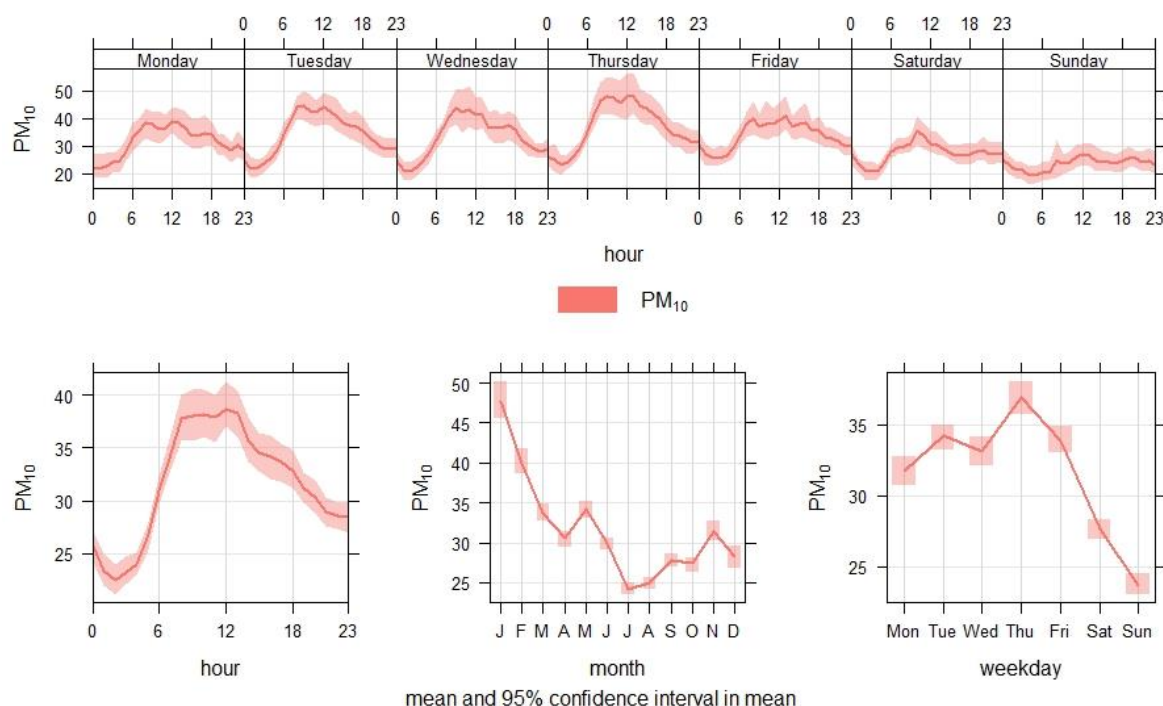
²⁰ Associations of long-term average concentrations of nitrogen dioxide with mortality. A report by the committee on the Medical Effects of Air Pollutants. August 2018

²¹ Evolution of WHO air quality Guidelines, Past Present and Future. World Health Organization 2017

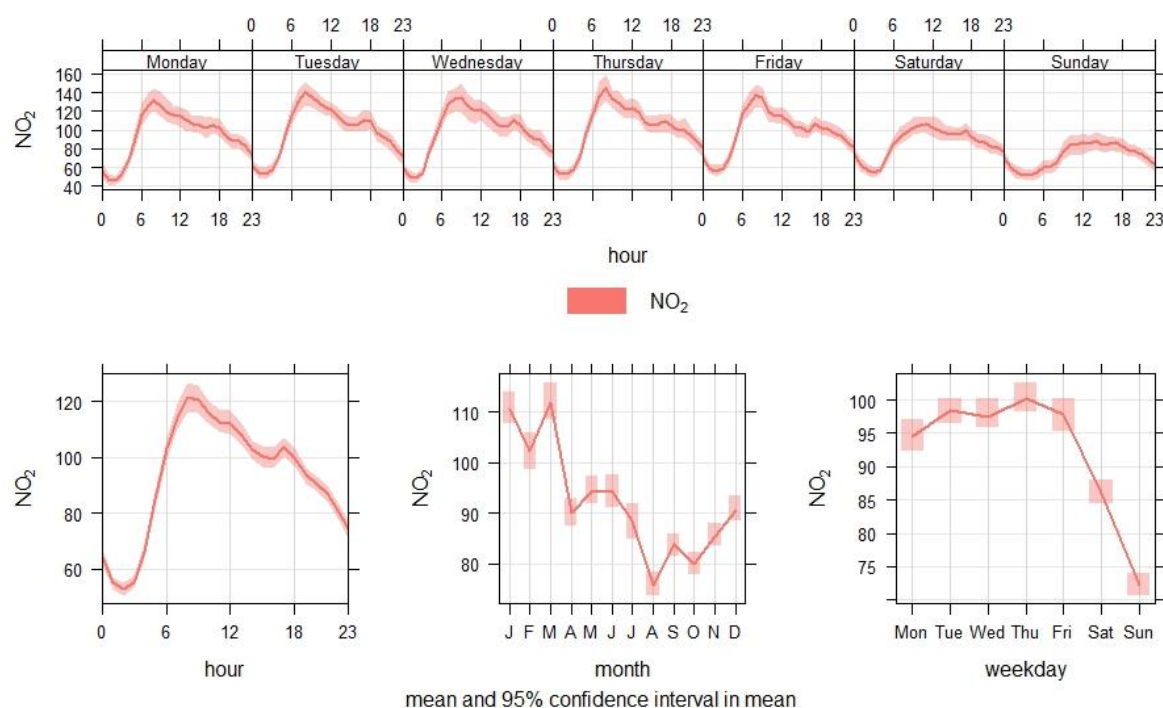
Appendix: 5 Further analysis of monitoring data

Further analysis of monitoring data shows the average diurnal profile during different days of the week. Changes in concentrations are closely related to traffic patterns.

Time Variation of PM₁₀ concentrations at Upper Thames Street 2017



Time Variation of NO₂ concentrations at Upper Thames Street 2017



Appendix 6: Mayor of London Policies

Environment Strategy

As part of his legal obligation to meet air quality Limit Values across London, the Mayor of London published the London Environment Strategy in May 2018. The Strategy also covers climate change mitigation and energy, the low carbon economy, waste, green space and transport.

London Plan

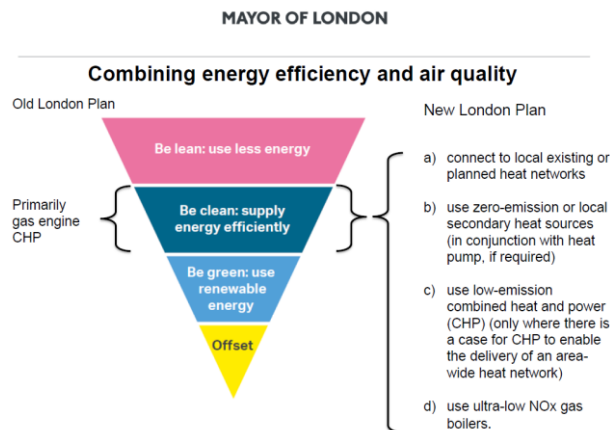
At the time of writing this Strategy, emerging policy on air quality is contained in Chapter 9 of the draft London Plan (with minor amendments). This deals with Sustainable Infrastructure:

- Policy SI 1 Improving air quality, part A (1) Development proposals should not lead to further deterioration of existing poor air quality;
- Policy SI 1 Improving air quality, part A (2) requires development proposals to use design solutions to prevent or minimise increased exposure to existing air pollution;
- Policy SI 1 Improving air quality, part A (3) requires masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should propose methods of achieving an Air Quality Positive approach through the new development and (3a) major development proposals must be at least air quality neutral and be submitted with an Air Quality Assessment.
- Policy SI 1 Improving air quality, part A (4) requires developers to demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.
- Policy SI 3 Energy infrastructure. Part D (1) requires major development proposals within Heat Network Priority Areas to have a communal low-temperature heating system in line with the following hierarchy; connection to a local existing or planned heat network; use zero emission or local secondary heat sources in conjunction with heat pump; use low-emission combined heat and power (CHP) only where there is a case for CHP to enable the delivery of an area-wide heat network.

In addition, a study on the air quality impacts from Combined Heat and Power in London for the GLA has been undertaken by Ricardo Energy and Environment. The report recommends a complete ban on combustion-based CHP provision for new

development, either in specific geographical areas where air quality is a particular problem, or there are sensitive communities.

The GLA has published an evidence report 'Low Carbon Heat: Heat Pumps in London' which acknowledges that as more up-to-date carbon factors for electricity are applied, heat pumps offer a substantially lower carbon system compared to gas-based systems (e.g. gas boilers and/or gas-fired Combined Heat and Power). This creates co-benefits for both carbon savings and reduced air pollutant emissions as there are no emissions locally.



Transport Strategy

The Mayor of London published a new Transport Strategy in 2018. It set out his plans to transform London's streets, improve public transport and create opportunities for new homes and jobs. The headline target is to 'aim for '80% of all trips in London to be made on foot, by cycle or using public transport by 2041'. Two key elements of the approach include:

Healthy Streets and healthy people: Creating streets and street networks that encourage walking, cycling and public transport use will reduce car dependency and the health problems it creates.

A good public transport experience: Public transport is the most efficient way for people to travel over distances that are too long to walk or cycle, and a shift from private car to public transport could dramatically reduce the number of vehicles on London's streets.

Several action plans will be developed to support the Strategy, the first of these is the Walking Action Plan.

Ultra-Low Emission Zone

An Ultra-Low Emission Zone (ULEZ) will be introduced in central London in April 2019. Vehicles travelling in the existing Congestion Charge Zone will be required to

meet new emission standards 24 hours a day, seven days a week, or pay a daily charge. From 2021, the Mayor proposes to extend the zone to encompass the North and South Circular boundaries.

In addition, since January 2018, all new taxis presented for licensing for the first time must be zero emission capable (ZEC). This means having CO₂ emissions of no more than 50g/km and a minimum 30-mile zero emission range. Also, all private hire vehicles (PHVs) licensed for the first time must have a Euro 6 petrol or diesel engine, or a Euro 4 petrol-hybrid engine.

In early 2019, TFL will also consult on proposals to reduce taxi emissions further, including a proposal of phased reductions of the taxi age limit for the dirtiest vehicles to 12 years. The 15-year age limit would be strictly mandated in 2019, with a proposed reduction in the age limit each year until a 12-year age limit is reached.

The Mayor of London announced a £23m scrappage scheme for the London's most polluting vans ahead of the introduction of the ULEZ. The scheme will initially help London's micro-businesses, which they define as those with fewer than 10 employees.

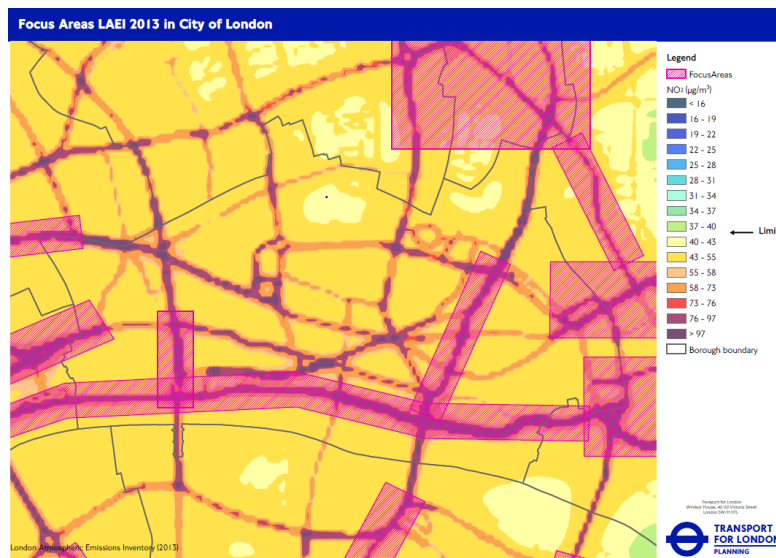
Air Quality Focus Areas

The Mayor of London has identified 'Air Quality Focus Areas' across London. These are areas where the Greater London Authority and Transport for London will focus action to improve air quality, reducing exposure. The Focus areas in the City of London are shown in Figure A6.1

The criteria used by TfL to determine air quality focus areas are available on the Greater London Authority web site²².

²²GLA (2016), London Atmospheric Emissions Inventory (LAEI) 2013 Air Quality Focus Areas - December 2016 update London Data store.

Figure A6.1: Air Quality Focus Areas in the Square Mile



Appendix 7: Air Quality Policies in the Draft City Plan

Policy HIC2: Air Quality

- Developers will be required to effectively manage the impact of their proposals on air quality. Major developments must provide an Air Quality Impact Assessment
- Development that would result in deterioration of the City's nitrogen dioxide or PM10 and PM2.5 pollution levels will be refused
- Developments should be at least Air Quality Neutral. Major developments must maximise credits for the pollution section of the BREEAM assessment relating to on-site emissions of oxides of nitrogen (NOx)
- 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, and necessary mitigation must be approved by the City Corporation
- Developments that include uses that are more vulnerable to air pollution, such as schools, nurseries, medical facilities and residential development, will be refused if the occupants would be exposed to poor air quality. Developments will need to ensure acceptable air quality through appropriate design, layout, landscaping and technological solutions
- Construction and deconstruction and the transport of construction materials and waste must be carried out in such a way as to minimise air quality impacts to the fullest extent possible. Impacts from these activities must be addressed within submitted Air Quality Impact Assessments
- Air intake points should be located away from existing and potential pollution sources (e.g. busy roads and combustion flues). All combustion flues should terminate above the roof height of the tallest building in the development to ensure maximum dispersion of pollutants.

Improving air quality and reducing exposure is also referenced in a number of other policy areas.

Policy HIC8: Play Areas and Facilities

- Play areas and facilities must be inclusive and must not be located in areas of poor air quality due to the negative health impacts on young children.

Strategic Policy S8: Design

- Developments should optimise micro-climatic conditions, address solar glare, day light and sunlight and uncomfortable wind conditions and deliver improvements in air quality

Policy D1: Sustainability Standards

- Mayor development will be required to achieve BREEAM rating of 'excellent' or outstanding obtaining maximum credits for the City's priorities (energy, water, pollution and materials)
- Demonstrate that the London plan carbon emission and air quality requirements have been met on site. In exceptional circumstances where standards cannot be met on site, offsetting will be required to account for the shortfall

Policy D3: Public Realm

- Public realm schemes must have regard to the wellbeing of users in relation to air pollution, noise, temperatures, shading and micro climate

Policy CEW3: New Waste Management Sites

- Proposals for new waste management, handling and transfer will be required to demonstrate that access arrangements, mode of transport and transport routes will minimise the potential for congestion and environmental impacts including local air quality impacts

Policy SI1: Infrastructure provision and connection

- This requires utility infrastructure and connections to be designed into the development and includes a requirement to plan for the electricity supply necessary during the construction period. Developers should engage with energy providers prior to commencement of development works to ensure the availability of Temporary Building Supplies, avoiding the need for diesel generators to provide electricity.

Strategic Policy S14

- The City Corporation will work in partnership with developers and others to promote a greener City including protecting, and seeking the provision, of new open space and green space and encouraging high quality green infrastructure through new development, public realm or transportation improvements.

Strategic Policy S20: Aldgate and Tower

- The Aldgate and Tower key area of change includes requirements to improve air quality around Mansell Street Estate, make improvements to Aldgate Bus Station to improve air quality and identify opportunities to reduce pollution through public realm improvements in the vicinity of Sir John Cass School and Middlesex Street

Strategic Policy S22: Fleet Street

- Residential development will be directed to appropriate sites off principal streets to reinforce the existing residential cluster, ensuring a high quality of residential amenity to reduce exposure to poor air quality

Strategic policy S23: Smithfield and Barbican Key Area of Change

- Improvements will be made to Beech Street to reduce the volume of traffic, improve air quality and increase amenity and vitality

Glossary

AQAP: Air Quality Action Plan

AQMA: Air Quality Management Area

AQS: Air Quality Strategy

BREEAM: Building Research Establishment Environmental Assessment Method

CHP: Combined Heat and Power

COMEAP: Committee on the Medical Effects of Air Pollutants

CRP: Cross River Partnership

Defra: Department for Environment Food & Rural Affairs

EA: Environment Agency

EPR: Environmental Permitting Regulations

EPUK: Environmental Protection UK

EU: European Union

EV: Electric Vehicles

g/kWh: grams per kilowatt hour

HC: Hydrocarbons

HWB: Health and Wellbeing Board

JSNA: Joint Strategic Needs Assessment

KCL: Kings College London

Kg: kilograms

kW: kilowatts

LEN: Low Emissions Neighbourhood

LAEI: London Atmospheric Emissions Inventory

MAQF: Mayor's Air Quality Fund

MCPD: Medium Combustion Plant Directive

µg/m³: microgram of pollutant per cubic metre of air

mg/m³: milligram of pollutant per cubic metre of air

mg/Nm³: milligram of pollutant per cubic metre of air at normal conditions

mg/kWh: milligram of pollutant per kilowatt hour

m/sec: metres per second

mW: Megawatt

NRMM: Non-Road Mobile Machinery

NO₂: Nitrogen dioxide

NO_x: Oxides of nitrogen

PHE: Public Health England

PHOF: Public Health Outcomes Framework

PHV: Private Hire Vehicles

PM₁₀: Particulate matter with a diameter of 10 micrometres

PM_{2.5}: Particulate matter with a diameter of 2.5 micrometres

SPD: Supplementary Planning Document

SPG: Supplementary Planning Guidance

STOR: Short-Term Operating Reserve

TfL: Transport for London

ULEV: Ultra Low Emission Vehicle

ULEZ: Ultra Low Emission Zone

WHO: World Health Organisation

ZEC: Zero Emission Capable

ZEZ: Zero Emission Zone

References

1. City of London Air Quality Strategy 2015 – 2020
2. Air Quality Guidelines - Global Update 2005 Particulate matter, ozone, nitrogen dioxide and sulfur dioxide
3. Fine Particulate Matter (PM_{2.5}) in the United Kingdom 2012 Air Quality Expert Group for Defra
4. <https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/working-london-boroughs>
5. Draft New London Plan, 13th August 2018, Mayor of London
6. Mayor of London: The Control of Dust and Emissions from Demolition and Construction, Supplementary Planning Guidance, July 2014
7. The City of London Code of Practice Deconstruction and Construction Sites, Ninth Edition, January 2019
8. Urban air pollution from combined heat and power plants - A measurement-based investigation, Kings College London, April 2018
9. Pilot study on the air quality impacts from Combined Heat and Power in London, Report for Greater London Authority, Ricardo Energy and Environment, Sept 2018
10. Ricardo Energy & Environment (2016) London STOR and Triad Management Study, ED62693
11. <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework>
12. Defra Update on Implementation of the Daily Air Quality Index Information for Data Providers and Publishers April 2013
13. Air Quality Guidelines Global Update 2005. Particulate matter, ozone, nitrogen dioxide and sulfur dioxide
14. Air Quality: Commission takes action to protect citizens from air pollution, European Commission Press Release, Brussels, 17 May 2018
15. UK plan for tackling nitrogen dioxide concentrations, July 2017, Defra and DfT
16. Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations, May 2018, Defra and DfT
17. Brexit and air quality Commons Library Briefing, Number CBP8195 10 October 2018
18. London Atmospheric Emissions Inventory (LAEI) 2013 Mayor of London
19. Understanding Health Impacts of Air Pollution in London, King's College London, July 2015
20. Associations of long-term average concentrations of nitrogen dioxide with mortality. A report by the Committee on the Medical Effects of Air Pollutants, August 2018
21. Evolution of WHO air quality Guidelines, Past Present and Future. World Health Organization, 2017
22. GLA (2016), London Atmospheric Emissions Inventory (LAEI) 2013 Air Quality Focus Areas - December 2016 update London Data store.