

Committee: Port Health and Environmental Services	Date: 23/11/2021
Subject: New World Health Organisation Air Quality Guidelines	Public
Which outcomes in the City Corporation's Corporate Plan does this proposal aim to impact directly?	2 and 11
Does this proposal require extra revenue and/or capital spending?	Yes
If so, how much?	£20,000 - £30,000
What is the source of Funding?	Identified in-year underspend in the Climate Action Strategy Central Risk Budget
Has this Funding Source been agreed with the Chamberlain's Department?	Yes
Report of: Juliemma McLoughlin, Executive Director, Environment	For decision
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Summary

Since 1987, the World Health Organisation (WHO) has issued air quality guidelines for the main air pollutants that have a damaging impact on health. As evidence about the harmful health impacts of air pollution advances, the air quality guidelines are revised. The latest set of guidelines were published in September 2021.

The new guidelines are more stringent than the previous set for nitrogen dioxide and particulate matter, PM_{2.5} and PM₁₀. New advice has also been issued for the management of black carbon; a type of particulate matter known to have a significant impact on health.

On 9th November 2021, the Environment Bill received Royal Assent. The Environment Act 2021 requires the government to set new targets for PM_{2.5}. The targets will be influenced by the new WHO air quality guidelines but are unlikely to be as stringent, at least not in the short term. Once the targets are known, the City Corporation will need to develop an air quality plan detailing how the new targets will be met. Local authorities have not previously been responsible for managing levels of PM_{2.5} as only a small proportion is generated locally.

Locally derived PM_{2.5} is predominantly in the form of 'black carbon'. It is regarded as one of the more toxic types of small particle and is created by the incomplete

combustion of fossil fuels. In addition to being detrimental to health, black carbon is also a potent climate warming agent.

As previous work has not taken place to ascertain, in detail, the sources of PM_{2.5} generated in the Square Mile, the proposal is to commission work to develop an inventory of local sources of PM_{2.5} and consider how it can be effectively controlled. This information will then feed into the development of the new air quality plan, which is required under the Environment Act 2021.

PM_{2.5} is the pollutant that has the greatest impact on health. By focussing on this pollutant, and in particular the black carbon fraction, the best health outcomes will be delivered. Action to deal with PM_{2.5} also has the benefit of reducing overall levels of PM₁₀. Reducing black carbon will assist the climate action programme.

Recommendation

Members are asked to:

- Approve the commission of research, at a cost of £20,000 - £30,000, into locally derived sources of PM_{2.5}, to formulate a plan to reduce levels in line with new statutory obligations, and for maximum health and climate benefits following the publication of the latest WHO Air Quality Guidelines.

Main Report

Background

1. Air pollution has an impact on health. It increases morbidity and mortality from cardiovascular and respiratory disease, and from lung cancer. Additionally, there is increasing evidence about the effects on other organs and systems in the body.
2. Since 1987, the World Health Organisation (WHO) has periodically issued health-based air quality guidelines to help governments reduce human exposure to air pollution. The guidelines were last reviewed in 2005 and published the following year¹. Since then, there has been a significant amount of evidence about the adverse health impacts of air pollution. This has led to the guidelines being revised and a new set published in September 2021².
3. The guidelines are designed to offer quantitative health-based recommendations for managing air quality. They are not legally binding, but they do provide an evidence-based tool to inform legislation and policy in WHO Member States, of

¹ <https://apps.who.int/iris/handle/10665/69477>

² <https://apps.who.int/iris/handle/10665/345329>

which the United Kingdom is one. Current air quality targets in the UK are based on the 2005 guidelines.

4. In addition to new guidelines for the key pollutants, interim targets have been set to guide the reduction of air pollution towards the achievement of the guidelines. This recognises the difficulty that some countries will face in meeting the new recommendations.
5. Table 1 details the new guidelines for the pollutants of concern in the Square Mile: nitrogen dioxide, particulate matter PM_{2.5} and PM₁₀. An additional 'peak season' target has also been set for ozone.
6. The annual average nitrogen dioxide guideline was set at 40µg/m³. However, the new guideline has been set at just 10µg/m³, demonstrating that this pollutant has a greater impact on health than previously thought. There is also a new 24-hour guideline for nitrogen dioxide.
7. The PM_{2.5} annual average guideline has reduced from 10µg/m³ to 5µg/m³ and the 24-hour guideline from 25µg/m³ to 15µg/m³. The PM₁₀ annual average guideline has reduced from 20µg/m³ to 15µg/m³ and the 24-hour guideline from 50µg/m³ to 45µg/m³.
8. New targets have also been set for carbon monoxide and sulphur dioxide. Historic monitoring has shown that these pollutants are both very low in the Square Mile, and across the country, and are therefore not considered to be a problem.

Table 1

Pollutant	Averaging time	Interim target				2005 AQG	2021 AQG	Average level in Square Mile
		1	2	3	4			
Nitrogen dioxide µg/m ³	Annual	40	30	20	10	40	10	20 - 60
	24-hour	120	50	-	25	N/A*	25	73 - 114
PM _{2.5} µg/m ³	Annual	35	25	15	5	10	5	12
	24-hour	75	50	37.5	15	25	15	50
PM ₁₀ µg/m ³	Annual	70	50	30	15	20	15	16 - 24
	24-hour	150	100	75	45	50	45	54 - 71
Ozone µg/m ³	Peak season	100	70	-	60	N/A*	60	No data
	8-hour	160	120		100	100	100	No data

* No previous guideline set for this averaging time

9. Particulate matter is made up of many sources. At this stage, guidelines have not been set for the different types of particles, although it is widely accepted that particles such as black carbon (formed through incomplete combustion of fossil fuels) have more of an impact on health than other particle types. Black carbon is

also a powerful climate warming agent that acts by absorbing heat in the atmosphere.

10. To recognise the significance of black carbon, in its latest review of the air quality guidelines, WHO has recommended:
 - a. Measurements of black carbon
 - b. Undertaking emissions inventories of black carbon
 - c. Taking measures to reduce black carbon

Current levels of air pollution in the Square Mile

Nitrogen dioxide

11. Nitrogen dioxide is a colourless and odourless gas that is generated when fuel is burned. The Square Mile has historically experience high levels of nitrogen dioxide, however a wide range of national, regional, and local action has led to a significant reduction in recent years.
12. One of the aims of the City Corporation's current Air Quality Strategy is for over 90% of the Square Mile to meet the 2005 WHO air quality guidelines for nitrogen dioxide by 2025. This was achieved for the annual average guideline in 2020, when it was 93%. This compares to 67% in 2019 and 33% in 2018. The 2005 hourly average guideline is met everywhere.
13. Appendix 1 contains a map showing concentrations of annual average nitrogen dioxide during 2020. It is presented with reference to the new WHO air quality guidelines and interim targets. A map of concentrations during 2019 has been included for comparison.
14. Nitrogen dioxide is currently being measured in over 80 locations across the Square Mile. Annual average concentrations are between $20\mu\text{g}/\text{m}^3$ and $60\mu\text{g}/\text{m}^3$. The latter figure was not measured anywhere in 2020 but is an output from computer modelling for that year. Very few places across the country currently meet the new WHO guideline of $10\mu\text{g}/\text{m}^3$. The maximum 24-hour reading in the Square Mile during 2020 was $114\mu\text{g}/\text{m}^3$.
15. Although levels of nitrogen dioxide were lower than expected during 2020 due to the response to the COVID 19 pandemic, it is not anticipated that levels will return to 2019 concentrations. Instead, following an anticipated slight increase in 2021, we will continue to see year on year improvements due to the range of air quality plans and programmes in place. This will be greatly helped by the work underway for climate action, which will deliver greater energy efficiency, more renewable energy, and an accelerated programme of decarbonisation.

Particulates PM₁₀ and PM_{2.5}

16. Particulate matter is made up of a wide range of substances, for example dust, sea salt, ammonia, sulphates, nitrates, and black carbon from fuel combustion. It is defined by its size. PM₁₀ includes any particles that are under 10 micrometers in diameter and PM_{2.5} less than 2.5 micrometers in diameter.
17. Annual average levels of PM₁₀ across the City are around 16µg/m³ to 24µg/m³. The maximum 24-hour reading in 2020 was 71µg/m³. Particles from vehicle tailpipes, and tyre and brake wear result in higher levels adjacent to busy roads.
18. Annual average PM_{2.5} concentrations are around 12µg/m³ across the Square Mile. The maximum 24-hour reading in 2020 was 50 µg/m³. Concentrations of PM_{2.5} are only very slightly higher at roadside which demonstrates the small contribution made to total PM_{2.5} by local road traffic.

Ozone

19. Ozone is not currently measured in the Square Mile as it has not been part of the statutory requirement for local air quality management. It is classed as a regional pollutant that cannot be controlled locally. It has also historically not been an issue in the City due to high levels of nitrogen dioxide which, due to chemical reactions that take place in the air, results in low levels of ozone. Levels of ozone in the south-east of the country are higher in rural areas than urban areas.
20. As nitrogen dioxide decreases, ozone levels in the Square Mile will increase. Plans are in place to install an ozone analyser in the Guildhall to measure the anticipated increase in ozone and provide data and corresponding health advice to the public.

Black carbon

21. Measurements of black carbon have been made around the Square Mile using portable hand-held sensors. Relatively high levels of black carbon have been detected away from roadsides, often in the City's alleyways. This has been attributed to solid fuel burning in restaurants. Guidance has been produced for the restaurant industry with advice on how to minimise emissions of black carbon and ensure that correct appliance and fuel type is used.
22. Air Quality Officers have also been visiting retail premises to check compliance with the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020. The aim is to prevent the sale and use of 'wet wood' which should reduce the amount of black carbon being emitted into the air

Proposal

23. The Environment Act 2021 received Royal Assent on 9th November. It redefines local government's statutory obligations for improving air quality. Once new

national air quality targets have been set, local authorities will be required to develop plans demonstrating how they will be met.

24. The government will be setting new targets for PM_{2.5}. The targets will be influenced by the new WHO guidelines, but we are unlikely to see an annual average target of 5µg/m³, at least not in the short term. At this stage it is not clear whether an additional target will be set for nitrogen dioxide.
25. The vast majority of PM_{2.5} measured in the Square Mile comes from outside its boundary. However, there is some PM_{2.5} generated locally. This is likely to be black carbon from the combustion of diesel in vehicles, generators and construction equipment, the burning of gas and from solid fuel used in restaurants.
26. The proposal is to commission work to understand the exact proportion of PM_{2.5} generated locally and how it can be most effectively controlled. This will assist in the formulation of a new action plan required by the Environment Act 2021. The dominant type of local PM_{2.5} is likely to be black carbon and targeting this pollutant locally will have the most effective health outcomes. Black carbon is a potent climate warming agent so this approach will lead to a positive effect on climate action. This work is anticipated to cost between £20,000 and £30,000.

Corporate & Strategic Implications

Strategic implications

27. Air quality policy and action at the City Corporation is framed in the Air Quality Strategy 2019 – 2024. It is supported by the Climate Action Strategy, Transport Strategy, Responsible Business Strategy, Procurement Strategy, and draft City Plan.
28. The work on air quality directly supports two Corporate Plan outcomes:
 - ‘People enjoy good health and wellbeing’
 - ‘We have clean air, land and water’
29. Tackling black carbon as an air pollutant will assist with the City Corporation’s climate action programme.

Financial implications

30. Research into the locally derived sources of PM_{2.5} is anticipated to cost between £20,000 and £30,000. The cost will be met by an identified in-year underspend from the Climate Action Strategy Central Risk Budget under the Resilience workstream.

Resource implications

31. The requirement for Local Air Quality Management under the Environment Act 2021 forms part of the City Corporation's statutory obligations and is undertaken by the Air Quality Team.

Legal implications

32. The City Corporation currently has a statutory duty to measure air pollution and develop and implement an improvement plan if health-based targets are not met. Under the Environment Act 2021, the City Corporation will be required to develop and implement a revised air quality plan detailing how new targets for PM_{2.5}, and any other named pollutant, will be met.

Risk implications

33. Air quality is listed as a corporate risk. The latest Deep Dive into the risk was presented to Audit and Risk Management Committee in January 2021. Taking the initiative at this early stage to assess and tackle local sources of PM_{2.5} will assist in managing the risk.

Equalities implications

34. Action to improve air quality has a positive impact on all sections of the population. The benefit is greatest for children and the elderly as they are more susceptible to the health impacts of air pollution. In December 2020, a Coroner ruled that a London child, Ella Adoo Kissi-Debrah, had died of asthma, with exposure to excessive air pollution being a contributory factor. This is the first time that air pollution has been explicitly linked to a named individual's death.
35. Improving air quality also has a positive impact on individuals whose lives are affected by asthma and other respiratory and cardiovascular conditions.

Climate implications

36. Black carbon is a potent climate warming agent. Identifying and reducing the amount of black carbon produced in the Square Mile will have a positive impact on climate action.

Security implications

37. None

Conclusion

- 38. New WHO Air Quality Guidelines have been published. They set more stringent recommendations for levels of nitrogen dioxide and particulate matter PM₁₀ and PM_{2.5} in the air. Advice has also been issued for managing black carbon.
- 39. The Environment Act 2021 alters the statutory obligations for local government with respect to air quality management. Local authorities will be given a new responsibility to take action to reduce levels of PM_{2.5} once new targets are set.
- 40. This proposal is to commission work to understand the exact proportion of PM_{2.5} generated locally and how it can be most effectively controlled. This will assist in the formulation of a new action plan required by the Environment Act 2021.
- 41. As the dominant type of local PM_{2.5} is likely to be black carbon, and this type of particle is considered to have a significant impact on health, targeting this pollutant locally will have the most effective health outcomes. Black carbon is also a strong climate warming agent so this approach will have a positive effect on climate action.

Appendices

Appendix 1: Maps of annual average nitrogen dioxide across the Square Mile during 2020 and 2019

Reference

[WHO Air Quality Guidelines 2005](#)

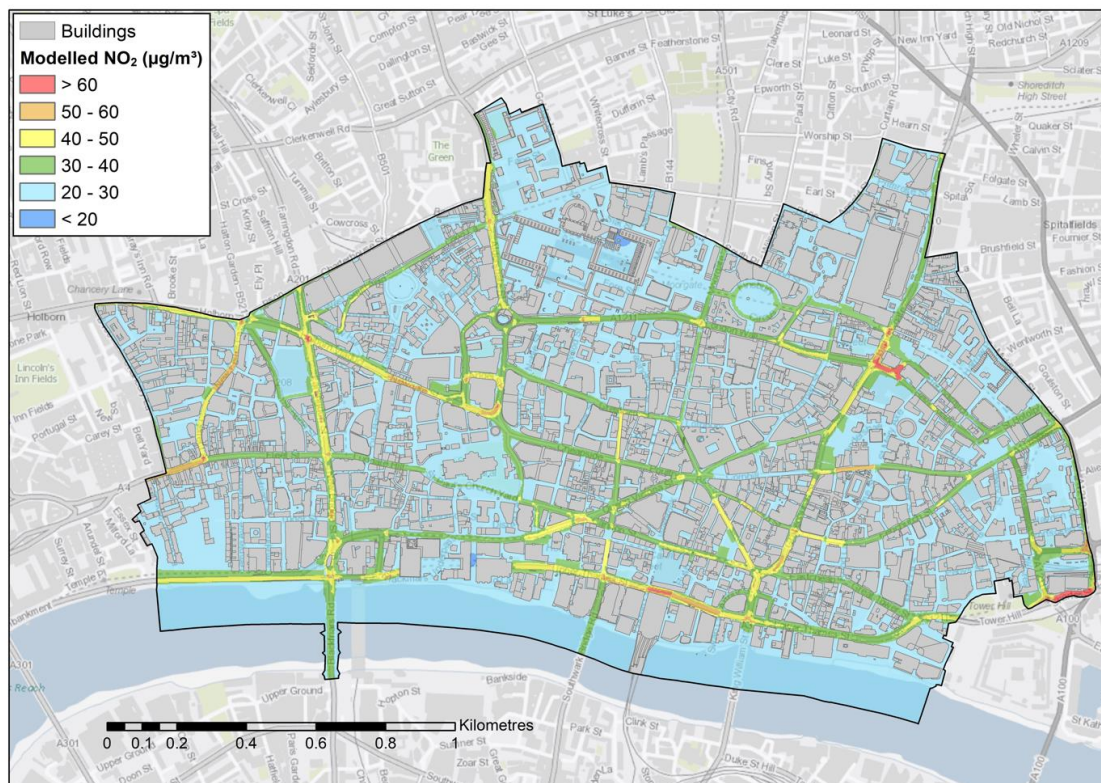
[WHO Air Quality Guidelines 2021](#)

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Appendix 1

Annual average nitrogen dioxide across the Square Mile, 2020, with reference to the WHO air quality guidelines and interim targets



Annual average nitrogen dioxide across the Square Mile, 2019, for comparison

