

Our proposals to help improve air quality, tackle the climate emergency, and reduce congestion by expanding the ULEZ London-wide and other measures

May 2022

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1. Background and overview

Purpose of this document

This document provides information on our proposals to help improve air quality, tackle climate change and reduce congestion, including:

- expanding the Ultra Low Emission Zone (ULEZ) scheme London-wide;
- making changes to Auto Pay for the Congestion Charge, ULEZ and Low Emission Zone (LEZ); and
- making changes to the Penalty Charge Notice level for the Congestion Charge and ULEZ.

The Mayor is also proposing to revise his Transport Strategy (MTS) to set out the triple challenges of toxic air pollution, the climate emergency and congestion that London is facing, notwithstanding achievements in delivering existing MTS policies and proposals. A new proposal would reinforce the importance of seeking to address these challenges and the role of road user charging including a London-wide ULEZ in doing so.

Information about why the proposals have been developed, the expected impacts on traffic and emissions as well as a summary of the potential wider impacts, including impacts on public health as identified in the Integrated Impact Assessment (IIA) are set out in the following sections.

This document also provides information on the long-term challenges facing London and how we are starting to explore the potential for future road user charging in the Capital.

Background to the proposed changes

As of the date of this consultation, the London Low Emission Zone (LEZ) applies London-wide. However, the ULEZ only applies in central and inner London.

The original ULEZ in central London was implemented in April 2019 and later expanded to inner London in October 2021. In March 2021 TfL also tightened the Low Emission Zone (LEZ) standards for heavy vehicles, which apply London-wide. These schemes have contributed to the triple challenge of reducing transport emissions to protect the health of Londoners, achieving net zero carbon emissions by 2030 and cutting congestion.

However, air quality remains a challenge, including in outer London. In September 2021, the World Health Organization (WHO) updated its recommended guidelines for air

pollutants¹ reflecting the overwhelming evidence of the health impacts of air pollution, even at low levels.

In 2019, there were around 4,000 premature deaths in London related to air pollution. The greatest number of those premature deaths were in London's outer boroughs, where the ULEZ doesn't currently apply. This is because even though pollution is lower in the outer boroughs, there is a higher proportion of older people in these areas, who are more vulnerable to the impacts of air pollution.² Over 500,000 Londoners suffer from asthma and are vulnerable to the effects of highly polluted air, with more than half of these people living in outer London. There has also been a slower rate of improvement in air quality in outer London than in central and inner London.

On 18 January 2022, the Mayor announced four potential approaches to address toxic air pollution, the climate emergency and traffic congestion in London. The approaches that were under consideration by the Mayor were:

- Extending the ULEZ London-wide with the current vehicle charge levels and emissions standards.
- Extending the ULEZ London-wide and adding a small clean air charge for all but the cleanest vehicles.
- A small, London-wide, clean air charge for all but the cleanest vehicles.
- A Greater London boundary charge for non-London registered vehicles entering Greater London.

After considering the options, on 4 March 2022 the Mayor of London, Sadiq Khan announced that he had asked Transport for London (TfL) to consult on the first option: expanding the current ULEZ London-wide in 2023 because this would strike the right balance between maximising the health and environmental benefits for Londoners while minimising the impacts on drivers. In addition, he said that the long-term and fairest solution to these challenges will ultimately be a more sophisticated form of road user charging, designed to be simple and fair for customers. This would enable all existing road user charges, such as the Congestion Charge and ULEZ, to be replaced. He asked TfL to start exploring how this concept could be developed, while acknowledging that it is still many years away from being ready to implement such a scheme.

¹ [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health#:~:text=Guideline%20values,-NO&text=The%20current%20WHO%20guideline%20value,effects%20of%20gaseous%20nitrogen%20dioxide.](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health#:~:text=Guideline%20values,-NO&text=The%20current%20WHO%20guideline%20value,effects%20of%20gaseous%20nitrogen%20dioxide.)

² <https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/health-burden-air-pollution-london>

In the meantime, while our aim is to tackle each of the triple challenges of air pollution, climate emergency and traffic congestion, ULEZ expansion in the near term is expected to be effective in addressing air quality, as well as having secondary benefits for carbon and congestion.

Overview of proposed changes

The proposals that form this consultation are:

- An extension of the ULEZ London-wide from 29 August 2023 with charge levels for vehicles not meeting minimum emission standards (ULEZ Charges), hours, days and emission standards set at the same level as the current scheme. Certain vehicles in the 'disabled' and 'disabled' passenger tax class, wheelchair accessible private hire vehicles and minibuses used for community transport will benefit from an extended 'grace period'³.
- Removal of annual £10 per vehicle Auto Pay registration fee for the ULEZ, Congestion Charge and LEZ in January 2023 (Auto Pay allows owners to set up an account so they automatically pay the relevant charge and so will not incur a penalty for non-payment).
- Increase the Penalty Charge Notice (PCN) level from £160 to £180 for non-payment of the ULEZ and Congestion Charge from January 2023. This charge is reduced by 50 per cent if paid in 14 days.
- A revision to the current 2018 Mayor's Transport Strategy (MTS), which would support the proposed London-wide extension of the ULEZ.

We would like your views on these proposals and on shaping any potential future of road user charging scheme. A summary of the consultation and a questionnaire can be found [here](#).

³ A grace period provides additional time for vehicles who do not currently meet the standard to meet the relevant (Euro) standard, without incurring a charge

Structure of this document

This document is in eight chapters:

- **Chapter 1** provides the context and background to the Mayor's air quality proposals.
- **Chapter 2** covers the rationale for improving air quality, tackling climate change and reducing traffic congestion in London.
- **Chapter 3** discusses the history of the ULEZ scheme and previous consultations undertaken on the scope and implementation of the scheme.
- **Chapter 4** describes the case for the proposed London-wide extension of the ULEZ scheme in reducing emissions and meeting the Mayor's objectives.
- **Chapter 5** details how proposals have been developed and shaped including how the options have been assessed.
- **Chapter 6** discusses the impact of the proposals and how these have been assessed.
- **Chapter 7** discusses shaping the future of road user charging
- **Chapter 8** outlines the next steps.

2. Triple challenges: air pollution, climate emergency and traffic congestion

The Mayor's Transport Strategy (MTS), published in 2018, sets out his vision to create a fairer, greener, healthier and more prosperous London. A shift away from car travel in favour of walking, cycling and public transport will be critical to realising this vision and that is why the central aim of the strategy is for 80 per cent of all trips in London to be made on foot, by cycle or using public transport by 2041. This will support "Good Growth", which works to re-balance development in London towards more genuinely affordable homes, reduce car dependency and create a more sustainable and socially integrated city. Achieving the aims of the MTS must start with an ambitious approach to London's streets, as that is where most travel happens.

The coronavirus pandemic and its impact on our lives over the past two years has changed our relationship with our streets, our neighbourhoods and our city. During the lockdowns of 2020 and 2021, as traffic levels fell, Londoners experienced their local areas from a new perspective. With reduced capacity on public transport due to social distancing, we became more reliant on walking and cycling for our trips as well as our leisure time. We witnessed the impact of reduced traffic on air quality, severance (where destinations that are geographically close cannot be reached easily), noise, and the general experience of our local areas.

As we begin to move on from the worst stages of the pandemic, we face three major challenges in London:

- While we have seen significant progress in reducing harmful **air pollution** over the past decade, we know that we need to go further to protect human health
- It has become clear that we are facing a **climate emergency**, and that the impacts of extreme weather can affect us all
- We have also seen **traffic congestion** return as London returns to business as usual with costs to the economy and our quality of life

Air pollution

88 per cent of state schools in London are in areas where air pollution exceeds WHO interim targets⁴

In 2019 toxic air is estimated to have contributed to the premature deaths of around 4,000 Londoners⁵

The Mayor has a duty to achieve the legal limits for air pollutants in Greater London.

Air pollution has a negative impact on the health of Londoners. It has a disproportionate impact on more vulnerable and deprived people. There is also growing evidence linking exposure to air pollution with the worst effects of coronavirus: exposure to air pollution before the pandemic increases the risk of hospital admissions from coronavirus, as well as other lung infections such as pneumonia and bronchitis.⁶ The two pollutants causing the greatest concern, based on their impact on human health, are⁷:

- Nitrogen dioxide (NO₂): At high concentrations, NO₂ causes inflammation of the airways. Long-term exposure is associated with an increase in symptoms of bronchitis in asthmatic children and reduced lung development and function.
- Particulate matter (PM): Long-term exposure contributes to the risk of developing cardiovascular and respiratory diseases, including lung cancer. Research shows that particles with a diameter of 10 microns and smaller (PM₁₀) are likely to be inhaled deep into the respiratory tract. The health impacts of particles with a diameter of 2.5 microns or smaller (PM_{2.5}) are especially significant as smaller particles can penetrate even deeper.

In 2020, TfL and the Greater London Authority (GLA) commissioned researchers from the Environment Research Group (ERG) at Imperial College London to assess the impact on health of the Mayor's air quality policies, and air pollution in London, using current (2019) and future levels of air pollution up to 2050 (projected from 2013). Their key findings were

⁴ LAEI 2019: <https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2019>. The lowest WHO interim target for PM_{2.5} is 10 µg/m³

⁵ [Health burden of air pollution in London, Imperial College, 2021: https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/health-burden-air-pollution-london](https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/health-burden-air-pollution-london)

⁶ Investigating links between air pollution, COVID-19 and lower respiratory infectious diseases, Imperial College London, 2021: <https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/investigating-links-between-air-pollution-and-covid-19>

⁷ <http://www.who.int/mediacentre/factsheets/fs313/en/>

that in 2019, in Greater London, the equivalent of between 3,600 to 4,100 deaths (61,800 to 70,200 life years lost⁸) were estimated to be related to PM_{2.5} and NO₂.

If no further action is taken to reduce air pollution, around 550,000 Londoners will develop diseases related to poor air quality over the next 30 years. In this case the cost to the NHS and social care system in London is estimated to be £10.4 billion by 2050.⁹ The greatest number of deaths related to air pollution¹⁰ are likely to be in outer London boroughs, mainly due to the higher proportion of elderly people in these areas, who are more vulnerable to the impacts of air pollution.¹¹

This is because lung function declines with age and older people are more likely to have co-morbidities. Children are also more vulnerable to breathing in polluted air. Children's airways are smaller and still developing, and they breathe more rapidly than adults. Buggies and prams put small children at the level of car exhausts.

Climate Emergency

Nearly a quarter of London's CO₂ emissions come from cars and goods vehicles¹²

Road traffic in London emits the equivalent CO₂ generated in heating over two million homes for a year¹³

In 2020, the Mayor brought forward his ambition for a net zero carbon London, (where the amount of carbon we produce is no more than the amount taken away) to 2030 in recognition of the scale of the climate emergency. In February 2022, the UN's Intergovernmental Panel on Climate Change (IPCC) warned that global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans¹⁴. Across sectors and regions, the

⁸ The original studies were analysed in terms of 'time to death' aggregated across the population. Strictly, it is unknown whether this total change in life years was from a smaller number of deaths fully attributable to air pollution or a larger number of deaths to which air pollution partially contributed. The former is used with the phrase 'equivalent' to address this issue. See COMEAP (2010) for a fuller discussion

⁹ <https://www.london.gov.uk/press-releases/mayoral/ulez-to-save-billions-for-nhs>

¹⁰ Note that this is not a direct causative relationship at the individual level; it is a collective statistical impact across the population

¹¹ <https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/health-burden-air-pollution-london>

¹² LAEI 2019

¹³ Estimate based on LAEI 2019 (6.4m tonnes CO₂ from road traffic) and ONS average UK home heating emissions (2,806kg CO₂e):

<https://www.ons.gov.uk/economy/environmentalaccounts/articles/covid19restrictionscuthouseholdemissions/2021-09-21>

¹⁴ https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

report concluded that the most vulnerable people and systems are observed to be disproportionately affected by climate change. In urban settings, observed climate change has already caused impacts on human health, livelihoods and key infrastructure.

We have already seen the impact that extreme weather events have had on Londoners and the city's infrastructure. A recent report commissioned by the Mayor found that in order to meet the target of getting to net zero carbon in London by 2030, car vehicle kilometres need to reduce by at least 27 per cent in the Capital by the end of the decade under his preferred pathway¹⁵. This highlights the need to take action to reduce CO₂ emissions. Not doing so will have negative and potentially irreversible consequences for global warming, resulting in rising sea levels and extreme weather conditions. These in turn can have potentially disastrous consequences for human and environmental wellbeing. Due to the Urban Heat Island effect, London can be five degrees hotter than surrounding countryside during the day, and 10 degrees hotter at night. It is estimated that there were over 400 excess deaths in Londoners over 65 years old during the summer 2018 heatwaves.¹⁶

Traffic congestion

Last year the average driver in London lost the equivalent of six days to congestion¹⁷

Nearly two-thirds of the cost of congestion in London can be attributed to delay on the road network in outer London¹⁸

The pandemic has had a significant impact on travel in London over the last two years. The first lockdown, announced in March 2020, led to traffic falling by 65 per cent compared to 2019 levels. However, traffic on London's road network recovered substantially outside of lockdown periods in 2020 and 2021. The recovery of public transport demand was slower, prompting concerns of a car-led recovery. In early April 2022, traffic volumes were around 10 per cent below their pre-pandemic levels, with bus and Underground demand respectively 20 and 30 per cent below pre-pandemic levels.

Cars (regardless of their emissions) take up a lot of road space relative to the number of people they move. The MTS outlines the Healthy Streets Approach, which is designed to put human health and experience at the heart of planning a city. Reducing car dependency

¹⁵ https://www.london.gov.uk/sites/default/files/nz2030_element_energy_final.pdf. The Mayor's preferred pathway is the 'accelerated green' scenario

¹⁶ Heatwave mortality monitoring – Summer 2018, PHE, 2018: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/942648/PHE_heatwave_report_2018.pdf

¹⁷ <https://inrix.com/press-releases/2021-traffic-scorecard-uk/>

¹⁸ [Traffic Note 4: Total vehicle delay for London 2019, TfL 2020](#)

is critical to the success of the Approach, which seeks to avoid streets that are congested, noisy and unpleasant to spend time in.

While a transition from petrol and diesel-fuelled vehicles towards zero-emission vehicles will continue to reduce the adverse impacts of tailpipe emissions, these vehicles still produce non-exhaust particulate emissions (e.g. from tyre and brake wear). Addressing air quality therefore means fewer vehicles, as well as cleaner vehicles, on our streets.

Last year, the cost of traffic congestion in London was estimated at £5.1 billion with the average driver losing 148 hours to congestion per year¹⁹. Nearly two-thirds of the cost of congestion in London can be attributed to delay on the road network in outer London.²⁰ Congestion also delays vital bus services (discouraging passengers to shift to bus usage), as well as delaying essential freight and servicing trips. It also makes public spaces unpleasant for walking and cycling, and worsens air pollution.

¹⁹ <https://inrix.com/press-releases/2021-traffic-scorecard-uk/> This figure does not take into account the cost of congestion on bus passengers and bus operating costs.

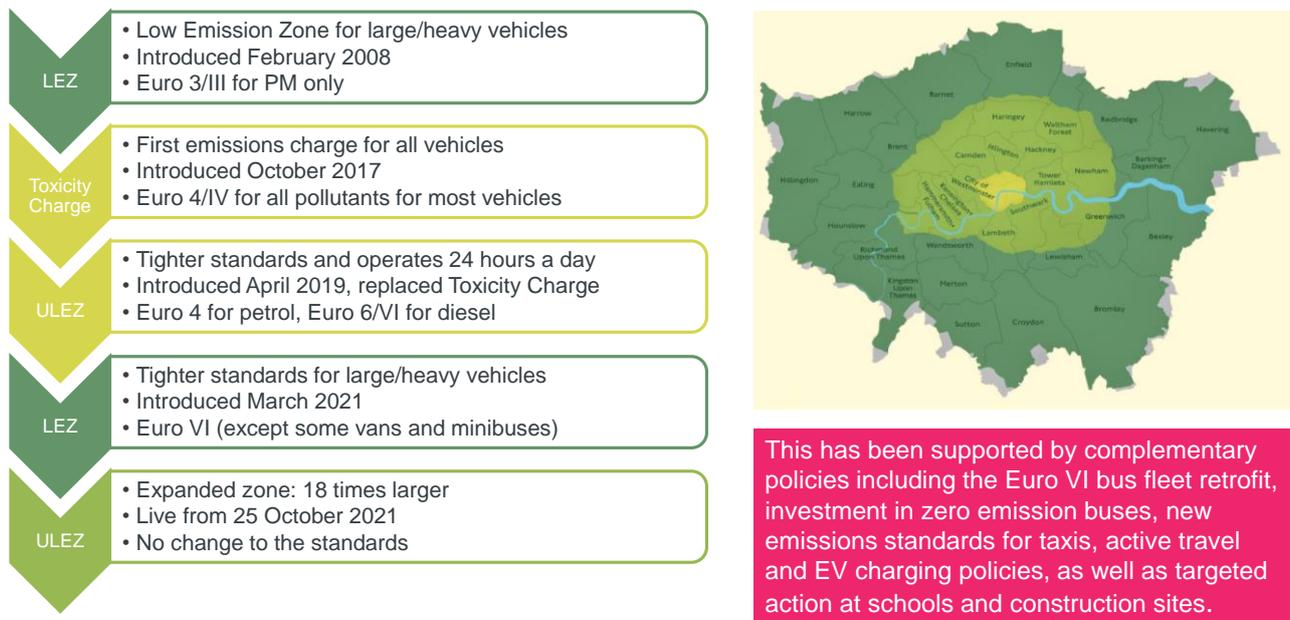
²⁰ Traffic Note 4: Total vehicle delay for London 2019, TfL 2020

3. The Ultra Low Emission Zone

History of low emission zones

There have been progressive policies for low emission zones in London, beginning with a focus on heavy vehicles before moving to light vehicles, these are summarised in Figure 1 below.

Figure 1: Policies for low emission zones



The Low Emission Zone (LEZ) for large/heavy vehicles was introduced in February 2008, first requiring heavy goods vehicles over 12 tonnes to meet the Euro III for PM standard, with more vehicle types included and progressively tighter emission standards over time. It covers most of Greater London and operates 24 hours a day, every day of the year including weekends and public holidays. Vehicles need to meet the LEZ emissions standards or pay a daily charge. A map of the LEZ area is shown in Figure 1. It is proposed that the London-wide ULEZ uses the same boundary as the current LEZ.

The first emissions charging scheme to include cars and small vans, was the Toxicity Charge (T-Charge). It was confirmed by the Mayor in February 2017. The T-Charge operated Monday to Friday from 7am – 6pm and mandated a £10 T-Charge on top of the Congestion Charge for motorists driving a pre-Euro 4 vehicle in central London.

Following this, on 8 April 2019 the Mayor launched the world's first ULEZ in central London, replacing the T-Charge with tighter emission standards²¹ and operating 24 hours a day and seven days a week.

Under the ULEZ scheme, cars, motorcycles, vans and other specialist vehicles (up to and including 3.5 tonnes) and minibuses (up to and including 5 tonnes) must meet the following minimum exhaust emission standards to travel within the zone or they are required to pay a daily ULEZ charge of £12.50:

- Euro 3 (NO_x) for motorcycles, mopeds, motorised tricycles and quadricycles.
- Euro 4 (NO_x) for petrol cars, vans and other specialist vehicles, up to and including 3.5 tonnes gross vehicle weight (GVW) and minibuses, up to and including 5 tonnes GVW.
- Euro 6 (NO_x and PM) for diesel cars, vans and other specialist vehicles, up to and including 3.5 tonnes GVW and minibuses, up to and including 5 tonnes GVW.

At the launch of the ULEZ in central London, HGVs, vans and specialist heavy vehicles over 3.5 tonnes GVW, as well as buses, coaches and minibuses over 5 tonnes GVW were required to meet Euro VI (NO_x and PM). These vehicles are also subject to London-wide Low Emission Zone (LEZ) standards across Greater London.

On 1 March 2021, the Mayor tightened LEZ standards across London for heavy vehicles with HGVs, buses and coaches required to meet the ULEZ, Euro VI (NO_x and PM) emissions standards or pay a daily charge.

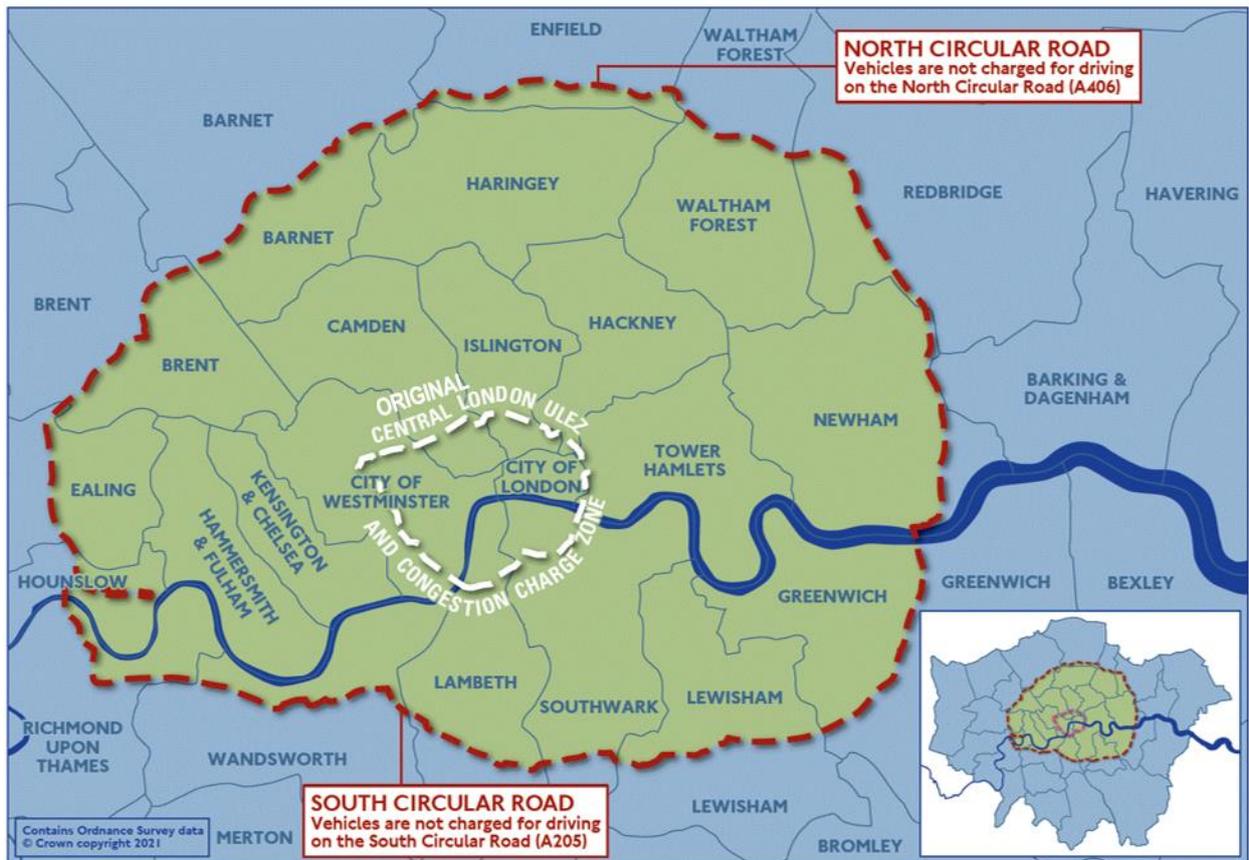
The LEZ daily charge is £100 for heavy vehicles that do not meet Euro VI (NO_x and PM) but meet Euro IV (PM), £300 for heavy vehicles that do not meet Euro IV (PM) and £100 for larger vans (up to 3.5t GVW) and minibuses that do not meet Euro 3. If the standards are not met and a LEZ charge is not paid, a penalty charge notice may be issued. The LEZ penalty charge is £1,000 for heavy vehicles that meet Euro IV (PM) but do not meet Euro VI (NO_x and PM), £2,000 for heavy vehicles that do not meet Euro IV (PM) and £500 for larger vans and minibuses (reduced to £500, £1,000 and £250 respectively if paid within 14 days).

On 25 October 2021, the Mayor expanded the ULEZ from central to inner London: up to, but not including, the North and South Circular Roads. The zone is now 18 times larger

²¹ As a basis TfL's scheme uses the standardised European "Euro" emissions standards rating as the basis for measuring and defining a vehicle's exhaust emissions. They are used to define the acceptable limits for exhaust emissions under ULEZ and LEZ. Euro standards for light vehicles use an Arabic numeral (e.g. Euro 5); those for heavy vehicles use a Roman numeral (e.g. Euro V).

than before with nearly four million people living in the zone. Measuring 380km², it covers one quarter of London and is the largest zone of its kind in Europe. A map showing the current inner London area of the ULEZ is shown in Figure 2.

Figure 2: Existing ULEZ



A map showing the LEZ boundary and evolution of the ULEZ scheme is shown below in Figure 3.

Figure 3: Current LEZ and ULEZ boundary

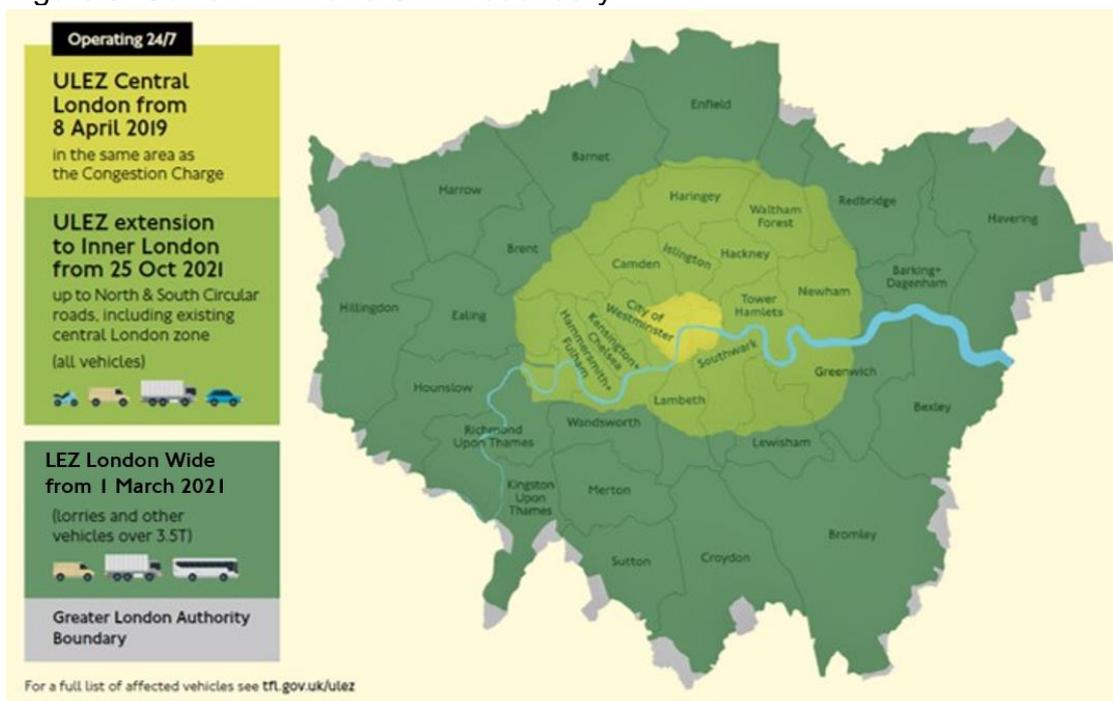


Table 1 summarises the way emissions standards have changed for large and heavy vehicles.

Table 1: Emissions standards for large and heavy vehicles over time

Date	LEZ standards: London wide		T-charge/ULEZ standards: central London	
	Standard for HGVs, buses and coaches	Standard for larger vans and minibuses	Standard for HGVs, buses and coaches	Standard for larger vans and minibuses
2008*	Euro III (PM only)	N/A	N/A	N/A

January 2012	Euro IV (PM only)	Euro 3 (PM only)	N/A	N/A
October 2017			Euro IV (PM and NO _x)	Euro 4 (PM and NO _x)**
April 2019			Euro VI (PM and NO _x)	Euro 4 for petrol vehicles and Euro 6 for diesel (PM and NO _x)***
March 2021	Euro VI (PM and NO _x)		N/A	

*February 2008 for HGVs over 12 tonnes, July 2008 for HGVs over 3.5 tonnes, buses and coaches

** T-charge standards for larger vans and minibuses were petrol Euro 4 (NO_x only) and diesel Euro 4 (PM and NO_x). The standards were only applied during congestion charge hours (Monday – Friday 7am – 6pm)

*** On 25 October 2021 the ULEZ expanded up to the North and South Circular Roads. The standards remained the same.

There are a small number of exemptions to the ULEZ charges for the following vehicle types:

- Military vehicles
- Showman's vehicles
- Vehicles not constructed or adapted for general use on the roads (e.g. mobile cranes)
- Historic tax class vehicles or vehicles constructed prior to 1 January 1973
- London-licensed taxis, as they are subject to separate emissions standards

For a temporary period (sometimes known as a 'grace period' or a 'sunset period') some vehicle types not meeting the ULEZ emissions standards do not pay any charges, giving them longer to meet them:

- Vehicles with 'disabled' and 'disabled passenger vehicle' tax class
- Minibuses operated by not-for-profit organisations
- Wheelchair accessible Private Hire Vehicles (PHVs)

NHS patients who are clinically assessed as too ill, weak or disabled to travel to an appointment on public transport, or at moderate or at high risk of coronavirus during a

pandemic, can claim back any ULEZ charge and Congestion Charge paid for journeys to receive NHS treatment. Claims are reimbursed by participating NHS Trusts.

The Mayor provided £61m of funding in various stages from February 2019 for a vehicle “scrappage scheme”, targeted at small businesses, charities, Londoners on low incomes and disabled Londoners, to help them adapt to the ULEZ, resulting in the removal of over 15,200 polluting non-ULEZ standards compliant vehicles from London’s roads. The scheme closed on 24 November 2021 after all funding was claimed.

Table 2: Scrappage scheme data

Vehicle type	Grant level	Vehicles scrapped
Cars	£2,000	9,660
Motorcycles	£1,000	52
Vans and minibuses	£7,000 to scrap, or scrap and replace with a Euro 6 vehicle £9,500 to scrap and replace with an electric vehicle	5,200
HGVs, buses or coaches	£15,000 to scrap or retrofit	123 (11 retrofits)

Previous ULEZ consultations

Each development of the ULEZ scheme has been the subject of consultation with stakeholders and the public. These have shaped the development of the scheme today. Table 3 details the previous consultations on ULEZ and outlines their purpose and dates.

Reports and documentation for all consultations can be found here: <https://tfl.gov.uk/corporate/publications-and-reports/ultra-low-emission-zone>.

Table 3 Previous ULEZ public and stakeholder consultations

Date of Consultation	Purpose

27 October 2014 – 9 January 2015	The first public consultation on the ULEZ in central London. After considering the feedback from the consultation, the previous Mayor approved the proposal for the Ultra Low Emission Zone (ULEZ) which would have set new exhaust emissions standards and a daily non-compliance charge to encourage cleaner vehicles to drive in central London from September 2020. This was confirmed in March 2015.
1 July 2015 - 25 August 2015	Consultation on updated ULEZ taxi and PHV licensing proposals, which were confirmed in October 2015.
5 - 29 July 2016	The current Mayor (elected May 2016) launched an engagement exercise on the Talk London website on initial ideas to tackle air quality in line with his manifesto commitments to bring forward the start of ULEZ in central London and to extend it to inner London ²² .
10 October–18 December 2016	Consultation proposals to introduce the Emissions Surcharge (T-Charge) and how ULEZ could be improved, including the potential to bring forward the start date of the ULEZ in central London and expanding it to inner London.
4 April–25 June 2017	Consultation on proposals to introduce the central London ULEZ in April 2019, 16 months earlier than originally planned. It also included proposals to strengthen the ULEZ emissions standards to include particulate matter.
21 June 2017 - 2 October 2017	Consultation on Mayor's Transport Strategy, including proposals for the early introduction of ULEZ and its expansion covering inner London
30 November 2017 – 28 February 2018	Consultation on proposals to tighten the Low Emission Zone (LEZ) heavy vehicle standards (London-wide) from 26 October 2020 ²³ and to extend the ULEZ from central to inner London from 25 October 2021.
20 May 2022 – 29 July 2022	This consultation on the proposal to extend the ULEZ to apply London-wide

²² See <http://data.london.gov.uk/dataset/clean-air-consultation-july-2016>

²³ This was subsequently delayed until 1 March 2021

Impacts of the previous and current LEZ and ULEZ schemes

Low Emission Zone

It has been hugely successful in reducing PM emissions from heavy vehicles and helped to bring London into compliance with PM₁₀ legal limits, as well as reducing NO_x emissions. The LEZ was assessed to have reduced emissions from London vehicles including significant reductions of emissions from London's buses, together these contributed to London's ability to meet legal limits for PM₁₀.

Central London ULEZ

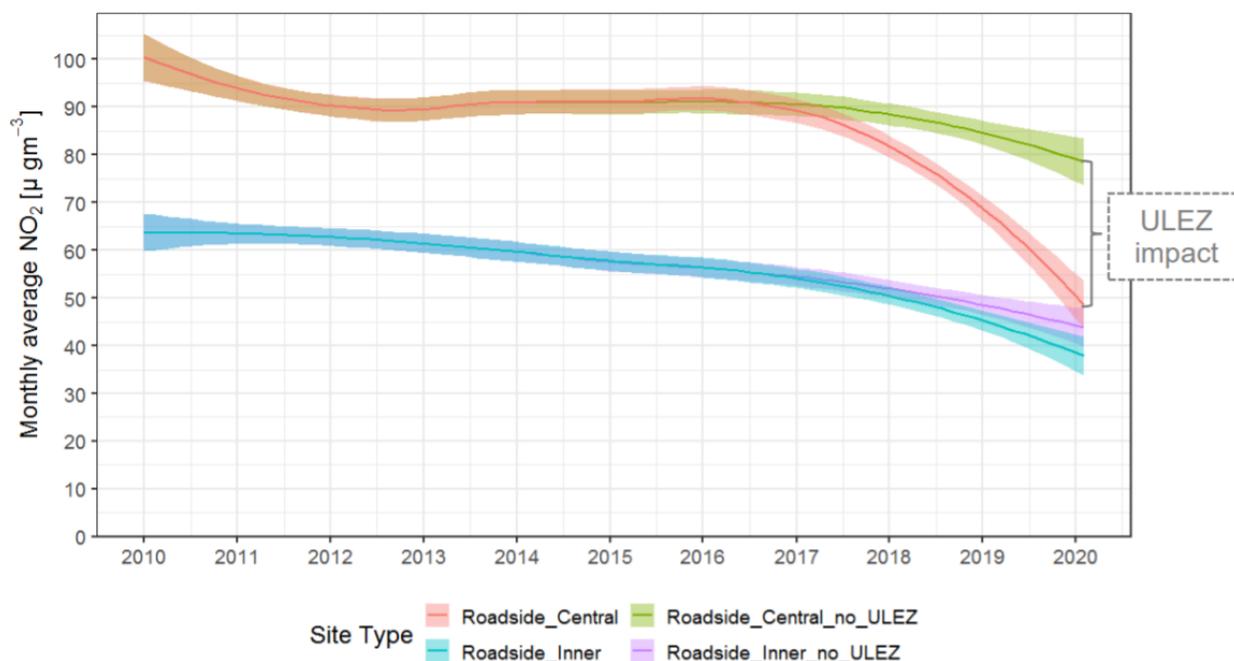
Following the introduction of the ULEZ in central London in April 2019, there have been considerable improvements in air quality both within and outside the central zone. The compliance rate is the percentage of vehicles detected in the zone that meet the emission standard.

In February 2017, when the scheme was first announced, the compliance rate was 39 per cent. Immediately before the ULEZ came into force (March 2019), the compliance rate had risen to 61 per cent (during congestion charging hours). By January 2020 the compliance rate in congestion charging hours was 77 per cent. There was also a reduction in the total volumes of non-compliant vehicles entering the zone. From March 2019 to January 2020, there was a 49 per cent reduction in the total number of non-compliant vehicles detected in the zone in congestion charging hours.²⁴

Concentrations of NO₂ at roadside sites in the central zone in February 2020 were 39 µg/m³ less than in February 2017, which is a reduction of 44 per cent. Figure 4 shows the impact of the ULEZ on NO₂ trends at roadside sites.

²⁴ Central London ULEZ- Ten Month Report
<https://tfl.gov.uk/corporate/publications-and-reports/ultra-low-emission-zone>. Congestion Charging hours were 7am – 6pm on weekday from March 2019 to January 2020

Figure 4: Trends in NO₂ in central and inner London compared to a no ULEZ scenario



The reduction in NO₂ in the central zone contributed to a reduction in the number of state schools in areas exceeding limits for NO₂ from 450 in 2016 to just 20 in 2019²⁵.

Inner London ULEZ (current scheme)

The expansion of the ULEZ to inner London (up to the North and South Circular Roads) in October 2021 extended the benefits of the central London scheme. TfL had already ensured in January 2021 that the main bus network met the same emissions standard as the ULEZ – all buses in operation were Euro VI or cleaner.

Compliance two weeks prior to launch was 87 per cent compared to 39 per cent in February 2017 when the plans for the larger area were first announced. This huge rate of pre-commencement compliance was in part the result of TfL's far reaching information campaign to raise awareness of the scheme before it came into operation. More than one million letters were sent to those seen driving in the area with non-compliant vehicles and more than 600,000 leaflets were sent to residents living close to the boundary. Four million emails were sent to people on TfL's customer database, and there was an extensive advertising campaign spanning radio, TV, posters, press, social media and online.

²⁵ <https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2019>

The benefits continued to increase once the scheme was in operation. The Expanded ULEZ First Month Report stated that compliance increased to 92 per cent in its first month of operation. Also, compared to two weeks before expansion there was a 37 per cent reduction in non-compliant vehicles, equating to 47,000 fewer non-compliant vehicles per day.²⁶

On an average weekday there were also 11,000 fewer vehicles driving each day in the zone. This equates to a one per cent reduction although it will take more time for settled traffic patterns to emerge post-launch and these will be further reported on in future.

Interaction with road user charging schemes

Congestion Charge

The Congestion Charge aims to reduce congestion within a specified area of central London. The charge operates between 07:00 and 18:00 on weekdays and between 12:00 and 18:00 at weekends and on bank holidays. There is no charge between Christmas Day and New Year's Day bank holiday (inclusive). The charge is currently set at £15. A map of the Congestion Charge Zone (CCZ) is shown in figure 5.

²⁶ https://www.london.gov.uk/sites/default/files/ulez_first_month_report_december_2021.pdf

Silvertown and Blackwall Tunnel Schemes

As part of the delivery of the Silvertown Tunnel, which is scheduled to open in 2025, drivers will pay a charge for using the Blackwall and Silvertown Tunnels. The exact charge levels for various types of vehicles using the new tunnel will be decided closer to the opening date, in accordance with the conditions set out in the Development Consent Order (DCO), which enables the construction of the Silvertown Tunnel.

This user charge will pay for building and maintaining the tunnel - but its main purpose is to manage traffic levels and the associated environmental, social and economic impacts. This is a legal requirement set out in the DCO. Any surplus revenue will be reinvested in delivery of the MTS.

4. Case for new proposals

The Mayor's Transport Strategy

The Mayor's Transport Strategy (MTS), published in March 2018, outlines the Mayor's vision for transport in London, and sets out the policies and proposals that will contribute to achieving it. The overarching aim of the MTS is to reduce Londoners' dependency on cars and to increase the active, efficient and sustainable (walking, cycling and public transport) mode share of trips in London to 80 per cent by 2041. An increase in the number of journeys made by sustainable modes, alongside a reduction in private car use, will not only support the overarching aim of the MTS but is also key to addressing poor air quality, the climate emergency and traffic congestion.

The MTS sets out the Mayor's objective to reduce harmful air pollution from road transport. It explains that air pollution can exacerbate health conditions and shorten the lives of Londoners. It further notes that the communities suffering the most from poor air quality are often the most vulnerable in society. The ULEZ contributes to addressing these challenges and is supported by policies set out in the MTS.

Policy 6 of the MTS states:

"The Mayor, through TfL and the boroughs, and working with stakeholders, will take action to reduce emissions – in particular diesel emissions – from vehicles on London's streets, to improve air quality and support London reaching compliance with UK and EU legal limits as soon as possible. Measures may include retrofitting vehicles with equipment to reduce emissions, promoting electrification, road charging, the imposition of parking charges/levies, responsible procurement, the making of traffic restrictions/regulations and local actions."

The MTS also has a proposal which relates directly to the ULEZ, Proposal 24, which states:

The Mayor, through TfL will seek to introduce the central London Ultra Low Emission Zone (ULEZ) standards and charges in 2019, tighter emissions standards London-wide for heavy vehicles in 2020, and an expanded ULEZ covering inner London in 2021.

Proposal 24 has, in effect, served its purpose with each of the measures mentioned having been implemented. It does not provide for the extension of ULEZ London-wide which is one of the proposals being consulted on.

TfL and the Mayor have taken account of the effects of the existing ULEZ and the tightened LEZ standards as well as the need to go further to address the triple challenges faced by Londoners when developing new proposals.

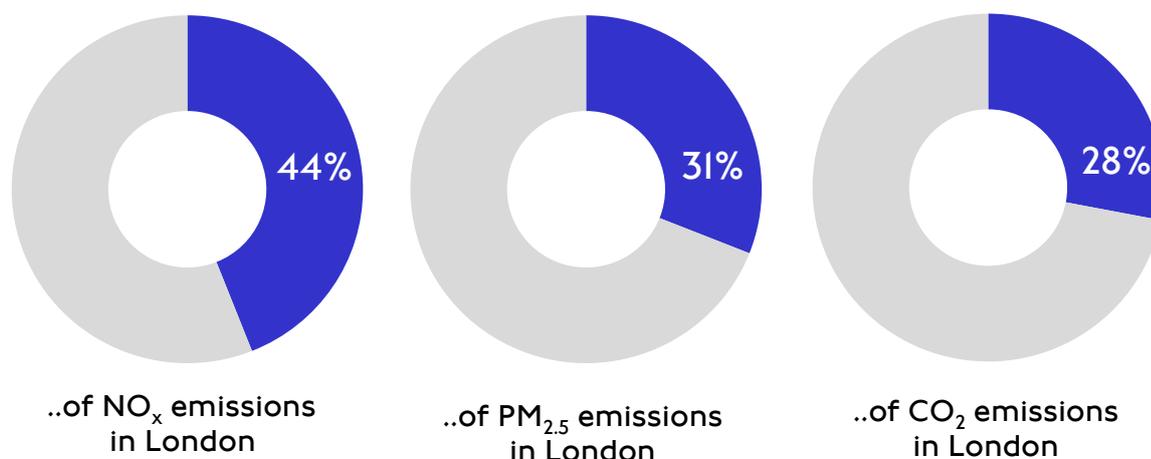
Therefore, as part of this consultation we are seeking views on making a limited amendment to the MTS to provide for a new proposal that will help London take the next steps in addressing the triple challenges and achieving the MTS' overarching aims. Further detail on this is provided below and the proposed revision is a separate document on the consultation website, which can be found [here](#).

Reducing vehicle emissions and resulting pollution

The challenges of air pollution, climate change and traffic congestion mean we need to urgently reduce road transport emissions and traffic in London. Despite recent improvements in air quality, air pollution in London remains the biggest environmental risk to the health of all Londoners.

Figure 6 Road transport emissions as a proportion of total emissions

Road transport accounts for...



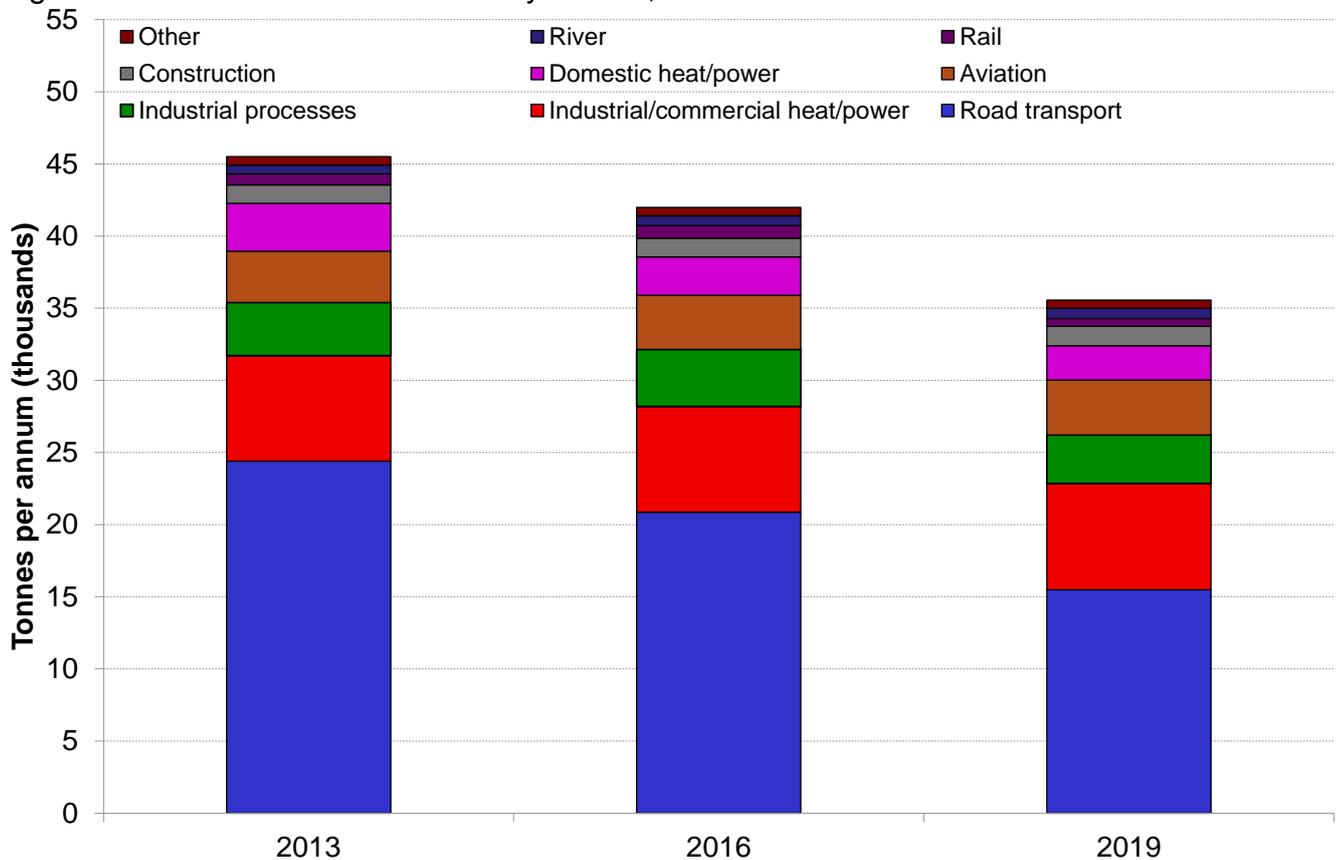
Source: London Atmospheric Emissions Inventory (LAEI), 2019

London-wide NO_x emissions decreased by 18 per cent between 2016 and 2019. The main reduction in emissions came from road transport, which were 31 per cent lower in 2019 compared to 2016. However, road transport remains the predominant source of NO_x emissions in London (figure 7).

Between 2016 and 2019, PM_{2.5} emissions from road transport reduced by 14 per cent. This is higher than the overall reduction in PM_{2.5} emissions from all combined sources over the same time period (a reduction of five per cent). However, road transport still contributes a substantial proportion of PM_{2.5} emissions. In 2016, road transport accounted for 33 per cent of PM_{2.5} emissions and in 2019 this had only fallen slightly to 31 per cent.

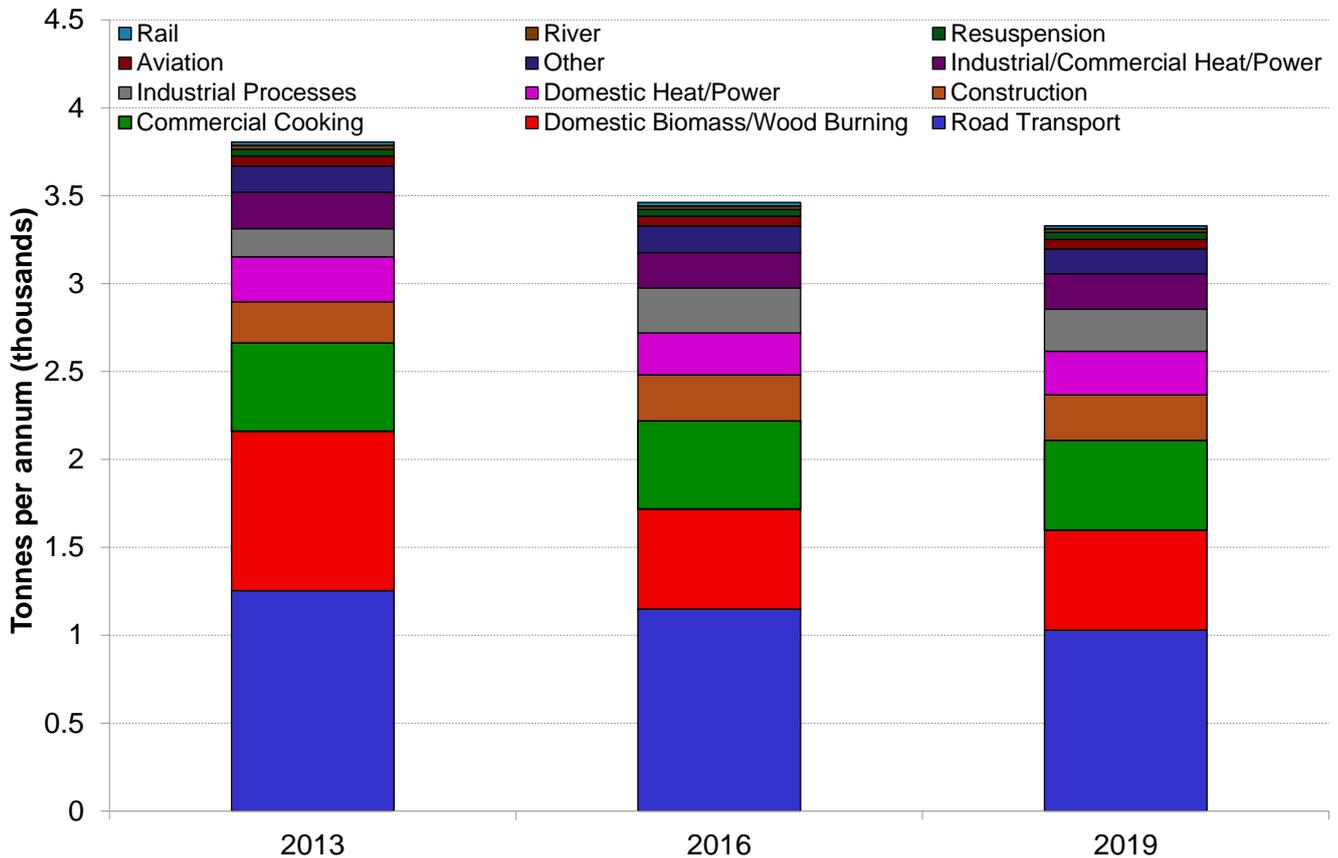
The expansion of the ULEZ to the North and South Circular Roads, along with cleaning up the bus and taxi fleets are expected to reduce PM_{2.5} emissions from road transport. However, the dominant proportion of road transport emissions are now non-exhaust emissions including tyre and brake wear along with road wear and resuspension of particles as vehicles travel on roads, which also contributes to London's particulate emissions. Therefore, it is essential to also reduce the number of trips made by motor vehicles and enable more walking, cycling and public transport where possible (modal shift).

Figure 7: NO_x emissions in London by source, 2013-2019



Source: LAEI

Figure 8: PM_{2.5} emissions in London by source, 2013-2019



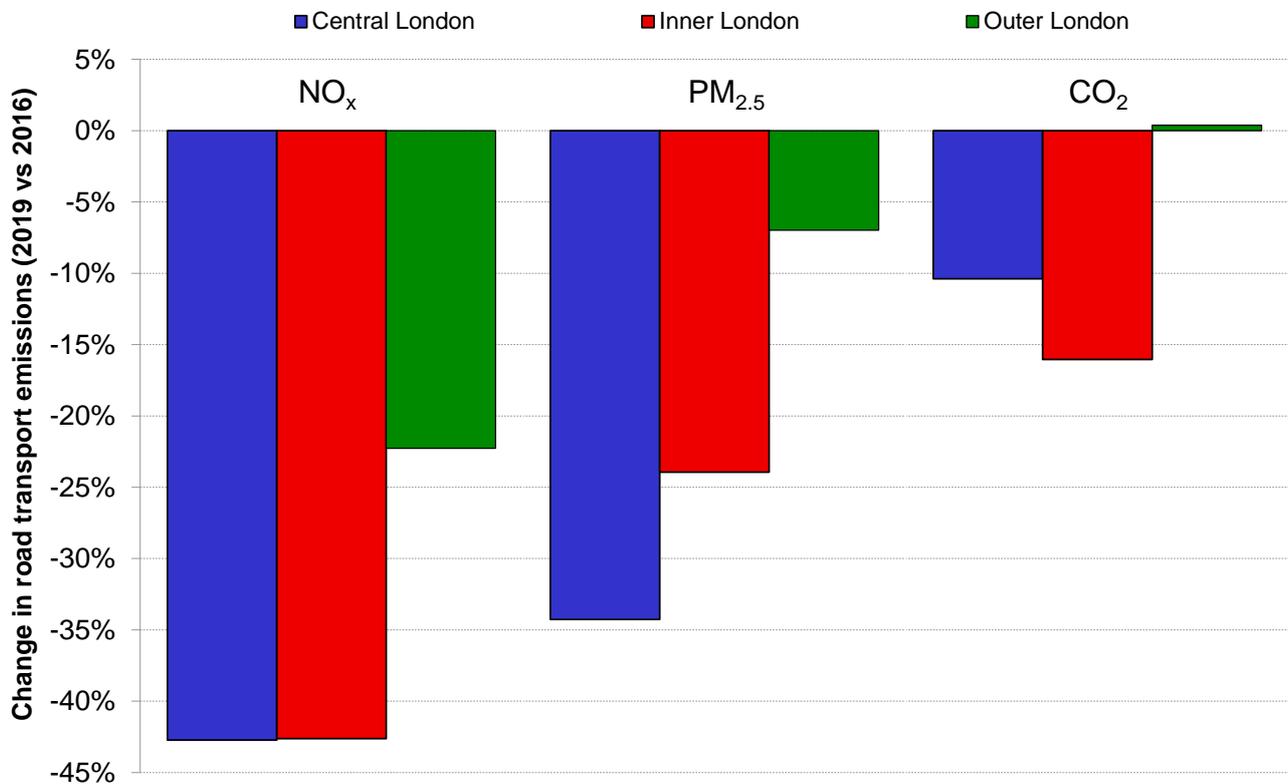
Source: LAEI

Emissions in outer London

The reduction in NO_x emissions from road transport since 2013 has not happened equally across London. Inner London road transport NO_x emissions halved between 2013 and 2019. Comparatively, outer London NO_x emissions from road transport fell by 31 per cent over the same time period, and in 2019 accounted for 28 per cent of London-wide NO_x emissions. Similarly, PM_{2.5} emissions from road transport fell by almost a quarter in inner London between 2016 and 2019, whereas in outer London they fell by seven per cent. As a result, outer London therefore accounts for an increasing proportion of NO_x, PM_{2.5} and CO₂ emissions from road transport and more needs to be done to ensure improvements in air quality are felt by all Londoners. In 2019, outer London accounted for 64 per cent of London-wide road transport NO_x and CO₂ emissions, and 65 per cent of London-wide road transport PM_{2.5} emissions.

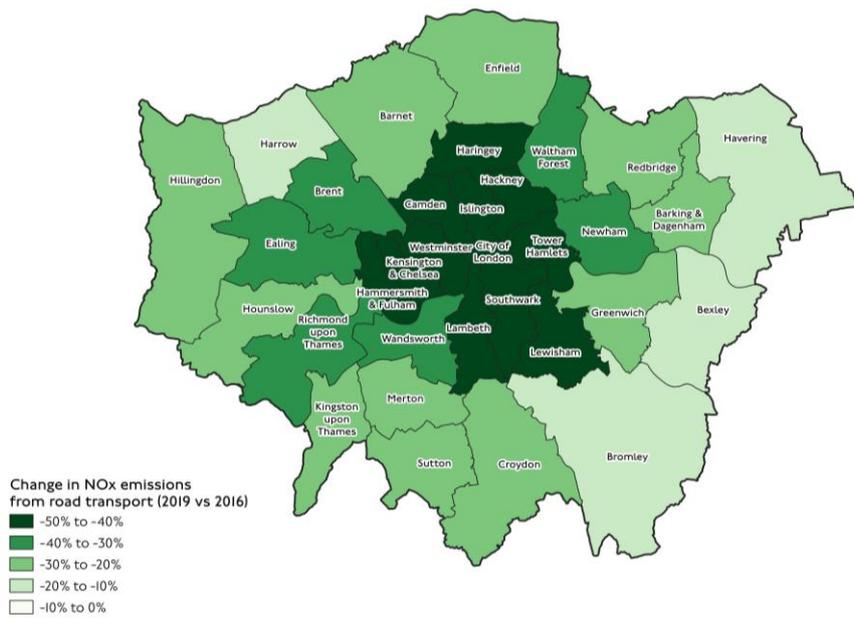
Figure 9 shows the success of schemes to improve air quality in central and inner London between 2016 and 2019; however, this also demonstrates that reductions in toxic emissions in outer London have been slower than in the rest of London. Reductions in NO_x, PM_{2.5} and CO₂ emissions from road transport between 2016 and 2019 are shown by borough in figures 10 to 12, further demonstrating the disparity in emissions improvements between inner and outer London.

Figure 9: Change in NO_x, PM_{2.5} and CO₂ emissions from road transport by spatial area, 2019 vs 2016



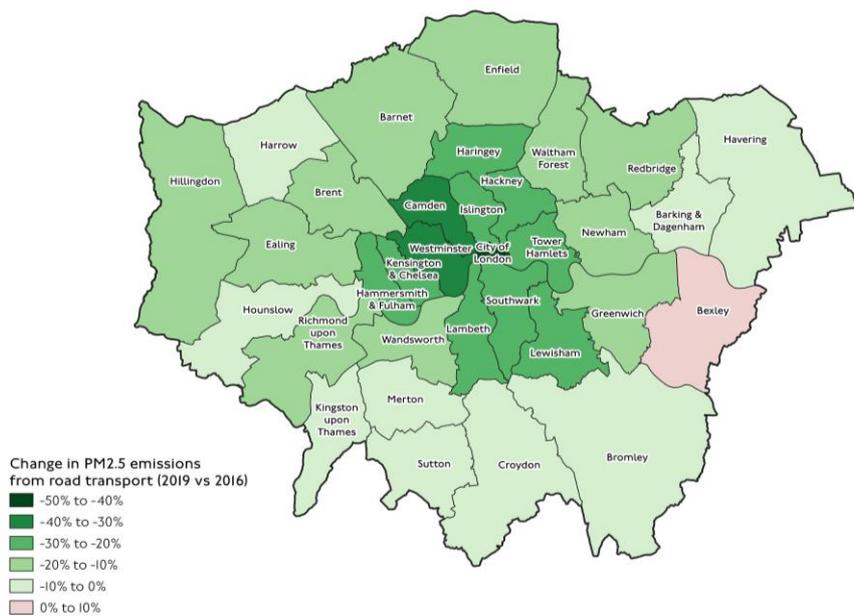
Source: LAEI

Figure 10 Change in NO_x emissions from road transport by borough (2019 vs 2016)



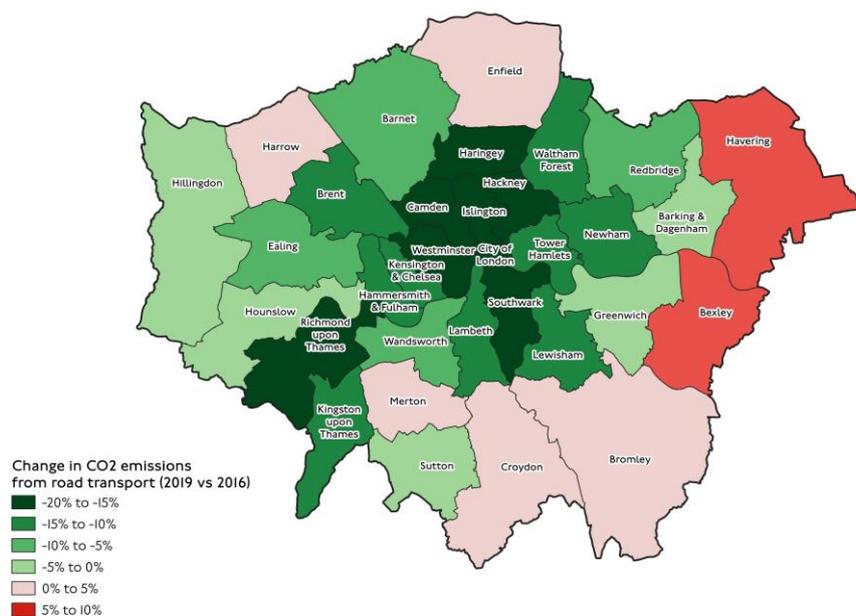
Source: LAEI

Figure 11 Change in PM_{2.5} emissions from road transport by borough (2019 vs 2016)



Source: LAEI

Figure 12 Change in CO₂ emissions from road transport by borough (2019 vs 2016)



Source: LAEI

Updated World Health Organization guidelines

In September 2021, the WHO updated its recommended guidelines for air pollutants²⁷. These guidelines reflect the overwhelming evidence of the health impacts of air pollution, even at low levels. In addition to the guidelines, the WHO has also provided interim targets aimed at promoting a gradual shift from high to lower concentrations in locations where air pollution is particularly high. The updated guidelines, interim targets and the UK's current legally binding air quality limits (which require compliance as soon as possible but by or before 2025) are shown in Table 4.

²⁷ [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health#:~:text=Guideline%20values,-NO&text=The%20current%20WHO%20guideline%20value,effects%20of%20gaseous%20nitrogen%20dioxide](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health#:~:text=Guideline%20values,-NO&text=The%20current%20WHO%20guideline%20value,effects%20of%20gaseous%20nitrogen%20dioxide).

The UK government is now consulting on new legal limits for PM_{2.5} and the Mayor has made the case for these to be aligned with the new interim WHO targets and for the legal limit for NO₂ to be updated as well²⁸.

Table 4: Recommended WHO 2021 air quality guideline levels compared to interim targets and UK limits

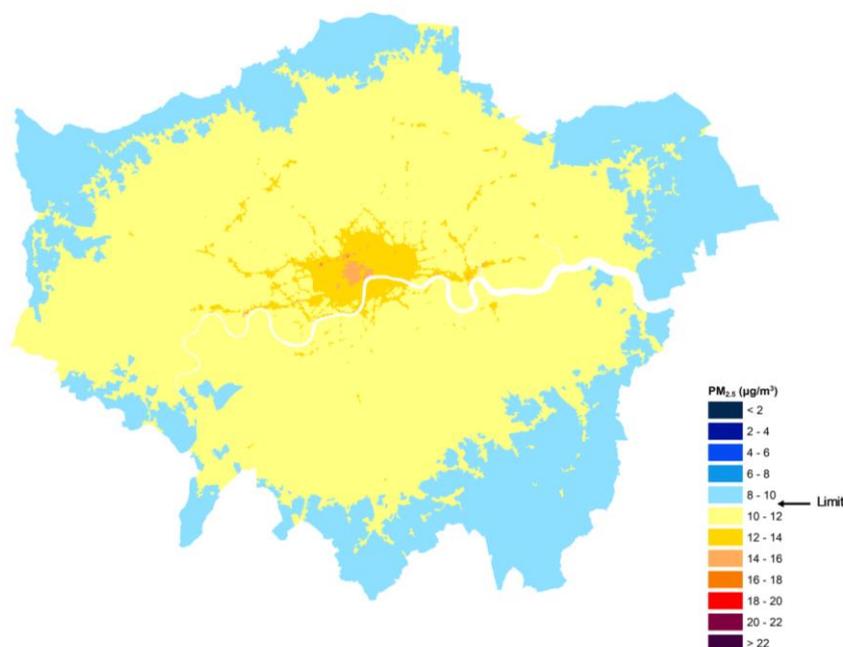
Pollutant	2010 Air Quality Limits	WHO Interim target*				2021 WHO Air Quality Guideline
		1	2	3	4	
PM _{2.5} µg/m ³	25	35	25	15	10	5
PM ₁₀ µg/m ³	40	70	50	30	20	15
NO ₂ µg/m ³	40	40	30	20	-	10

*WHO interim targets are proposed as incremental steps in a progressive reduction of air pollution and intended for use in areas where pollution is high

All London residents live in areas that are within the PM_{2.5} UK legal limits (25 µg/m³), as shown in Figure 13. However, more needs to be done to reduce the significant number of Londoners which live in areas exceeding the lowest WHO interim target of 10 µg/m³ (Table 5) and the even lower guideline of 5 µg/m³. Although there has been a reduction in Londoners living in areas of exceedance since 2016, 88 per cent of Londoners still live in areas which do not meet the lowest interim target (10 µg/m³), and all Londoners live in locations where concentrations exceed the guideline limit of 5 µg/m³.

²⁸ <https://content.tfl.gov.uk/next-steps-for-reducing-emissions-from-road-transport.pdf>

Figure 13: Annual mean PM_{2.5} concentrations, 2019



Source: LAEI

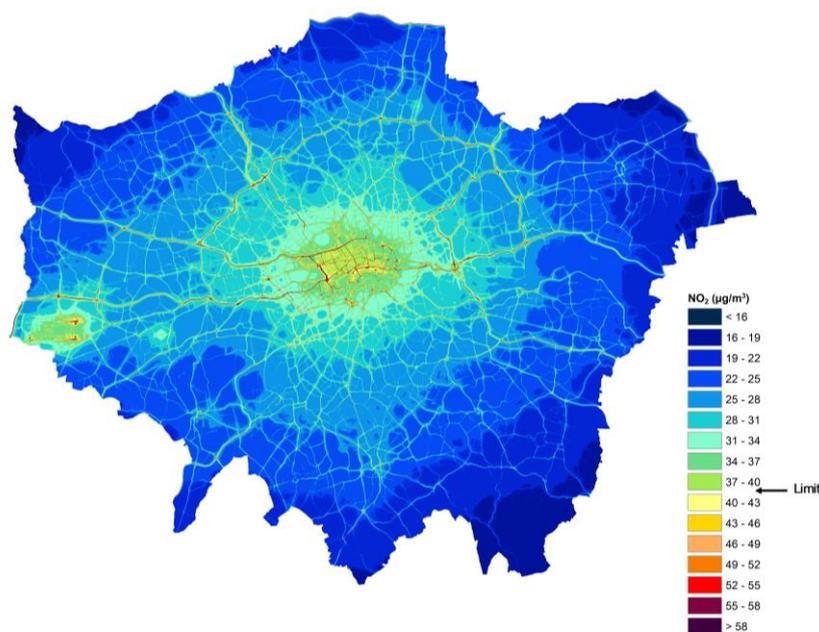
Table 5: London residents living in areas of PM_{2.5} exceedance by concentration level

PM _{2.5} concentration	London residents living in areas of exceedance		Proportion of population living in areas of exceedance	
	2016	2019	2016	2019
15 µg/m ³	259,300	6,000	3%	0.1%
10 µg/m ³	8,798,900	7,962,700	100%	88%
5 µg/m ³	8,798,900	9,082,700	100%	100%

Source: LAEI

There has been a significant reduction in the number of London residents who live in areas which exceed the UK legal limits (40 µg/m³) for NO₂ since 2016, with fewer than two per cent of Londoners (around 170,000) living in areas of exceedance in 2019 (Table 6). However, almost a third of London residents live in areas which exceed 30 µg/m³, the level 2 interim target set by the WHO, and all Londoners live in areas which exceed the guideline limit of 10 µg/m³. It is clear that more needs to be done to reduce the number of Londoners living in areas where NO₂ concentrations exceed interim target levels of 30 µg/m³ and 20 µg/m³ to minimise the number of Londoners who are regularly exposed to harmful levels of air pollution.

Figure 14: Annual mean NO₂ concentrations, 2019



Source: LAEI

Table 6: London residents living in areas of NO₂ exceedance by concentration level

NO ₂ concentration	London residents living in areas of exceedance		Proportion of population living in areas of exceedance	
	2016	2019	2016	2019
40 µg/m ³	2,065,700	173,700	23%	2%
30 µg/m ³	7,933,400	2,796,300	90%	31%
20 µg/m ³	8,798,900	8,995,100	100%	99%
10 µg/m ³	8,798,900	9,082,700	100%	100%

Source: LAEI

Health impacts of air pollution

Toxic air pollutants (PM_{2.5} and NO₂) from road traffic, have a damaging impact on Londoners' health, stunting the growth of children's lungs and worsening chronic health conditions such as asthma, lung and heart disease. Not only is this harming the quality and duration of individual lives, it also has wider costs - a recent study estimated that, if no

action is taken to reduce current levels of pollution the cumulative cost of air pollution to the NHS and social care system in London is estimated to be £15.4 billion²⁹.

Toxic air pollution is not just a central and inner London problem. The levels of NO_x, PM₁₀ and PM_{2.5} pollution are higher in central and inner London. However, while NO_x, PM₁₀ and PM_{2.5} have all been reducing in London, the rate of reduction has been significantly slower in outer London³⁰. For example, the rate of reduction of NO_x from road transport has been at half the rate in outer London compared to that seen in both central and inner London.

Furthermore, as of 2019, everyone living in outer London (as well as those living in inner London) lived in areas where NO_x and PM_{2.5} levels exceeded the WHO's guideline rates.

Toxic air pollution also gives rise to the greatest health impacts in outer London. Even though levels of NO_x, PM₁₀ and PM_{2.5} are lower, the greatest share of premature deaths related to poor air quality are in outer London boroughs, due to the higher proportion of older Londoners living in these boroughs. In 2019, the London boroughs with the highest number of premature deaths related to air pollution were Bromley, Barnet, Croydon and Havering.

We know that - alongside other complementary policies such as a clean, ULEZ-compliant TfL bus fleet - implementing the ULEZ in central and inner London has been effective in reducing harmful emissions from road transport. An expansion of the ULEZ can ensure that these air quality improvements are felt across London, and all Londoners can benefit from policies to combat toxic air pollution.

Health inequalities relating to air pollution

Health inequalities are systematic, avoidable and unfair differences in mental or physical health between groups of people. These inequalities typically relate to age, ethnicity and income.

In 2021, a joint TfL/GLA study³¹ explored the relationships between air quality and inequalities³². The study confirmed earlier findings that communities with higher levels of deprivation, or higher proportions of people from non-White ethnic backgrounds, are more likely to be exposed to higher levels of air pollution.

²⁹ https://www.london.gov.uk/sites/default/files/modelling_the_long-term_health_impacts_of_changing_exposure_to_no2_and_pm2.5_in_london_final_250220_-4.pdf

³⁰ <https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2019>

³¹ https://www.london.gov.uk/sites/default/files/air_pollution_and_inequalities_in_london_2019_update_0.pdf

³² Using data up to 2019

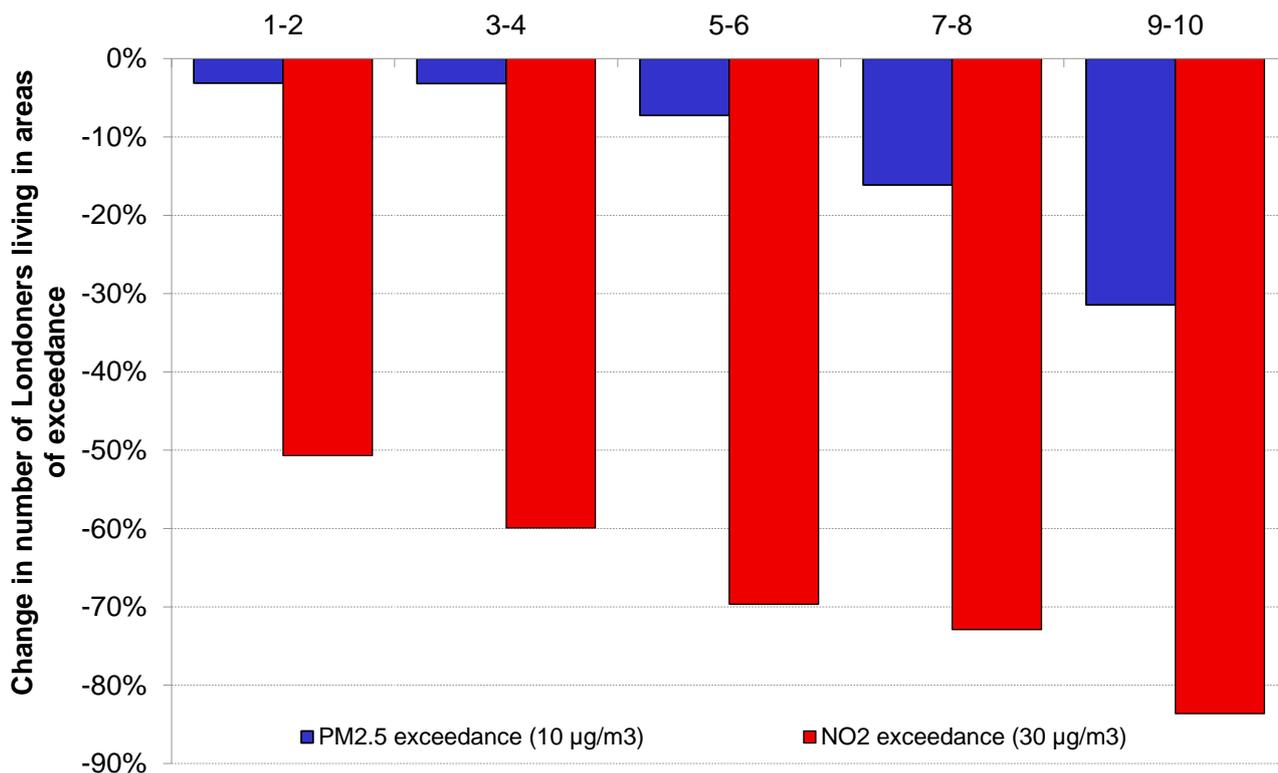
While there have been improvements in air quality across London, improvements have been slower in more deprived areas. For this analysis PM_{2.5} exceedance is based on the WHO interim target 4 (10 µg/m³) and NO₂ exceedance is based on WHO interim target 2 (30 µg/m³). These levels have been selected as they are the next step on the path to deliver a shift from high concentrations to lower concentrations, and to ultimately work towards meeting WHO guideline levels.

Between 2016 and 2019, Londoners living in areas exceeding the WHO interim target for NO₂ (30 µg/m³) fell by 65 per cent London-wide, the ULEZ made a material contribution to this success. However, this improvement was not evenly distributed, with residents living in London's most deprived areas³³ experiencing a 51 per cent reduction, compared to the 84 per cent reduction experienced in London's least deprived areas³⁴, as shown in Figure 15. This disparity is also evident when looking at the change in the number of Londoners living in areas which exceed the WHO interim target for PM_{2.5} (10 µg/m³). In deprived areas, the number of residents living in areas of exceedance fell by just three per cent between 2016 and 2019, whilst the figure for London's least deprived areas was 31 per cent.

³³ Most deprived 20 per cent nationally, as defined by the Index of Multiple Deprivation

³⁴ Least deprived 20 per cent nationally, as defined by the Index of Multiple Deprivation

Figure 15: Change in Londoners living in areas of PM_{2.5} and NO₂ exceedance by deprivation level, 2019 vs 2016.



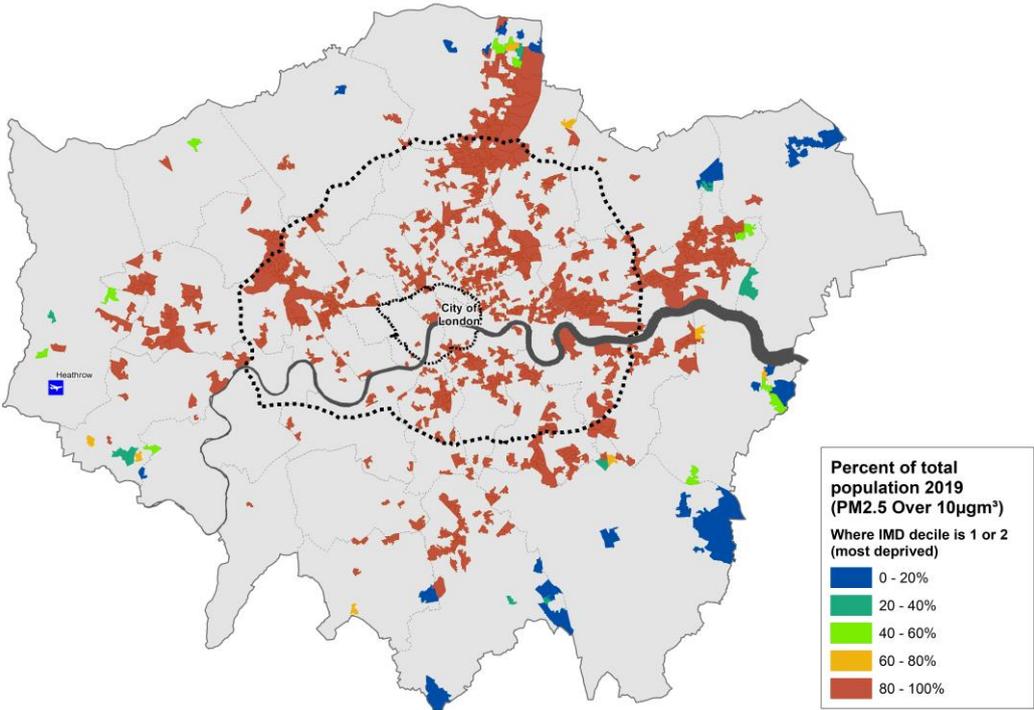
Source: LAEI (2016, 2019), Index of Multiple Deprivation (2019).

Note: Levels of exceedance are 10 µg/m³ for PM_{2.5} (WHO interim target 4) and 30 µg/m³ for NO₂ (WHO interim target 2).

The inequality of air quality improvements means that Londoners living in more deprived areas continue to be disproportionately impacted by poor air quality. In 2019, 45 per cent of residents living in London's most deprived areas lived in locations exceeding the interim target for NO₂ of 30 µg/m³, compared to 12 per cent in London's least deprived areas. Similarly, Figure 16 and Figure 17 show the difference in population exceeding the WHO interim target of 10 µg/m³ for PM_{2.5} in London's most deprived areas, compared to London's least deprived areas.

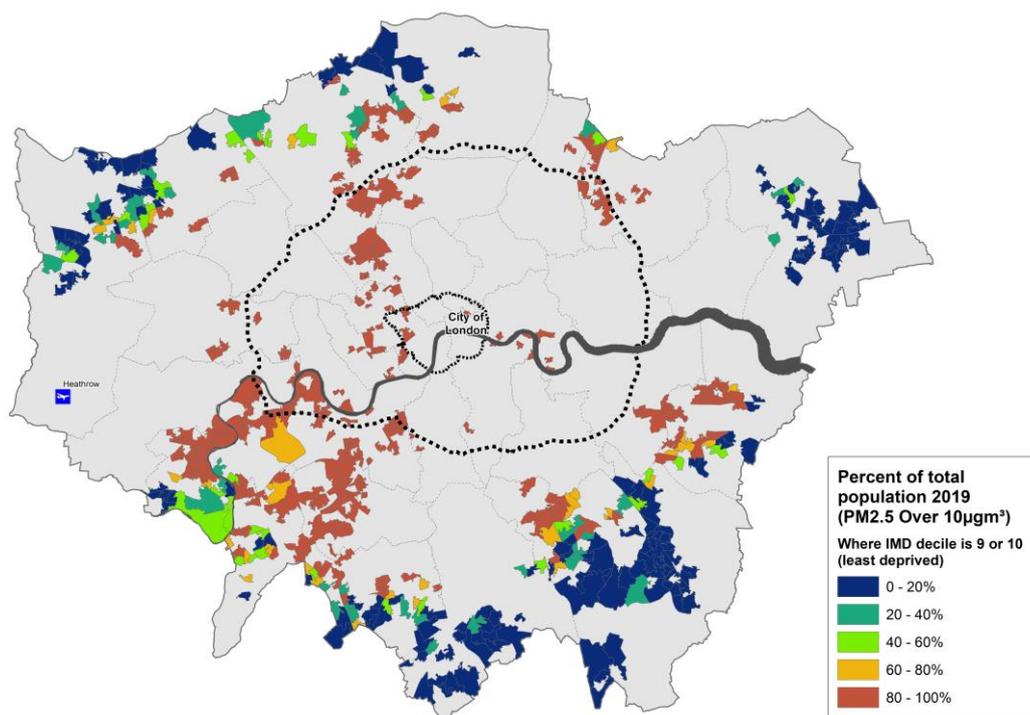
Londoners living in deprived areas are disproportionately exposed to, and impacted by, poor air quality and this situation persists despite overall improvements in air quality across the city. Low-income Londoners, who are less likely to own a car, are among this group which is disproportionately affected.

Figure 16 Population living in areas exceeding PM_{2.5} 10 µg/m³ and areas ranked as 20 per cent most deprived



Source: LAEI (2019), IMD (2019)

Figure 17 Population living in areas exceeding PM_{2.5} 10 µg/m³ and areas ranked as 20 per cent least deprived



Source: LAEI (2019), IMD (2019)

Reducing carbon emissions

We know from experience in central and inner London that the ULEZ is effective in reducing the usage of older, more polluting vehicles which in turn reduces harmful air pollutant emissions and improves air quality and Londoners' health³⁵. Most vehicles in London are already compliant with the ULEZ emissions standards; but it is important that the owners of those remaining non-compliant vehicles that are encouraged to switch to walking, cycling or public transport where possible, or use cleaner vehicles, including car club vehicles, for essential journeys. As well as addressing the primary aim of the ULEZ expansion - tackling the key air pollutants described above - this switch will also help to reduce carbon emissions to help tackle the climate emergency and reduce traffic congestion by removing private vehicles from the road.

³⁵ https://www.london.gov.uk/sites/default/files/ulez_first_month_report_december_2021.pdf

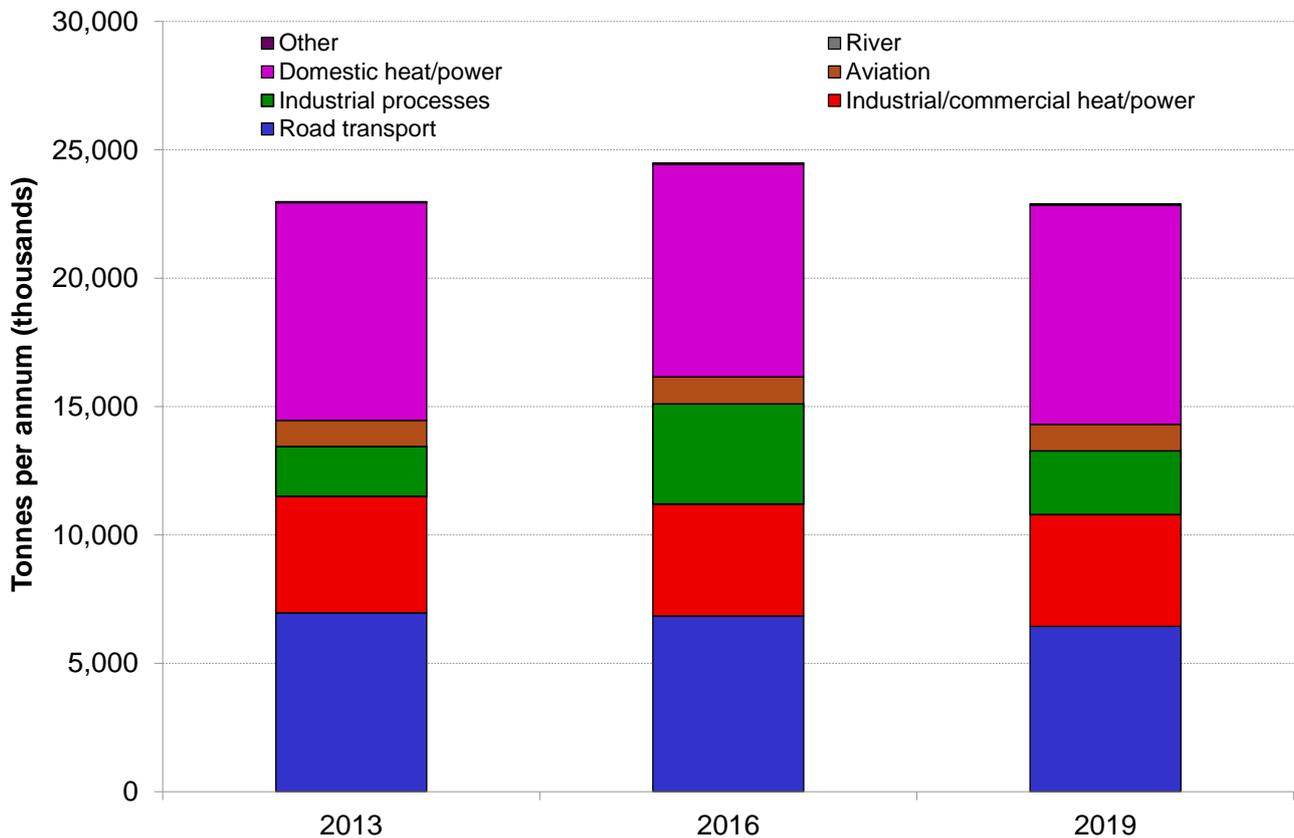
We also need to do more to reduce carbon emissions in London. At the national level, the Climate Change Act 2008 requires the UK to achieve a 100 per cent reduction in greenhouse gas levels compared to 1990 levels by 2050.

In 2018, the Mayor published his London Environment Strategy and 1.5°C Climate Action Plan. These set out pathways, policies and actions needed to achieve a zero carbon London by 2050. Since then, the science has shown the need for even more urgent action and the stark consequences of failing to act. Recognising this urgency, the Mayor has declared a climate emergency for London and set a target for London to be net zero carbon by 2030. This puts London at the forefront of global cities and UK action on climate change. The 2030 net zero carbon target is central to the London Recovery Board's Green New Deal mission.³⁶

Figure 18 shows that between 2016 and 2019 carbon emissions only reduced by six per cent, with the figure for road transport emissions falling by the same amount. In 2019, 28 per cent of carbon emissions were from road transport, which remained unchanged from 2016. It is clear that we need to accelerate the rate at which carbon emissions are reducing in order to achieve net zero by 2030.

³⁶ https://www.london.gov.uk/sites/default/files/london_net_zero_2030_-_an_updated_pathway_-_gla_response_1.pdf

Figure 18: CO₂ emissions in London by source, 2013-2019



Source: LAEI

As well as addressing the primary aim of the ULEZ expansion - tackling the key air pollutants described above – the expansion of the ULEZ into outer London will also help to reduce CO₂ and reduce traffic congestion by a modest amount by removing private vehicles from the road.

We know from experience in central and inner London that the ULEZ is effective in reducing the usage of older, more polluting vehicles which in turn reduces harmful air pollutant emissions and improves air quality and Londoners' health³⁷. Most vehicles in London are already compliant with the ULEZ emissions standards; but it is important that the owners of those remaining vehicles that are non-compliant are encouraged to switch to walking, cycling or public transport where possible, or use cleaner vehicles, including car club vehicles, for essential journeys.

³⁷ https://www.london.gov.uk/sites/default/files/ulez_first_month_report_december_2021.pdf

The expansion of the ULEZ to inner London was accompanied by three vehicle scrappage schemes to support this shift which cost a total of £61 million. For the London-wide ULEZ proposal the Mayor is considering a large-scale and targeted vehicle scrappage scheme to support Londoners, including, for example, those on low incomes, disabled people, charities and businesses.

The recent expansion of the ULEZ to inner London also produced a modest overall reduction in vehicle usage. To the extent that the expansion of the ULEZ to outer London achieves a similar effect, it will encourage a modal shift towards renewable means of transport such as walking, cycling or public transport. This modal shift will contribute to reductions in carbon emissions and congestion, which contribute to tackling the climate emergency.

5. Development of proposals

Option development

The previous chapters have shown that while there has already been significant progress in reducing the negative effects of air pollution, there is still a long way to go to achieve the new WHO air quality guideline limits and protect health. The MTS evidence base³⁸ and further option analysis (considering a wide range of traffic reduction measures, not limited to road user charging schemes) have shown that road user charging policies also have the potential to deliver small but material reductions in carbon emissions and traffic volumes, with associated benefits.

In December 2021, TfL presented the Mayor with a range of road user charging approaches that could be developed in the next few years to tackle emissions and resulting air pollution³⁹. The approaches presented to the Mayor were⁴⁰:

- Extending the ULEZ to cover almost all of Greater London (i.e. “London-wide ULEZ”)
- Implementing a low-level daily Clean Air Charge for all but the cleanest vehicles
- A combined ULEZ expansion and Clean Air Charge
- Introducing a Greater London Boundary Charge for vehicles driving into London

A preliminary assessment of the potential of the four approaches was undertaken to understand their impacts, including impacts on air quality, traffic volumes and CO₂ emissions.

The Mayor considered the benefits and drawbacks of each of the four approaches and concluded that the proposal for a London-wide ULEZ in 2023 was the optimal approach to develop further and take to public and stakeholder consultation due to its higher impact on emissions whilst limiting the number of people impacted by the charge. The ULEZ is consistent with the original scheme objective of reducing air pollutant emissions from road transport⁴¹. We have updated these objectives to reflect current challenges in 2022, and these are listed below.

³⁸ <https://tfl.gov.uk/corporate/publications-and-reports/travel-in-london-reports#mtsevidence>

³⁹ <https://content.tfl.gov.uk/next-steps-for-reducing-emissions-from-road-transport.pdf>

⁴⁰ “Next generation charging” (London-wide) was also presented to the Mayor for his consideration but would take considerably longer to develop.

⁴¹ <https://content.tfl.gov.uk/ulez-consultation-2014-report-to-the-mayor.pdf> The original ULEZ objectives can be found on page 8.

- Reduce air pollutant emissions from road transport, particularly those with greatest health impacts, to support Mayoral strategies and contribute to achieving compliance at UK legal levels and further than this, meeting World Health Organization interim targets (see Table 4);
- Reduce CO₂ emissions from road transport, to support Mayoral strategies and contribute to the ambition that London will be net zero carbon by 2030; and
- Promote mode shift to sustainable transport and, for those who do need to drive, support Londoners to shift to the cleanest vehicle available.

The proposals for consultation

Expanding the ULEZ London-wide (to the LEZ boundary) from 29 August 2023

Background and context

The ULEZ was first introduced in April 2019 in central London and was expanded up to inner London in October 2021. The development of the scheme and air quality benefits are discussed in detail in chapter three.

What is proposed

To improve air quality in outer London and to reduce emissions as quickly and effectively as possible to protect human health, we are proposing to expand the ULEZ to the current LEZ boundary on 29 August 2023. The LEZ boundary covers 96 per cent of Greater London, is proven to be an effective boundary for the LEZ scheme, has existing signage which could be adapted and would provide drivers with appropriate routes to avoid entering the zone if they do not comply with ULEZ emissions standards. A detailed map of the LEZ boundary can be found [here](#).

The proposed expansion is intended to improve air quality in outer London by encouraging individuals to use sustainable transport or switch to cleaner vehicles, thereby contributing to the reduction in the number of older, more polluting vehicles in London. It will also make a smaller contribution to reducing carbon emissions and congestion. All revenue raised from charges that is not spent on implementation and operational costs would be reinvested to facilitate the delivery of the MTS including in outer London.

A series of exemptions and discounts are in place for the existing ULEZ scheme (*Table 7*).

Table 7 Existing exemptions and discounts

Type	Arrangement description
Exemption for a grace period (until 26.10.25)	'Disabled' and 'disabled passenger' tax class vehicles*
Exemption for a grace period (until 26.10.25)	Wheelchair accessible private hire vehicles (London licensed)
100 per cent discount for a grace period (until 29.10.23)	Minibuses used for community transport
Exemption	London licensed taxis (Reducing emissions from taxis is being achieved through other policies. Since 2018 all London licenced taxis new to licencing are required to be Zero Emissions Capable, and maximum vehicle age limits are applied.)
Exemption	Historic vehicles (those built more than 40 years ago, with a historic tax class), and all vehicles constructed before 01/01/1973
Exemption	Military vehicles
Exemption	Specialist non-road going vehicles (e.g. construction or agricultural vehicles)
100 per cent discount	Showman's vehicles

We propose to extend grace periods in line with those proposed for previous iterations of the scheme to reflect the need for these groups to have time to prepare for the newly charged area in the time available. Some impacts are also expected to be mitigated through a new large-scale and targeted vehicle scrappage scheme to support Londoners.

Table 8 Grace periods

Grace period for...	Number of years at April 2019 launch	Number of years at Oct 2021 launch	Number of years at proposed Aug 2023 launch
Disabled' and 'disabled passenger' tax class vehicles	4.5 years (was due to end Sep 2023)	4 years (was extended to Oct 2025)	4 years (proposed two year extension to 24 Oct 2027)
Wheelchair accessible private hire vehicles	6.5 years (due to end Oct 2025)	4 years (no change to end date)	4 years (proposed two year extension to 24 Oct 2027)
Minibuses used for community transport	N/A (did not exist due to nature of central zone)	2 years (due to end Oct 2023)	2 years (proposed two year extension to 26 Oct 2025)

Removing the annual £10 per vehicle Auto Pay registration fee for the ULEZ, Congestion Charge and LEZ

Background and context

Customers who are registered for Auto Pay are automatically charged for the number of charging days their registered vehicle is used during charging hours within the Congestion Charge Zone, and if it doesn't meet the standards, the LEZ and ULEZ. Customers are billed monthly. Auto Pay for private drivers was introduced in January 2011, with customers able to pre-register from 22 November 2010. A scheme for fleets was available from the start of the Congestion Charge in 2003 (later replaced by Fleet Auto Pay).

The benefit of Auto Pay (for both fleet and private vehicles) is that it removes the risk of customers being issued with a Penalty Charge Notice (PCN) for non-payment if their registered vehicle is driven within a charging zone during charging hours and they forget to pay the daily charge. Customers also benefit from the convenience of automated billing which removes the administrative burden of paying daily charges and mitigates the risk of

having to pay a higher charge after the day of travel or incurring penalty charges for failing to pay.

What is proposed

Currently, we charge a £10 annual fee for each vehicle that is registered for Auto Pay (including Fleet Auto Pay). We are proposing to stop charging this fee to help remove a barrier for people to sign up to Auto Pay. This is particularly relevant for infrequent drivers or those who do not often enter charging zones, where the annual £10 fee may put off registration for infrequent or 'just in case' use. This change is proposed to take place on 30 January 2023.

The proposed expansion of the ULEZ means there are likely to be higher numbers of people paying charges in London. Removing the administration fee for Auto Pay is likely to support these individuals by allowing customers to avoid getting a PCN by signing up to Auto Pay for free.

The proposal to remove the administration fee ensures that there is no cost differential between those paying daily charges and those paying by Auto Pay and further incentivises a convenient payment channel that also allows people to avoid higher charges for paying after the day of travel or incurring a PCN.

Increasing the penalty charge level from £160 to £180 for non-payment of the ULEZ charge and Congestion Charge

Background and context

If the ULEZ charge or Congestion Charge are not paid within the time allowed (up to three days from date of travel), and the vehicle is not exempt or registered for a 100 per cent discount, a PCN may be issued.

The level of penalty charge (PCN level) for non-payment of the ULEZ charge is £160, discounted to £80 if paid within 14 days. The PCN level has been £160 since the scheme was implemented on 8 April 2019.

The PCN level for non-payment of the Congestion Charge is also £160, discounted to £80 if paid within 14 days. The PCN level for the Congestion Charge was last increased on 2 January 2018, when it increased from £130 to £160.⁴²

⁴² Prior to this, the PCN level was varied on three occasions; in 2004, it increased from £80 to £100, in 2007 it increased to £120 and in 2013 it increased to £130.

What is proposed

We are proposing to increase the penalty charge level for the ULEZ and Congestion Charge⁴³ from £160 to £180 from 30 January 2023. Due to a number of factors, including inflation, increases in public transport fares and the level of the Congestion Charge itself⁴⁴ reducing the relative disbenefit of the penalty charge, the deterrent effect of receiving a PCN over time has decreased. For the Congestion Charge, the proportion of Vehicle Registration Marks (VRMs) given multiple PCNs has increased from 25.1 per cent in 2018 to 28.3 per cent in 2021. For the ULEZ, the proportion has increased from 25 per cent to 32.3 per cent⁴⁵ between 2019 (when the scheme was introduced) and 2021. The PCN level needs to increase for both schemes to maintain the deterrent effect and achieve scheme objectives.

Minor administrative changes

We are also proposing to make minor administrative changes to the Congestion Charge and Low Emission Zone Scheme Orders. These proposed changes are summarised below:

- Remove reference to being able to purchase a licence for a specified period of days (7, 31 or 365 charging days) for those liable to pay the full charge and replace with 'a licence for consecutive charging days' not referencing the specified period of days
- Remove reference to specific payment channels in the Scheme Orders and replace with 'by any payment channel provided by TfL'
- Remove reference to specific payment method in the Scheme Orders and replace with 'by any payment method accepted by TfL'
- Remove reference to specific communication channels in the Scheme Order and replace with 'by any communications channel provided by TfL'

Revising the Mayor's Transport Strategy

The MTS is the principal policy tool through which the Mayor exercises his responsibilities for the planning, development, provision, and management of transport in London. The

⁴³ Link to Proposed Congestion Charge and Low Emission Zone changes Impact Assessment: <https://haveyoursay.tfl.gov.uk/15619/widgets/44946/documents/27069>

⁴⁴ The Congestion Charge was increased from £11.50 to £15 as part of the package of temporary changes which were introduced on 22 June 2021 in response to the transport challenges of the Covid-19 pandemic. This increase was introduced as a permanent change on 20 December 2021.

⁴⁵ Repeat offenders have been calculated separately for each contravention year, and are based upon unique vehicles for which more than one PCN has been issued for the relevant scheme and year of contravention.

Mayor is required to prepare and publish a transport strategy and to keep that strategy under review.

The MTS⁴⁶ was published in 2018 following a public and stakeholder consultation.⁴⁷ It contains Proposal 24:

The Mayor, through TfL, will seek to introduce the central London Ultra Low Emission Zone (ULEZ) standards and charges in 2019, tighter emissions standards London-wide for heavy vehicles in 2020, and an expanded ULEZ covering inner London in 2021.

It has become clear that further action needs to be taken beyond the measures included in Proposal 24 (which have now all been successfully introduced) if we are to address the triple challenges of toxic air pollution, the climate emergency and traffic congestion that London is now facing and achieve the other aims of the MTS. To ensure the MTS and the proposal to expand the ULEZ to cover all of Greater London are in alignment, it is necessary to revise the MTS to add a supplementary proposal to Proposal 24. The following is being proposed:

Proposal 24.1

The Mayor, through TfL and the boroughs, will seek to address the triple challenges of toxic air pollution, the climate emergency and traffic congestion through road user charging schemes including by expanding the Ultra Low Emission Zone London-wide.

New proposal 24.1 would be accompanied by narrative which describes each of the three challenges and why it is important that they are addressed. As reducing vehicle kilometres is key, road user charging will form part of the solution as well as continuing to support the delivery of other MTS objectives. The full text of the proposed MTS revision is set out in a separate document on the consultation website, which can be found [here](#). If adopted, the revised text would be published as an addendum to the 2018 MTS.

Impacts assessment in respect of the proposed MTS revision

When revising the MTS, the Mayor must have regard to the effect the revised strategy would have on the health of persons in Greater London, health inequalities between persons living in Greater London, the achievement of sustainable development in the UK and climate change and its consequences as well as other matters such as consistency with national policy and other strategies. He must include those policies and proposals that he considers are best calculated to promote improvements in health and the reduction of health inequalities and to contribute to the achievement of sustainable development and

⁴⁶ [Mayor's Transport Strategy, 2018](#)

⁴⁷ TfL's Report on the consultation, 2018: <https://content.tfl.gov.uk/mts-consultation-report-4.pdf>

the mitigation of or adaptation to climate change (except to the extent that it is not reasonably practicable to do so). The Mayor must also have regard to the equalities impacts, in line with the public sector equality duty⁴⁸, and to the requirements of the Strategic Environmental Assessment (SEA) regulations⁴⁹.

As set out in the consultation document, TfL commissioned Jacobs to undertake an Integrated Impact Assessment (IIA) of the likely significant impacts on a range of matters arising from the proposals currently under consultation. With regard to the proposed MTS revision, the IIA encompasses a Strategic Environmental Assessment (SEA) and resulting environmental report, an Equalities Impact Assessment (EQIA), a Health Impact Assessment (HIA) and an Economic and Business Impact Assessment (EBIA).

Jacobs' approach to undertaking the impacts assessment of the proposed MTS amendment, as well as two potential alternatives to the proposal⁵⁰, was set out in a Scoping Report. In accordance with regulation 12(5) of the SEA Regulations, this was sent to the following consultation bodies: Environment Agency, Historic England and Natural England for their comment in advance of the start of the consultation (summarised in Appendix A). Feedback has informed the impacts assessment, and where appropriate the separate assessment of the proposed scheme itself.

The [IIA of the proposed MTS revision](#) is included within the suite of consultation documents, and contains a detailed description of the process followed including the stakeholder engagement undertaken. In summary, the assessment concluded that there are no impacts identified across all three options (the proposed revision and two alternative options) that are significant enough at this strategic level to change the existing scoring on the environmental, economic, and social and health objectives of the MTS.

Next steps

At the end of this consultation, TfL will analyse the responses received from the public and stakeholders about its proposals to extend the ULEZ London-wide; and the other Congestion Charge and LEZ-related proposals set out above - removal of the Auto Pay

⁴⁸ This duty is contained in section 149 of the Equality Act 2010. It applies to the Mayor and TfL's exercise of public functions and is a duty to have 'due regard' to the need to: eliminate discrimination, harassment, victimisation and any other prohibited conduct; advance equality of opportunity between people who share a relevant protected characteristic and those who do not, and to foster good relations between people who share a protected characteristic and those who do not. Protected characteristics for the purpose of the duty are age, disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex, and sexual orientation, and in respect of the first element of the duty, marriage and civil partnership status.

⁴⁹ The Environmental Assessment of Plans and Programmes Regulations 2004/ 1633

⁵⁰ The two potential alternatives assessed were two of the potential approaches mentioned at page 5, Alternative A was extending ULEZ London-wide alongside a small clean air charge and B was the small clean air charge alone.

annual registration fee under Congestion Charge, ULEZ and LEZ, the increase in penalty charge levels under Congestion Charge and ULEZ and the other minor scheme changes – and will present its analysis to the Mayor, with recommendations about whether the proposals should proceed or be modified in light of issues raised. The Mayor will then consider the consultation responses, the IIA and advice provided in the decision document and decide whether or not to confirm the proposals, with or without modifications.⁵¹

In relation to the proposed MTS revision, the Mayor will consider TfL's report on the public and stakeholder consultation responses together with the IIA and advice provided in the decision document and decide whether to publish it. Before publication, the Mayor is required to lay a copy of the pre-publication draft before the London Assembly, which may move a motion to reject it within 21 days.

Following the publication of any revisions to the MTS, a SEA-related Post-Adoption Statement (PAS) must be published, setting out how environmental considerations, and the responses of consultees (including statutory consultees) have been taken into account.

Privacy considerations

In all our work we follow the principles of data minimisation and privacy by design. In operating the current Congestion Charge, LEZ and ULEZ Road User Charging (RUC) schemes, we collect personal data, principally through the use of Automatic Number Plate Recognition (ANPR) enforcement cameras across London, the creation and use of customer accounts, the processing of payments and PCNs and via the provision of customer service.

In addition, we use data derived from vehicle numberplates (Vehicle Registration Marks: VRMs) collected by the ANPR cameras, to monitor and analyse road traffic in London and for transport planning purposes. When doing this, we replace the VRM with an alternative set of letters and numbers. This is called 'pseudonymisation' and is a way of distinguishing vehicles by using a unique identifier that does not reveal its 'real world' identity and helps protect people's privacy.

⁵¹ A variation order amending the Congestion Charge Scheme Order has been made by TfL to implement the Auto Pay and PCN level proposals under that scheme, subject to being confirmed by the Mayor (with or without modifications). A draft variation order to implement the proposals relating to the ULEZ and LEZ is also included with the consultation documents. This order cannot be formally made by TfL until the Mayor decides whether or not to approve the MTS revision (subject to submission to the London Assembly). If approved and published, TfL will make a variation order (in materially the same form as the draft), which it will then submit to the Mayor to decide whether to confirm it (with or without modifications). Copies of the two variation orders and consolidated texts of the two Scheme Orders are included in the consultation materials

The data from most of our ANPR cameras is shared with the Metropolitan Police Service (MPS) for the purposes of preventing and detecting crime, including serious crime and terrorism. A Mayoral Delegation allowing TfL to share its ANPR data with the MPS has been in place since 2015. A replacement Delegation⁵² is due to come into force to allow the continuation of this data sharing (including the sharing of new contextual image data with the MPS resulting from camera technology upgrades) in the circumstances of the current inner London ULEZ and its proposed London-wide expansion, and includes arrangements to secure the MPS complies with appropriate data protection, privacy and information sharing principles. The MPS is the controller of any data they receive from our ANPR cameras and are responsible for using it in compliance with relevant data protection legislation. It is estimated that 2.5 million vehicles are seen in London every day of which around 900,000 are already seen within the current ULEZ.

We have adopted a data minimisation approach to all the current RUC schemes, which includes the numbers and locations of on-street cameras, a robust retention schedule for all personal data processed (including ANPR data and associated contextual images), stringent contractual obligations on our contractors to support compliance and a commitment to transparent processing. To that end we have published a detailed [privacy notice](#) as well as previous [DPIAs](#) undertaken in relation to RUC. In order to effectively operate and enforce an enlarged ULEZ, it is anticipated that approximately 2,750 additional ANPR cameras may be needed. The final number of the cameras required will be assessed to ensure that they are the minimum necessary in order to effectively enforce and deliver the scheme – as well as ensuring that they are in appropriate locations. We will also consider whether any of the existing cameras used within the current ULEZ can be removed as the expansion of the zone may mean they are no longer needed.

A draft [Data Protection Impact Assessment](#) (DPIA) is included in the consultation materials.

⁵² MD 2977, which can be found here: <https://www.london.gov.uk/decisions/md2977-delegation-tfl-grant-anprc-data-access-mps>

6. Impacts of proposals

Expanding the ULEZ London-wide from 29 August 2023

This section summarises the expected impacts of an expanded London-wide ULEZ on vehicle compliance, traffic (including congestion), mode shift, air quality (including emissions), business and economics, and people (including health and equalities). It contains our analysis of the likely significant impacts and a summary of the IIA report commissioned by independent consultants.

To assess the impacts of the proposed expansion, we have utilised TfL's package of strategic models, including our London highway demand model (LoHAM) and our travel demand model for London (MoTiON), as well as expertise in emissions modelling. Air pollution modelling was produced by Imperial College London in collaboration with TfL. Further detail on the methodology and sources of data can be found in Appendix B.

The impacts presented here are based on a scenario that assumes travel behaviour has broadly returned to a pre-pandemic situation and a central forecast for compliance with ULEZ standards is achieved. This is reasonable as traffic levels have quickly and broadly returned to pre-pandemic levels, unlike public transport which is still suppressed. Further work has been undertaken to assess the impacts of the proposals in an uncertain future, which is increasingly important given the unprecedented events of the past two years. For example, we have assessed the impacts of the scheme against a scenario where there are longer term implications of the pandemic for travel behaviour. Different compliance rates have also been assessed, including lower and higher compliance rates and how long it takes for the compliance rate to be achieved. Taking this approach provides reassurance and ensures the robustness of the estimated scheme impacts. Details of this 'Hybrid Forecast' and compliance rate sensitivity tests are described in Appendix B.

As highlighted earlier, we commissioned an independent consultant (Jacobs) to assess the potential likely significant impacts (positive and negative) of the consultation proposals and to suggest potential mitigations for any identified negative impacts. The assessment considered impacts on the environment, people (health and equality), and business and economy. The full London-wide ULEZ IIA report can be found [here](#). Summaries of the IIA report's findings can also be found later in this section.

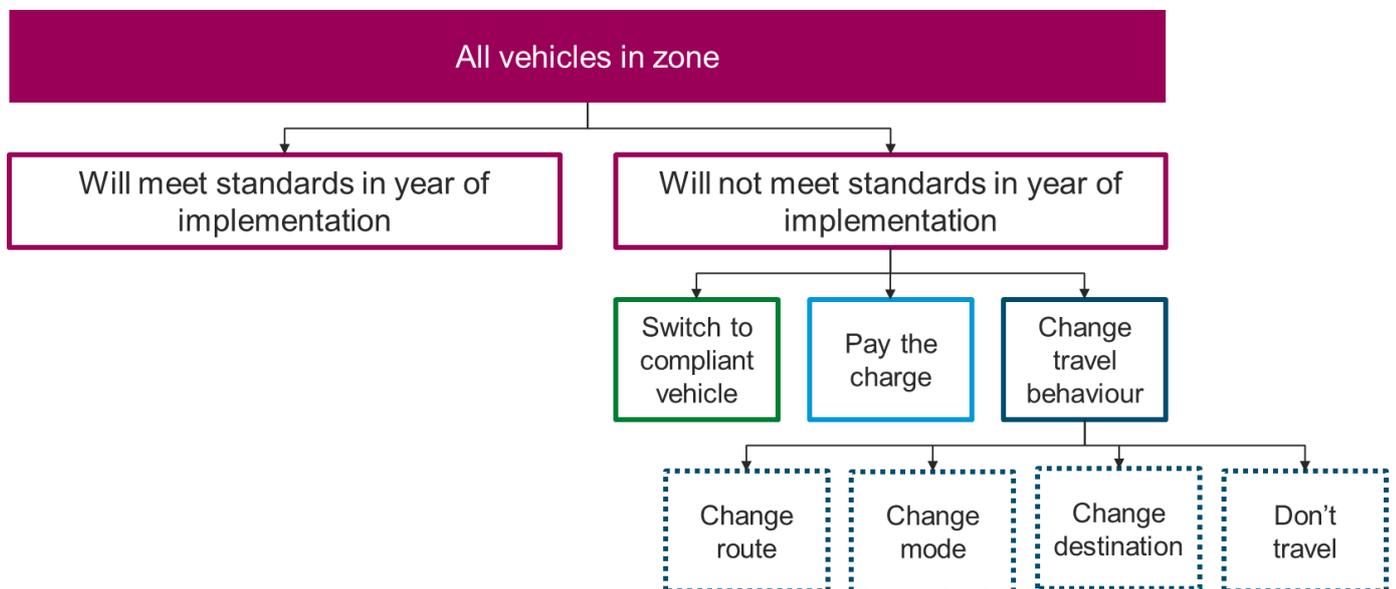
The primary study area for impacts presented in the first half of this section is the Greater London area. The London-wide ULEZ IIA report, which is summarised in the latter half of this section, focuses on the impacts on the ULEZ expansion area (the area between the existing inner London ULEZ and the LEZ boundary) and areas adjacent to Greater London. The air quality impacts presented in this section and in the London-wide ULEZ IIA

report are based on the London Atmospheric Emissions Inventory which covers Greater London, as well as the area from the GLA boundary up to and including the M25.

Response of vehicle users

A key part of the assessment is estimating how people might respond to the proposed changes. Those who have (or use) vehicles that do not meet the ULEZ standard have a choice in how they respond to the introduction of the scheme (Figure 19).

Figure 19: Summary of possible responses to the scheme



The primary objective of an expanded ULEZ is to improve air quality and reduce emissions in outer London. Therefore, the scheme aims to encourage frequent users of the zone who primarily travel using a non-compliant vehicle to switch to a sustainable mode or change to a compliant vehicle.

For those who travel less frequently in, to and around the expanded (i.e London-wide) zone, it may not be cost effective to change their vehicle specifically to comply with the ULEZ standards. These users are more likely to 'stay and pay' the £12.50 daily charge for the small number of trips they make. Those who drive in London more frequently are more likely to change their vehicle. In both cases there will be a number of users unwilling to pay the ULEZ daily charge or change to a different vehicle and therefore will either choose to change mode, change destination, change route (if travelling between two locations outside of London), or not travel at all.

Summary of impacts

The impacts of the proposed ULEZ expansion London-wide on compliance, vehicle kilometres, mode shift and air quality are outlined in detail in the subsequent sections. In summary, the introduction of a London-wide ULEZ could have the following impacts:

- A reduction of non-compliant cars from 160,000 to around 46,000 at the end of 2023 and a reduction in non-compliant vans from 42,000 to 26,000.
- A reduction in non-compliant car kilometres of 40 per cent in outer London, and 38 per cent London-wide. A 52 per cent reduction in non-compliant van kilometres in outer London, and 45 per cent London-wide.
- The mode shift impact would be the greatest in outer London with a 2.4 per cent reduction in car trips, 1.7 per cent increase in walking and cycling trips, 1.2 per cent increase in bus trips and a 0.7 per cent increase in rail trips.
- A reduction of NO_x emissions from cars and vans in outer London of 9.6 per cent and 6.6 per cent respectively. London-wide reductions in road transport NO_x emissions are estimated to be 5.4 per cent, equivalent to 362 tonnes of NO_x.
- Overall, taking into account all road transport emissions, an estimated reduction in NO_x vehicle emissions in outer London of 6.9 per cent.
- An 11.3 per cent reduction in tailpipe PM_{2.5} emissions in London, and an overall reduction in PM_{2.5} emissions from road transport of 1.5 per cent, this is equivalent to eight tonnes of PM_{2.5}.
- An average reduction in NO₂ concentrations in outer London of 1.6 per cent, and reduction in central and inner London of 0.7 per cent and one per cent respectively. As a result, nearly 30,000 additional Londoners would live in areas meeting the WHO interim target of 30 µg/m³ and 340,000 additional Londoners would live in areas meeting the tighter interim target of 20 µg/m³.
- Almost all of London's most deprived communities would experience an improvement in air quality – 99.9 per cent live in areas with improved NO₂ concentrations and 97 per cent live in areas with improved PM_{2.5} concentrations (albeit marginal).
- It is estimated that, without the ULEZ expansion London-wide, 106 schools would not meet the WHO interim target of 30 µg/m³ NO₂. With London-wide ULEZ in place, this would reduce to 91 schools, improving 15 schools in central and inner London. A further 145 schools, most of them in outer London, would also meet the tighter WHO interim target of 20 µg/m³.

Vehicle compliance impacts

The most significant impact on air quality and emissions will be as a result of people switching from non-compliant to ULEZ standards compliant vehicles, especially those who travel more frequently.

We have estimated that out of around two million unique cars seen in London every day, around 92 per cent will already be compliant by the end of 2023⁵³. The introduction of a London-wide ULEZ could increase compliance to over 95 per cent in London. This equates to a reduction in the number of non-compliant cars from 160,000 to around 46,000, with around 70,000 switching to compliant vehicles and 44,000 fewer cars due to behaviour change.⁵⁴

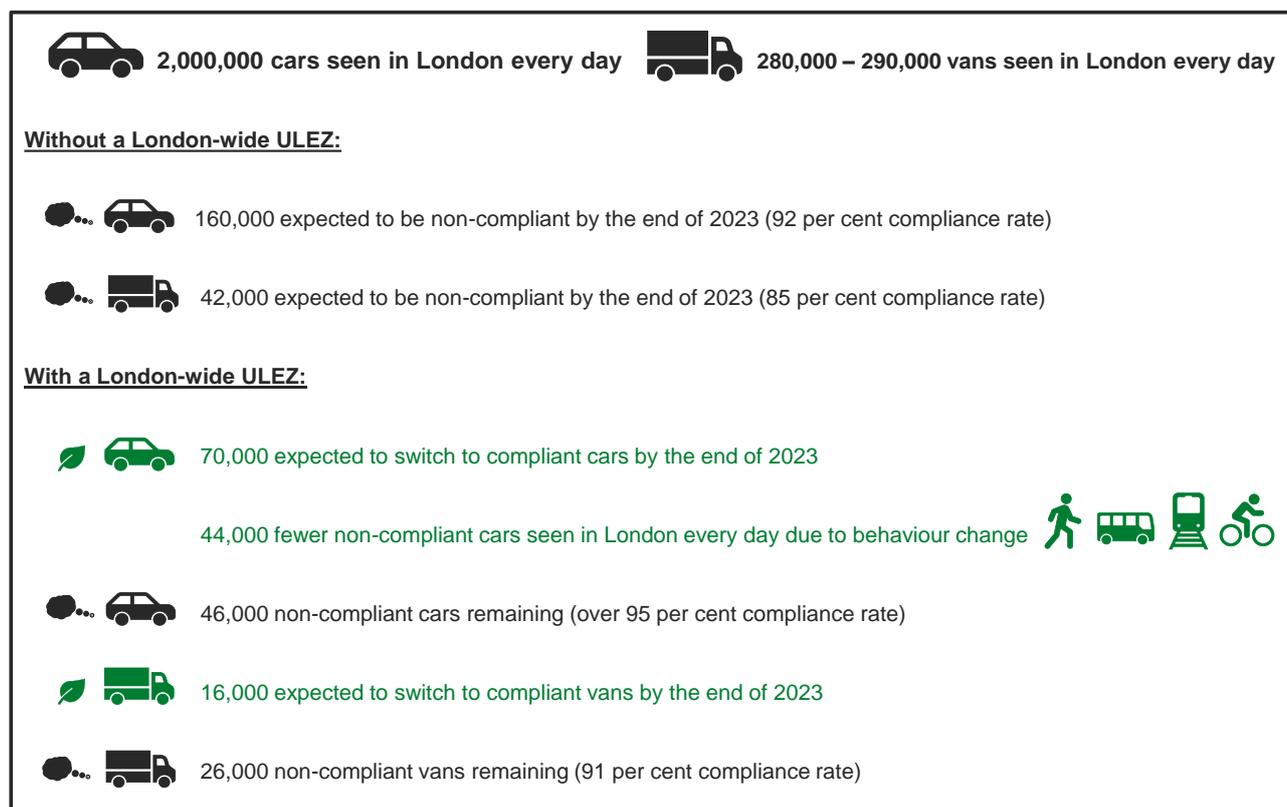
It is estimated that around 280,000 to 290,000 vans are seen in London every day. Around 85 per cent of these are forecast to be compliant by the end of 2023. With the ULEZ expansion London-wide, compliance is estimated to increase to around 91 per cent, reducing the number of non-compliant vans from around 42,000 to 26,000. No demand response for vans has been assumed in the modelling as, primarily, it is expected that any businesses that leave the market as a result of the new emissions standards will be replaced by other businesses that have compliant vehicles or are willing to pay the charge. However, there may be a small change in demand for those that use their van for discretionary (and/or infrequent) purposes or those that could feasibly switch to using a cargo bike instead of a van.

Figure 20 shows the compliance rates for the daily vehicle population (daily unique vehicles seen) by the end of 2023, with and without London-wide ULEZ.

⁵³ Note that figures reported for cars exclude Private Hire Vehicles (PHVs), unless stated otherwise.

⁵⁴ Based on our central compliance scenario. Emerging traffic data suggests that compliance rates based on vehicle kilometres is suitable for unique vehicles. Our estimates for unique vehicles in outer London will evolve as the camera network in outer London develops.

Figure 20 Scheme impacts on London-wide daily unique vehicles



Traffic impacts (including congestion changes)

Expanding the ULEZ to outer London is expected to have a modest impact on total London-wide car kilometres; it will reduce them by about 0.5 per cent. Most of this reduction is from people with non-compliant cars choosing to change mode, not travel or avoid London. The reduction in non-compliant car kilometres is estimated to be 38 per cent London-wide. As non-compliant car kilometres are estimated to be only a small proportion of overall car kilometres, this means the reduction in overall car kilometres is small.

The impact on car kilometres will be greatest in outer London, with a one per cent reduction in total car kilometres and a 40 per cent reduction in non-compliant car kilometres. Despite the reduction London-wide, there could be a one per cent increase in car kilometres in inner London. This is likely due to destinations and more direct routes becoming available to those who previously were able to avoid the ULEZ daily charge by not driving into inner London. However, non-compliant car kilometres in inner London are estimated to reduce by 28 per cent, as a result of the expansion of ULEZ to outer London, on top of the reductions that will result from the scheme currently in place. There is not

expected to be a significant impact on total van kilometres, though there is expected to be a reduction in van kilometres from vehicles which do not comply with ULEZ standards (a 45 per cent reduction in non-compliant van kilometres London-wide).

Table 9: Expected impact on traffic across London, split by ULEZ standards compliant and non-compliant vehicle kilometres

	London-wide	Central London	Inner London	Outer London	Non-GLA ⁵⁵
Total car kilometres 	-0.5%	-0.9%	+1.0%	-1.0%	-0.2%
Non-compliant car kilometres 	-38%	-19%	-28%	-40%	-11%
Non-compliant van kilometres 	-45%	-4%	-15%	-52%	-24%

As a result of the expected reduction in overall traffic in London, there is forecast to be a slight increase in average speeds and reduction in travel times London-wide. This is primarily from the traffic reduction expected in outer London. As traffic is expected to increase slightly in inner London, there is forecast to be a slight reduction in average speeds and a slight increase in travel times. Table 10 shows the expected impact in the AM peak (0800 to 0900), interpeak (average hour between 1000 and 1600) and PM peak (1700 to 1800).

⁵⁵ From the GLA boundary up to and including the M25.

Table 10 Expected impact on travel time and speeds across London by time period

	Travel time (vehicle hours)			Average speed (km/h)		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Central	-0.1%	-0.5%	-0.1%	-0.2%	0.2%	-0.1%
Inner	0.5%	0.8%	1.4%	-0.2%	-0.2%	-0.9%
Outer	-1.7%	-1.3%	-1.6%	1.0%	0.4%	0.9%
London-wide	-0.9%	-0.5%	-0.5%	0.5%	0.1%	0.1%

Mode shift impacts

A London-wide ULEZ is expected to have a small but material impact on car trips⁵⁶ in London⁵⁷ reducing by around 146,000⁵⁸ every day. This equates to 1.7 per cent of all car trips. The reduction in car trips (1.7 per cent) is larger than the reduction in car kilometres (0.5 per cent) indicating that the proposed expansion has a greater impact on shorter journeys. Previous analysis on active travel potential estimates that nearly half of car trips made by London residents could be cycled in around 10 minutes⁵⁹.

Out of the 146,000 fewer car trips in London, just under 70 per cent are expected to switch to sustainable modes. This means an additional 55,000 (0.7 per cent) walking or cycling trips, 26,000 (0.6 per cent) bus trips and 19,000 (0.3 per cent) rail trips every day in London. This would have a small but positive impact on the London-wide active, efficient and sustainable mode share.

The proposed London-wide ULEZ is expected to have the biggest impact on mode shift in outer London with a 2.4 per cent (166,000) reduction in car trips, 1.7 per cent (64,000) increase in walking and cycling trips, 1.2 per cent (29,000) increase in bus trips and a 0.7 per cent (17,000) increase in rail trips.

⁵⁶ This figure combines car driver and car passenger trips

⁵⁷ In this context, 'in London' means trips to, from and within Greater London

⁵⁸ The absolute trip numbers for central, inner and outer London (when separated) do not add up to the London-wide total. This is because if a trip goes through multiple areas it is counted in each of those areas. For example, if a trip goes between outer and inner London, it will contribute to one trip in inner and one trip in outer (when areas are separated), but only one trip London-wide.

⁵⁹ https://www.london.gov.uk/sites/default/files/health_impact_of_cars_in_london-sept_2015_final_0.pdf

Air quality impacts

The area covered by the air quality impact analysis is based on the London Atmospheric Emissions Inventory (LAEI), with central, inner and outer London defined by the Congestion Charge Zone, the current inner London ULEZ boundary (up to but excluding the North and South Circular Roads) and the Greater London area (GLA) boundary respectively. The modelling also covers the area from the GLA boundary up to and including the M25, defined in this analysis as 'non-GLA'. A map showing the area covered by the LAEI is shown in Appendix C. Note also that figures reported for cars exclude Private Hire Vehicles (PHVs), unless stated otherwise.

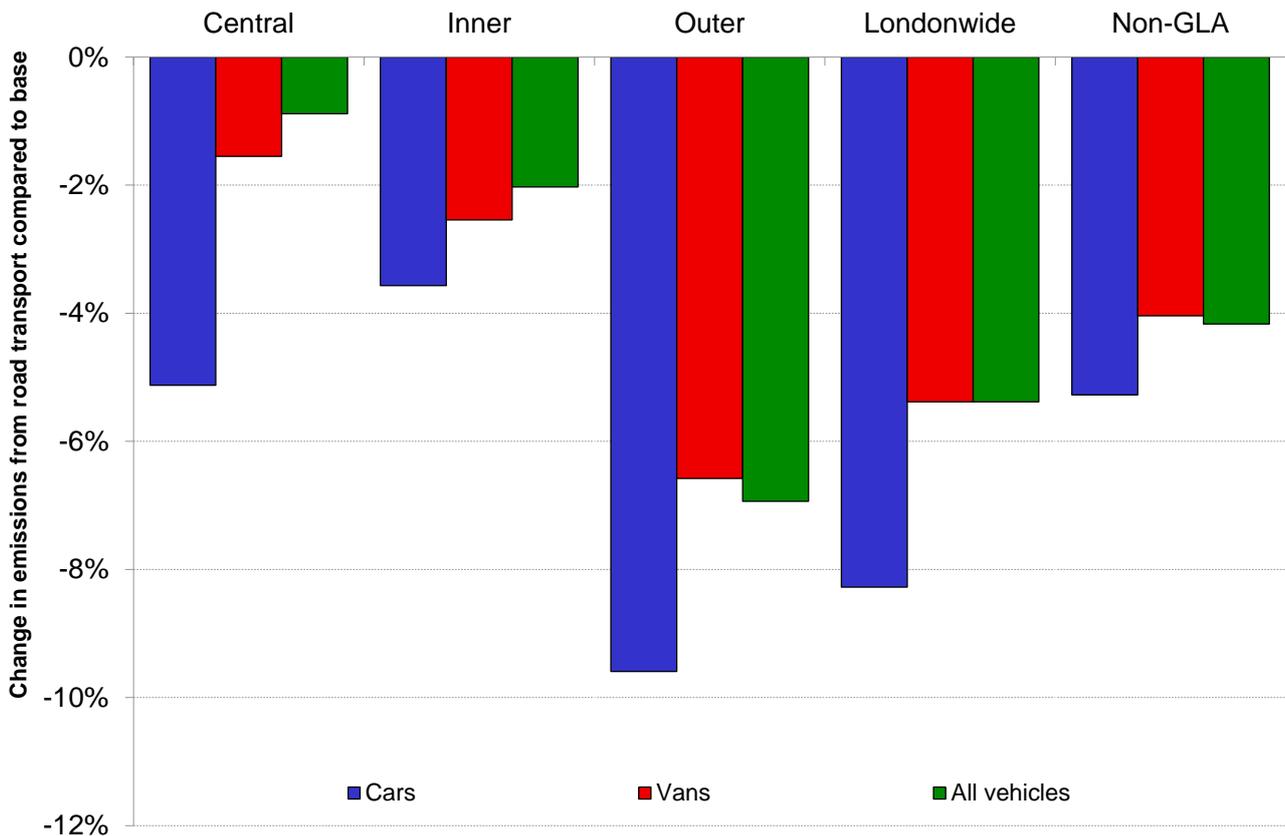
Road transport NO_x emissions

Figure 21 shows the impact of the ULEZ expansion proposal on NO_x emissions compared to the 2023 baseline, for cars, vans and all vehicles by spatial area. The proposed expansion has the greatest impact on NO_x emissions from cars in outer London (a reduction of 9.6 per cent) and vans in outer London (a reduction of 6.6 per cent). However, the benefits of expansion to outer London are felt across Greater London, including a reduction in NO_x emissions from cars in central and inner London of 5.1 per cent and 3.6 per cent respectively, compared to the 2023 baseline. The impact of the ULEZ expansion proposal on borough-level NO_x emissions is summarised in Appendix D with a range of between 0.9 per cent reduction (City of London) to an 8.5 per cent reduction in London Borough of Sutton, with the greatest reductions taking place in outer London boroughs.

Overall, taking into account all road transport emissions it is estimated that the London-wide expansion of the ULEZ would deliver a reduction in NO_x vehicle emissions in outer London of 6.9 per cent, as well as a reduction in inner London of two per cent, and 0.9 per cent in central London. London-wide reductions in road transport NO_x emissions are estimated to be 5.4 per cent, equivalent to 362 tonnes of NO_x.

A reduction of road transport NO_x emissions of 5.5 per cent is estimated in the area outside London up to and including the M25, which is the area covered by the modelling. The scale of impact is slightly smaller than for the outer London area because the impact on vehicle compliance is estimated to be lower there than inside the expanded ULEZ zone as only vehicles entering to drive in the zone are impacted.

Figure 21: Road transport NO_x emissions by area and vehicle type, 2023 with London-wide ULEZ vs 2023 without



Reductions of road transport NO_x emissions are estimated across most areas of London. Reductions are also expected on the Transport for London Road Network (TLRN) in all boroughs and along the North and South Circular Roads in all boroughs, as well as at key locations including town centres.

It is expected that the outer London ULEZ expansion could deliver an 8.3 per cent reduction in car NO_x emissions, and a 5.4 per cent reduction in van NO_x emissions London-wide. Some slight increases in NO_x emissions are expected on a small number of roads within the current inner London ULEZ. It is estimated that approximately two per cent of road lengths in the current ULEZ may have an increase of more than one per cent in NO_x emissions, compared to 98 per cent estimated to have no change or improved emissions. This is due to the expansion of the zone to outer London leading to some re-routing and re-distribution of trips which previously avoided the current inner London ULEZ. However, overall there is a decrease in NO_x emissions from both cars and vans in inner London – a reduction of 3.6 per cent and 2.5 per cent respectively.

PM_{2.5} emissions

Figure 22 shows the reduction in PM_{2.5} emissions compared to the 2023 baseline, for cars, vans and all vehicles. This is shown for outer London and Greater London, and by PM_{2.5} emissions type. On average across London, around 90 per cent of PM_{2.5} emissions from road transport are due to non-exhaust sources including brake and tyre wear, and due to abrasion of the road surface over time. These sources tend to follow patterns of changes in vehicle kilometres, whereby increases in kilometres tends to increase non-exhaust emissions.

It is estimated that the ULEZ expansion London-wide would deliver a 11.3 per cent reduction in tailpipe PM_{2.5} emissions in London, and an overall reduction in PM_{2.5} emissions from road transport of 1.5 per cent, this is equivalent to 8 tonnes of PM_{2.5}.

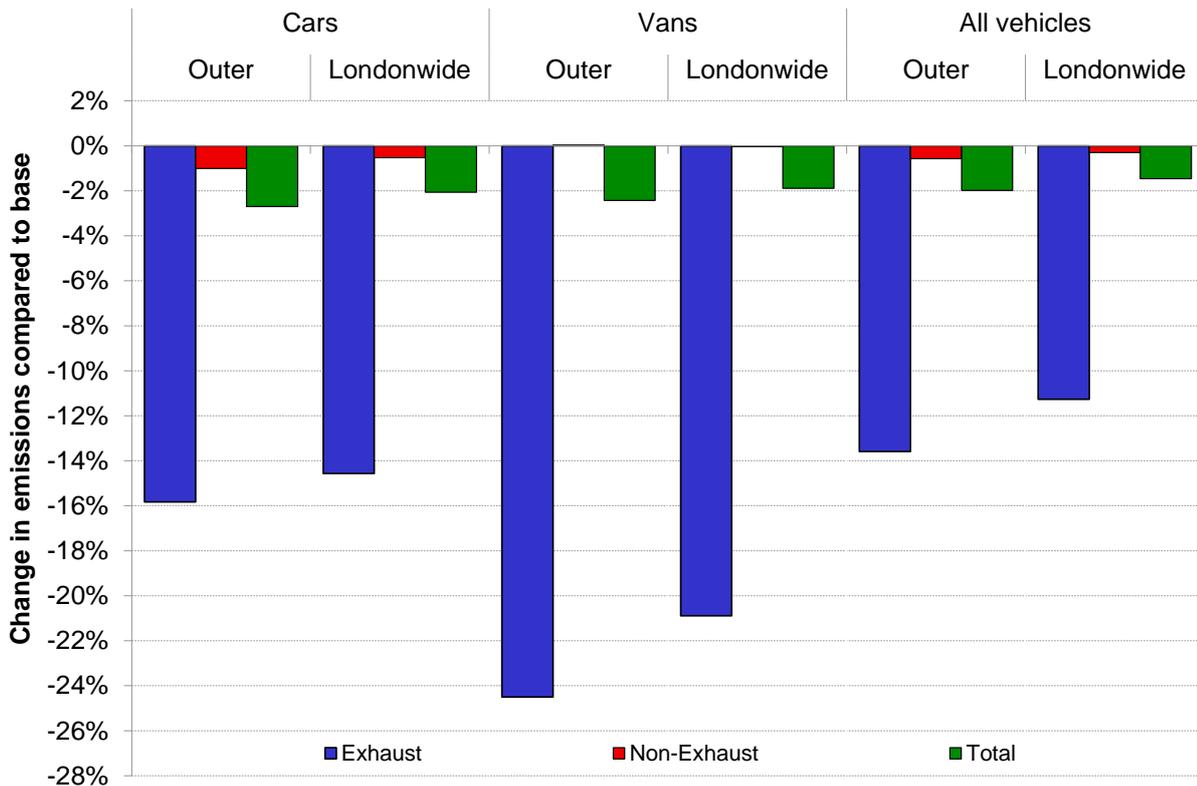
The ULEZ expansion London-wide would reduce overall PM_{2.5} emissions (exhaust and non-exhaust) from cars and vans in outer London by 2.7 per cent and 2.4 per cent respectively. The expansion would also deliver a reduction in PM_{2.5} emissions from cars in central London of 1.7 per cent, 0.2 per cent for vans and 0.4 per cent for all vehicles. Whilst there could be a slight increase in non-exhaust PM_{2.5} emissions from cars in inner London (one per cent), due to a small amount of trip re-distribution and re-routing, the scheme could lead to a small overall reduction in PM_{2.5} road transport emissions (including exhaust) from all vehicles in inner London of 0.2 per cent, including no change in PM_{2.5} from cars, and a 0.8 per cent reduction of van PM_{2.5} emissions.

An expanded ULEZ could reduce London-wide PM_{2.5} exhaust emissions from cars and vans by 14.6 per cent and 20.9 per cent respectively. The greatest impact on tailpipe PM_{2.5} emissions is for vans in outer London, reducing emissions by 24.5 per cent compared to the baseline; there is also a reduction in PM_{2.5} tailpipe emissions from cars in outer London of 15.8 per cent.

Over time, exhaust emissions contribute a lower proportion of emissions of PM_{2.5} compared to non-exhaust sources. Challenges also remain with regards to potential increases in tyre wear and abrasion of road surface especially where electric vehicles may be heavier compared to petrol or diesel counterparts.

The impacts of the ULEZ expansion on PM_{2.5} emissions at a borough level are summarised in Appendix D with a range up to a three per cent reduction (in the London Borough of Sutton) and the greatest reductions taking place in outer London boroughs. Reductions of road transport PM_{2.5} exhaust emissions are estimated across London. Reductions are also expected on the TLRN in all boroughs, and along the North and South Circular, as well as at key locations including town centres. Taking account of some changes in local traffic flows and speeds means that some very small increases in non-exhaust PM_{2.5} emissions may occur in some localised areas.

Figure 22: Road transport PM_{2.5} emissions by emission type and area, 2023 with London-wide ULEZ vs 2023 without



There are a few roads in inner London where the ULEZ expansion would have a greater than one per cent increase in PM_{2.5} emissions for all vehicles compared to the 2023 baseline. This is likely a result of a small number of trips re-distributing and re-routing as a result of the expanded zone. However, there is a negligible impact on PM_{2.5} car emissions in inner London (<0.1 per cent increase) overall and ULEZ expansion London-wide could deliver a reduction in exhaust PM_{2.5} emissions from cars of 9.7 per cent in inner London. There is also a reduction in overall PM_{2.5} emissions from vans in inner London as a result of the expansion – a reduction of 0.8 per cent of total PM_{2.5} emissions from vans, and a reduction of 8.8 per cent of exhaust PM_{2.5} emissions from vans.

Carbon emissions

In addition to driving a shift to cleaner vehicles, the ULEZ expansion London-wide would also encourage a shift to active, efficient and sustainable modes, thus delivering a reduction in carbon emissions. The greatest reduction in carbon emissions in London is from cars in outer London; a reduction of 1.4 per cent compared to the 2023 baseline without the expansion. There is a slight increase in carbon emissions in inner London (0.3 per cent) due to some re-routing around the current inner London ULEZ boundary.

However, overall the expansion proposals would deliver a 0.4 per cent reduction in London-wide carbon emissions from road transport equivalent to 23,000 tonnes, including a 0.9 per cent reduction in carbon emissions from cars. Carbon emissions are expected to reduce by 1.6 per cent outside London⁶⁰, equivalent to 43,000 tonnes of carbon.

The impacts at a borough level are summarised in Appendix D.

Pollutant concentrations

It is important to emphasise that forecast levels and the change in pollutant concentrations are based, as with all impacts, on the expansion impacts in 2023 compared to the 2023 base. Concentrations in outer London tend to be lower than in central and inner London due to better dispersion along major roads, which reduces the impact of traffic emissions at the roadside and because background concentrations influenced by other sources tend to be lower away from the centre of London. However, concentrations in outer London are improving at a slower rate compared to the rest of London and many outer London residents live in areas which exceed the lowest WHO interim target for NO₂ of 20 µg/m³.

Concentrations in 2023 are expected to be around 20 per cent lower than levels predicted for 2019 based on the London Atmospheric Emissions Inventory (LAEI). This is as result of reductions in emissions due to programmes such as bus electrification, and the uptake of zero emission capable vehicles, notably cars, vans and taxis. Whilst the proposed expansion reduces emissions in 2023, there is uncertainty around the return of traffic levels over the medium term. Traffic levels in the 2023 reference case remain slightly below pre-pandemic levels and activity at Heathrow airport remains subdued compared to before the pandemic. Further details of dispersion modelling assumptions are provided in Appendix C. Delivery of the expansion of ULEZ to outer London, however, would enable us to bring forward air quality improvements and ensure air quality benefits can be delivered across outer London despite potential changes to travel demand over the medium term. Interventions such as London-wide ULEZ also help to ensure that emissions reductions in London will continue, to help get beyond legal compliance and to achieve much greater ambitions for meeting the WHO guidelines for air quality which will bring significant health benefits to Londoners.

NO₂ concentrations

London-wide average concentrations of NO₂ are predicted to reduce by 1.3 per cent with the London-wide ULEZ in place. Average concentrations of NO₂ across all zones and boroughs in London, and outside London are predicted to improve as a result of reduced road transport NO_x emissions. Impacts are higher in outer London where average

⁶⁰ In the area covered by the LAEI, from the GLA boundary up to and including the M25.

reductions of 1.6 per cent are forecast compared to one per cent in inner London and 0.7 per cent in central London. Borough level data is provided in Appendix D.

Table 11 Annual average NO₂ concentrations µg/m³ (population weighted)

	LAEI 2019	Base 2023	London-wide ULEZ 2023	Scheme Reduction (µg/m ³)	Scheme % Reduction
Central	38.7	30.8	30.6	-0.2	-0.7%
Inner	31.5	24.4	24.2	-0.2	-1.0%
Outer	25.7	20.2	19.9	-0.3	-1.6%
Greater London	28.4	22.2	22.0	-0.3	-1.3%
Non-GLA	22.2	18.0	17.8	-0.2	-1.1%

Figures 23 and 24 show the predicted annual average NO₂ concentrations with the London-wide ULEZ and the change in NO₂ concentrations compared to the 2023 baseline. These show that overall improvements in NO₂ concentrations are predicted across London and outside the GLA boundary as a result of the ULEZ expansion to outer London, with the biggest reductions occurring close to roads due to the scheme focus on reducing road traffic emissions.

Figure 23 Annual mean NO₂ concentrations 2023 with the London-wide ULEZ

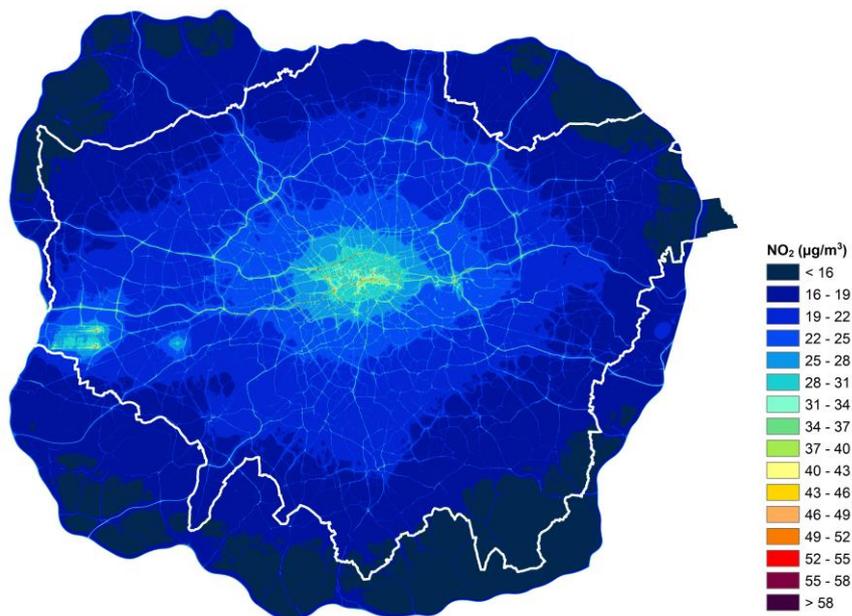
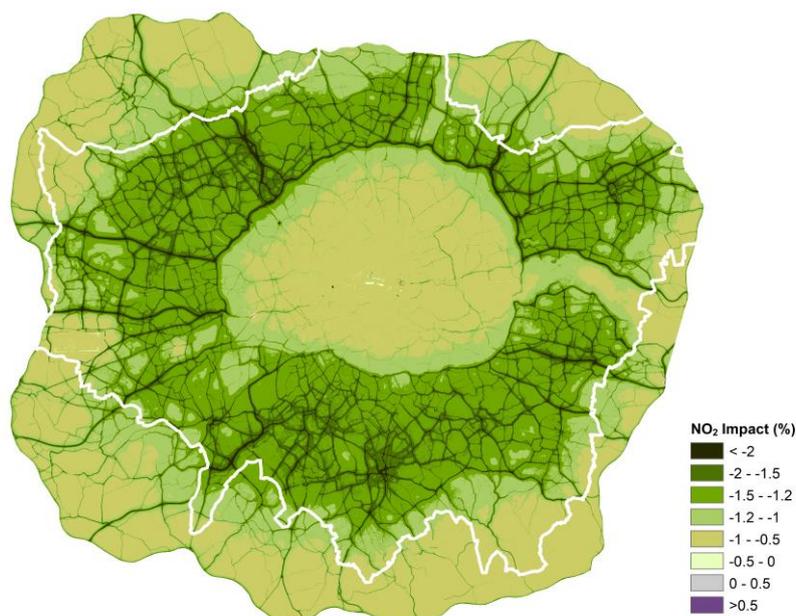


Figure 24 Impact of London-wide ULEZ impact on NO₂ concentrations



PM_{2.5} concentrations

Average concentrations of PM_{2.5} are estimated to be around seven per cent lower than levels in 2019. The London-wide average PM_{2.5} concentration with the London-wide ULEZ in place in 2023 is estimated to be 10.1 µg/m³, just above the WHO interim target of 10 µg/m³. Whilst the ULEZ expansion provides a small reduction in PM_{2.5} emissions, overall average concentrations of PM_{2.5} across all zones and boroughs in London, and those outside London are predicted to remain largely the same with the expansion. Concentrations considered across smaller areas, including those at census output area where population exposure statistics are derived show very small improvements in PM_{2.5} which do result in overall improvement in exposure to PM_{2.5}. Borough level data is provided in Appendix D.

Figure 25 and Figure 26 below show the predicted annual average PM_{2.5} concentrations with the proposed London-wide ULEZ and the change in PM_{2.5} concentrations. These show small overall improvements in PM_{2.5} across most of London with the impacts tending to be slightly higher close to major roads. The A12, A13, A2 and A40 inside the North and South Circular Roads are predicted to experience very small increases in PM_{2.5} concentrations of around 0.1 µg/m³, however, these changes in concentrations do not

result in a deterioration of population exposure London-wide because of wider but equally small improvements in PM_{2.5} concentrations.

Table 12 Annual average PM_{2.5} concentrations µg/m³ (population weighted)

	LAEI 2019	Base 2023	London- wide ULEZ 2023
Central	12.8	12.0	12.0
Inner	11.3	10.5	10.5
Outer	10.3	9.6	9.6
Greater London	10.8	10.1	10.1
Non-GLA	9.6	9.0	9.0

Figure 25 Annual mean PM_{2.5} concentrations 2023 with the London-wide ULEZ

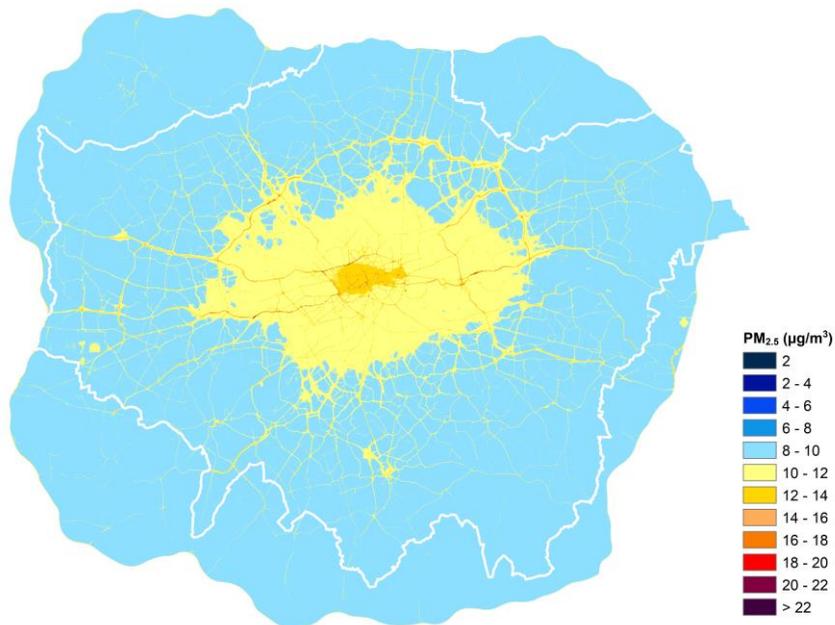
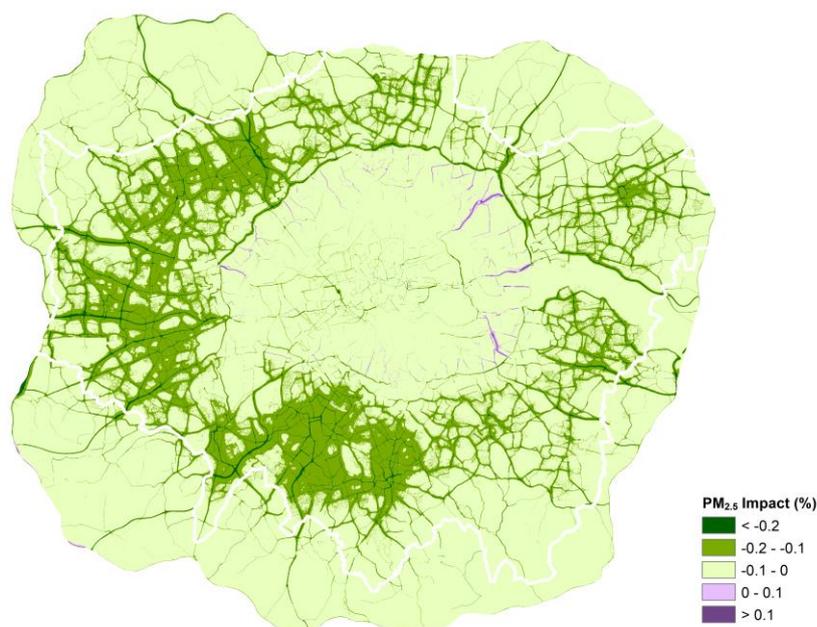


Figure 26 Impact of London-wide ULEZ on PM_{2.5} concentrations



People living in areas of exceedance

Improvements in air quality overall means that with the expansion of the ULEZ in place it is estimated that less than 3,000 people in Greater London will be living in areas exceeding legal limits for NO₂⁶¹. The majority of these people are in inner London, with the remaining in central London. As London moves forward and is achieving existing legal limits for NO₂ across most areas (more specific roadside exceedances are discussed below) further ambitions to achieving WHO guidelines and new UK legal limits to be adopted in October 2022 are clearly in sight, representing significant health benefits to Londoners.

Analysis of population exposure shows that in 2023 over 255,000 people London-wide will exceed the WHO interim target of 30 µg/m³, representing 2.8 per cent of the population. The expanded ULEZ is forecast to move nearly 30,000 people into air quality meeting the WHO interim target of 30 µg/m³. Even more substantial, however, is the shift the expansion of ULEZ London-wide can deliver in achieving the even tighter WHO interim target of 20 µg/m³. An estimated 74 per cent of London's population lives in areas exceeding this target, and London-wide ULEZ is expected to reduce exposure for over 340,000 people to meet this target level. The vast majority of these people (99 per cent)

⁶¹ Analysis based on average concentrations at Output Area level (spatial area as defined in the census)

are in outer London. Table 13 and Table 14 show the population exposure data for both WHO 30µg/m³ and WHO 20 µg/m³.

Table 13 Population living in areas of NO₂ exceedance (30 µg/m³)

	Total		Exceeding		% Exceeding		No Longer Exceeding
	Base 2023	London-wide ULEZ 2023	Based 2023	London-wide ULEZ 2023	Based 2023	London-wide ULEZ 2023	
Central	218,300	218,300	136,100	124,800	62%	57%	11,300
Inner	3,854,200	3,854,200	115,700	100,000	3%	3%	15,700
Outer	5,115,800	5,115,800	3,200	1,600	0%	0%	1,500
Greater London	9,188,300	9,188,300	255,000	226,500	3%	2%	28,600
Non-GLA	980,500	980,500	20,600	20,300	2%	2%	200

Table 14 Population living in areas of NO₂ exceedance (20 µg/m³)

	Total		Exceeding		% Exceeding		No Longer Exceeding
	Based 2023	London-wide ULEZ 2023	Based 2023	London-wide ULEZ 2023	Based 2023	London-wide ULEZ 2023	
Central	218,300	218,300	218,300	218,300	100%	100%	0
Inner	3,854,200	3,854,200	3,854,200	3,853,600	100%	100%	600
Outer	5,115,800	5,115,800	2,702,300	2,360,200	53%	46%	342,100
Greater London	9,188,300	9,188,300	6,774,800	6,432,200	74%	70%	342,700
Non-GLA	980,500	980,500	62,500	57,000	6%	6%	5,500

The Mayor has stated his ambition to achieve the WHO interim target of 10 µg/m³ in order to deliver widespread and lasting health benefits to all Londoners. Whilst the changes in average PM_{2.5} concentrations are very small, it is estimated that the London-wide ULEZ will contribute to improving air quality across London. In particular, around 44,200 people are expected to live in areas achieving 10 µg/m³PM_{2.5} for the first time as a result of the ULEZ applying London-wide. This includes over 13,000 people in inner London, and over 30,000 in outer London, as shown in

Table 15.

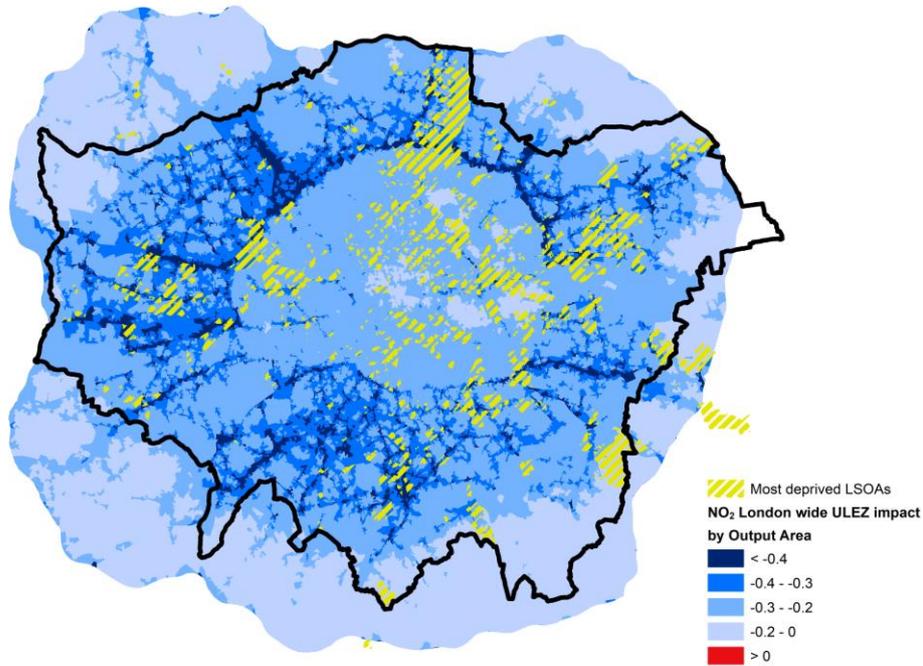
Table 15 Population living in areas of PM_{2.5} exceedance (10 µg/m³)

	Total		Exceeding		% Exceeding		No Longer Exceeding
	Based 2023	London-wide ULEZ 2023	Based 2023	London-wide ULEZ 2023	Based 2023	London-wide ULEZ 2023	
Central	218,300	218,300	218,300	218,300	100%	100%	0
Inner	3,854,200	3,854,200	3,326,500	3,313,000	86%	86%	13,500
Outer	5,115,800	5,115,800	770,200	739,500	15%	14%	30,700
Greater London	9,188,300	9,188,300	4,315,000	4,270,800	47%	46%	44,200
Non-GLA	980,500	980,500	24,900	24,500	3%	3%	400

Pollution exposure in areas of deprivation

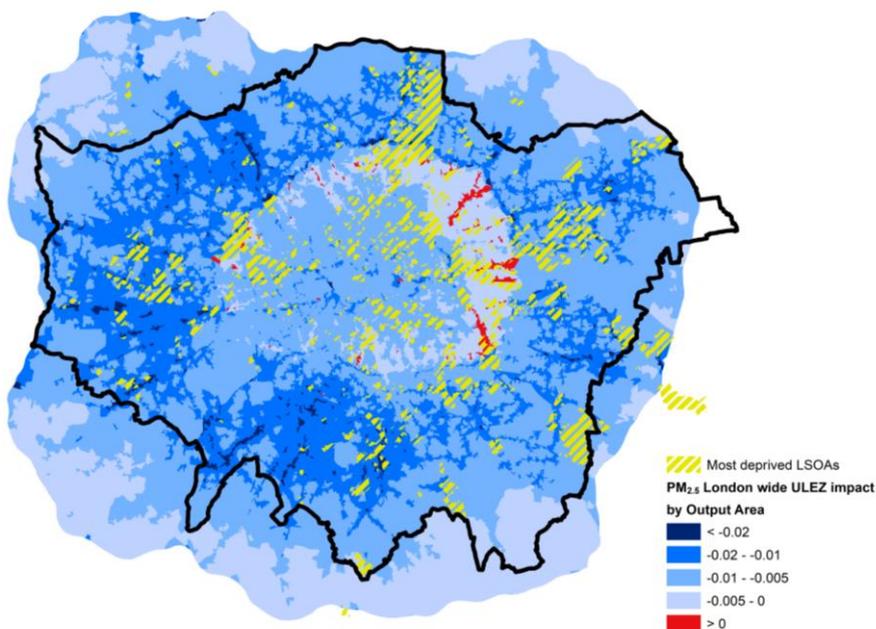
As described in section four, the most deprived groups of people in London tend to suffer more from poor air quality. The impacts of the London-wide ULEZ expansion on NO₂ and PM_{2.5} concentrations have been analysed and are mapped in Figure 27 and Figure 28 below in addition to the most deprived areas of London.

Figure 27 NO₂ impact with London-wide ULEZ in 2023 vs 2023 base and deprived areas



Note: Most deprived areas defined as Lower Super Output Areas (LSOAs) in lowest two deciles of the IMD

Figure 28 PM_{2.5} impact with London-wide ULEZ in 2023 vs 2023 base and deprived areas



Note: Most deprived areas defined as Lower Super Output Areas (LSOAs) in lowest two deciles of the IMD

Almost all people living in the most deprived areas (around 1.5 million) benefit from improved air quality overall. Over 99.9 per cent live in areas with improved NO₂ concentrations and 97 per cent live in areas with improved PM_{2.5} concentrations (albeit small). It is estimated that three per cent of people living in the most deprived areas may experience a slight increase in PM_{2.5} of around 0.1 µg/m³. However, this is compared to the vast majority of these areas having improved air quality for both PM_{2.5} and NO₂.

Table 16 Population impacted by changes in NO₂ and PM_{2.5} concentrations in the most deprived areas, by spatial area

		Total population in deprived areas	Population with deterioration in air quality	% of deprived population	Population with improved air quality	% of deprived population
NO ₂	Central	19,700	0	0%	19,700	100%
	Inner	896,720	294	0%	896,426	100%
	Outer	580,859	0	0%	580,859	100%
	Non-GLA	19,550	0	0%	19,550	100%
PM _{2.5}	Central	19,700	0	0%	19,700	100%
	Inner	896,720	26,844	3%	869,876	97%
	Outer	580,859	0	0%	580,859	100%
	Non-GLA	19,550	0	0%	19,550	100%

Note: Most deprived areas defined as Lower Super Output Areas (LSOAs) in lowest two deciles of the Index of Multiple Deprivation

Schools, hospitals and care homes

Pollutant concentrations around schools in both London and outside the GLA boundary have been assessed by averaging concentrations around 150 metres of the school location. Figure 29, Figure 30 and Figure 31 show the location of schools in London meeting legal limits for NO₂ (40 µg/m³) as well as WHO interim targets (30 µg/m³ and 20 µg/m³)

Within London, all 3,256 schools assessed are forecast to be below the legal limit for NO₂ (40 µg/m³), both with and without the London-wide ULEZ. It is estimated that, without the London-wide ULEZ, 106 schools would not meet the WHO target of 30 µg/m³ NO₂. With London-wide ULEZ in place, this would reduce to 91 schools, improving 15 schools in central and inner London. Appendix D provides a summary of the schools' concentrations for NO₂ and PM_{2.5}.

Improving pollution levels around schools and achieving WHO interim targets for children is important to continue to improve the health of young Londoners. Analysis of concentrations around schools shows that 2,369 are currently expected to exceed the

WHO interim target of 20 $\mu\text{g}/\text{m}^3$ for NO_2 in 2023. With a London-wide ULEZ in place, 145 of these schools, most of them in outer London, would meet this level.

Average concentrations have been assessed at 298 hospitals inside the M25 and 584 care homes. None of these locations exceed the legal limit for NO_2 of 40 $\mu\text{g}/\text{m}^3$, but over 228 are currently expected to exceed the WHO interim target of 20 $\mu\text{g}/\text{m}^3$. With the London-wide ULEZ in place this is estimated to fall to 215 hospitals, an improvement of 13 hospitals. Similarly, 335 care homes are currently estimated to be above WHO interim target of 20 $\mu\text{g}/\text{m}^3$ for NO_2 , and this is expected to improve to 305 with the expansion of ULEZ London-wide, with improvements at 30 care homes.

$\text{PM}_{2.5}$ concentrations have also been assessed at schools and show that over 77 per cent of schools in London exceed the WHO interim target of 10 $\mu\text{g}/\text{m}^3$, representing 1,421 schools. All hospitals and care homes assessed are expected to be in areas exceeding the WHO interim target of 10 $\mu\text{g}/\text{m}^3$ for $\text{PM}_{2.5}$. There is little improvement in $\text{PM}_{2.5}$ concentrations at schools as a result of the London-wide ULEZ, showing that improving $\text{PM}_{2.5}$ levels in London requires further action across all emissions sectors.

Figure 29 Schools exceeding NO_2 40 $\mu\text{g}/\text{m}^3$ in 2023 with London-wide ULEZ

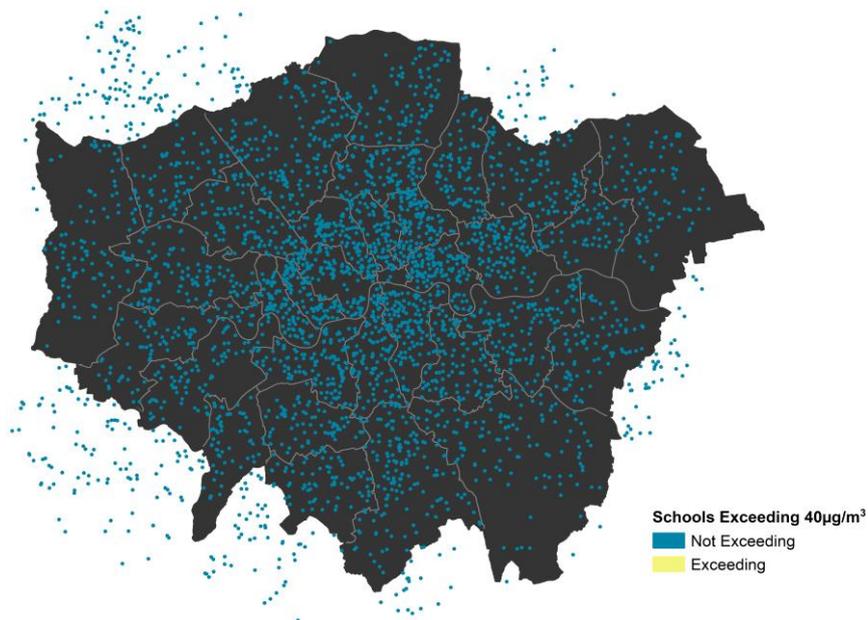


Figure 30 Schools exceeding NO₂ 30µg/m³ in 2023 with London-wide ULEZ

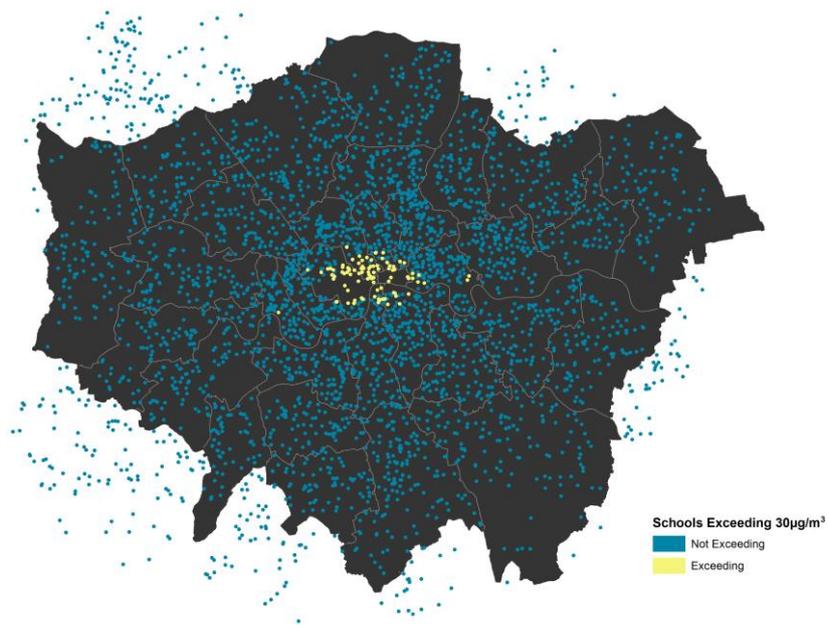
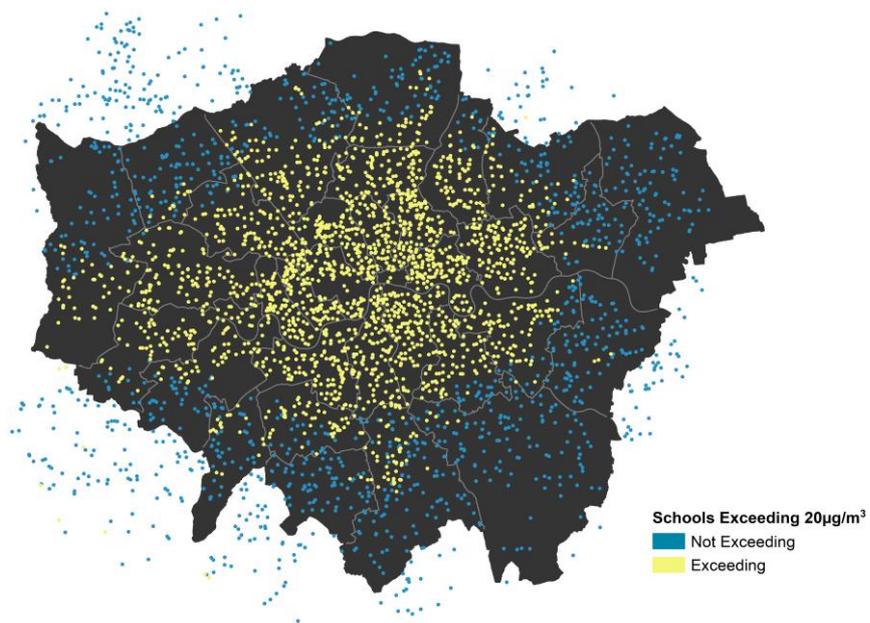


Figure 31 Schools exceeding NO₂ 20µg/m³ in 2023 with London-wide ULEZ



Road lengths

Air quality based on average concentrations over small areas (census Output Areas) are used to describe the changes in population exposure. However, concentrations are nearly always higher at the roadside due to the impact of traffic emissions close to roads. TfL assess concentrations at roadside at a distance of about four metres from the kerb in order to understand how policies impact locations where concentrations tend to be higher, especially where the focus is on reducing traffic emissions.

For many years large proportions of London's main road network have exceeded UK legal limits. Policies such as ULEZ and its expansion to inner London have accelerated the uptake of cleaner vehicles through the use of Euro 6/VI standards for diesel vehicles, and Euro 4 for petrol vehicles. This means that one per cent of London's roads are expected to exceed UK legal limits in 2023, compared to 54 per cent in 2016.

In 2019, 63 per cent of London's roads exceeded the WHO interim target of 30 $\mu\text{g}/\text{m}^3$ for NO_2 , and 99 per cent exceeded the lowest interim target of 20 $\mu\text{g}/\text{m}^3$. Table 17 provides the estimated proportion of major road lengths that are predicted to exceed UK legal limits and WHO interim targets for NO_2 .

Table 17 Proportion of road lengths meeting UK legal limits for NO_2 (40 $\mu\text{g}/\text{m}^3$), and the WHO interim targets (30 $\mu\text{g}/\text{m}^3$ and 20 $\mu\text{g}/\text{m}^3$)

	Proportion of road lengths meeting UK legal limit of 40 $\mu\text{g}/\text{m}^3$		Proportion of road lengths meeting UK legal limit of 30 $\mu\text{g}/\text{m}^3$		Proportion of road lengths meeting UK legal limit of 20 $\mu\text{g}/\text{m}^3$	
	2023 Base	London-wide ULEZ 2023	2023 Base	London-wide ULEZ 2023	2023 Base	London-wide ULEZ 2023
Central	84%	85%	9%	10%	0%	0%
ULEZ (excluding Central)	98%	98%	78%	80%	0%	0%
Outer	100%	100%	93%	95%	19%	23%
GLA	99%	99%	86%	87%	12%	15%
Non-GLA	99%	99%	24%	25%	14%	16%
TLRN	97%	97%	75%	78%	7%	8%

The expansion of ULEZ London-wide would reduce the proportion of the road network which exceeds these values, particularly in outer London. It is estimated that 87 per cent of roads in London would meet the 30 $\mu\text{g}/\text{m}^3$ interim target. However, the expansion could ensure that almost a quarter (23 per cent) of the road network in outer London meets the

lowest interim target of 20 µg/m³ in 2023, compared to 19 per cent without the expansion. This means that 15 per cent of London's road network could meet the 20µg/m³ target, up from 12 per cent without the expansion.

As a result of the expansion a number of outer London boroughs, including Bromley, Croydon, Harrow, Sutton and Merton, would have fewer than one per cent of the road network exceeding the interim target of 30 µg/m³. Outer London boroughs are also predicted to have the largest increase in the proportion of roads meeting 20 µg/m³ as a result of the expansion.

The expansion is expected to improve air quality concentrations of roadside NO₂ across the TLRN in all boroughs with largest improvements in outer London boroughs particularly for the proportion of roads achieving the 20 µg/m³ target. Appendix C provides the proportion of road lengths exceeding NO₂ across London's boroughs.

Environmental impacts as assessed in the Integrated Impact Assessment (IIA)

In addition to the assessment above, the environmental impacts of the proposals have been assessed as part of the IIA. Findings are summarised below.

Across Greater London, moderate (NO_x) to minor (PM₁₀ and PM_{2.5}) beneficial impacts are expected on road traffic emissions of air pollutants, with minor (NO₂) to negligible (PM₁₀) beneficial impacts on exposure to air pollution.

Minor (NO₂) to negligible (PM_{2.5}) beneficial impacts are expected on exposure to air pollution and achieving WHO Interim Targets across Greater London, with a minor beneficial impact on compliance with legal limits across Greater London.

Negligible beneficial impacts are also expected for carbon emissions in Greater London and on nature conservation sites due to decreases in NO_x concentrations.

A minor positive impact is also expected on cultural heritage assets from reduced risk of acid rain in London as a result of NO_x reduction, with a neutral impact expected on the soiling of historic buildings from reductions in PM emissions.

Neutral impacts are expected on anticipated additional tonnage of vehicles scrapped and on fly-tipping in those parts of outer London which not fall within the London-wide ULEZ boundary.

In addition, the impact on the built environment or streetscape within urban/suburban areas of outer London as a result of the installation of new street furniture is expected to be neutral, although it is expected there will be localised minor negative impacts of new street furniture in some rural areas.

Business and economic impacts

The proposed London-wide expansion of ULEZ is forecast to reduce total trips⁶² in London by around 44,000 each day, with 19,000 trips diverting to avoid London and 25,000 trips not happening at all. In percentage terms, this is under a 0.2 per cent reduction in total trips.

Shopping trips in London are expected to reduce by just under 7,000 trips or 0.2 per cent, with 3,000 of these now taking place outside of London and the remainder ceasing completely. Business trips in London could reduce by under 2,000, or 0.1 per cent. There could also be a small shift of commuting trips to outside of London, but there is not expected to be a reduction overall.

Overall, business and economic impacts are considered to be short term as adjustments are made to adapt to the scheme. Impacts on PHV provision and taxis licensed outside of London and on the night-time economy spend from people living outside of London are considered to be neutral.

Minor negative impacts are expected on reduced retail spend from people living outside of London; increased van operating costs for a significant proportion of tradespeople, street markets, delivery companies and similar; and on localised labour markets, in particular at Heathrow Airport.

People (including health and equalities) impacts

The Mayor's aim is that by 2041, all Londoners do at least 20 minutes of active travel each day to stay healthy⁶³. Currently only 37.6 per cent of Londoners who live in outer London achieve this⁶⁴. This is much lower than the 49.3 per cent of inner Londoners – which shows the particular need to encourage outer Londoners to use active and sustainable travel options.

As highlighted earlier, the London-wide ULEZ expansion is expected to increase active travel, particularly for outer London residents. For example, there could be an additional 60,000 (1.9 per cent) walking trips and 3,000 (1.5 per cent) cycling trips made entirely within outer London every day. This will help to improve the health outcomes for individuals choosing to walk and cycle.

⁶² Trips by all modes and purposes

⁶³ <https://content.tfl.gov.uk/healthy-streets-for-london.pdf>

⁶⁴ Travel in London 14

It is expected that the London-wide ULEZ expansion will bring improvements to air quality, resulting in better health outcomes for all Londoners, with disproportionately greater health benefits for older people and children, and differential benefits for people with a range of long-term health conditions, children and older people living in outer London. Impacts on vulnerable populations as a result of reduced urban heat island effects are considered to be neutral.

Impacts on disabled people travelling by car in outer London who qualify for Motability scheme and disabled vehicle tax class exemption are considered to be neutral. However, a moderate disproportionate negative financial impact is expected on disabled people who make journeys using non-compliant vehicles and do not qualify for Motability scheme and disabled vehicle tax class grace period. These disabled people, alongside people on low incomes and older people, are expected to experience moderate differential impacts on health (stress and anxiety and isolation).

It is expected there will be disproportionate moderate negative impacts on care workers (particularly Black, Asian and minority ethnic people and women) using a non-compliant vehicle where employers do not reimburse staff. Differential moderate negative impacts are expected on people who receive domiciliary care, mobile healthcare services, and/or informal care in outer London, particularly disabled people, older people, pregnant or maternal women, and people with underlying health conditions.

Moderate negative impacts are expected on those reliant on non-compliant vehicles including people on low incomes accessing employment (particularly in night-time economy) or opportunities in outer London; people with restricted mobility including pregnant and maternal women; and tradespeople, likely to be disproportionately experienced by men and members of the Gypsy and Traveller community, working in outer London.

Some minor differential negative impacts are expected for people who travel by non-compliant vehicle, including:

- pregnant and maternal women, older people, disabled people, people with underlying health conditions, and people on low incomes accessing medical appointments at specialist facilities in outer London or healthcare outside London
- people of different faiths accessing places of worship in outer London
- young people attending SEN schools in outer London and/or their carers and families on low incomes
- BAME people and women who work for the NHS in lower paid positions in outer London
- charities and community organisations operating within outer London and the vulnerable groups who rely on their services

It is expected there will be disproportionate minor negative impacts for those reliant on non-compliant vehicles including women taking children to school in outer London and BAME PHV drivers working in outer London.

Community severance⁶⁵ impacts are expected for people living in communities adjacent to the London-wide ULEZ boundary, particularly those on low incomes, who are required to travel into outer London by car to access employment, services and facilities.

A minor differential negative impact on perceptions of safety is also expected for women, disabled people, young people, transgender people, LGBT+ people and BAME people, who travel by non-compliant private vehicle but cannot afford to upgrade to a compliant vehicle.

There are several discounts, exemptions and reimbursements for the existing inner London ULEZ scheme that will remain in place, as well as grace periods which will have end dates extended. These would mitigate some of the impacts associated with the implementation of the Proposed Scheme on certain people travelling within the ULEZ expansion area and on some businesses.

The proposals include extending the existing grace periods (during which a 100 per cent discount applies) that apply to disabled or disabled passenger vehicle tax class vehicles and wheelchair accessible private hire vehicles (WAV PHVs)⁶⁶ fulfilling a private hire booking for two years, from October 2025 to October 2027. The grace period for community minibuses would also be extended for two years, from October 2023 to October 2025.

In addition, for the London-wide ULEZ proposal the Mayor is considering a large-scale and targeted vehicle scrappage scheme to support Londoners, including, for example, those on low incomes, disabled people, charities and businesses.

Removing the annual £10 Auto Pay vehicle registration fee for ULEZ, Congestion Charge and LEZ and increasing the penalty charge from £160 to £180 for ULEZ and Congestion Charge

Customers who are registered for Auto Pay are automatically charged for the number of charging days their registered vehicle is used during charging hours within the Congestion Charge Zone, and if it doesn't meet the standards, the LEZ and ULEZ. The proposed

⁶⁵ The term 'community severance' describes the effects of transport infrastructure or motorised traffic as a physical or psychological barrier separating one built-up area from another built-up area or open space.

⁶⁶ WAV PHVs will only be exempt when carrying out a private hire booking for a TfL-licensed PHV operator. At all other times PHV owners will have to pay the charge if their designated wheelchair-accessible PHV does not meet the emissions standards and is not in the disabled or disabled passenger vehicle tax class.

removal of the Auto Pay registration fee is designed to help mitigate the impact of increasing the PCN level and remove a barrier to those signing up for this payment channel.

Drivers that have not paid the ULEZ or Congestion Charge within the time allowed (up to three days from date of travel), whose vehicles are not exempt or registered for a 100 per cent discount, may be issued with a PCN⁶⁷. The proposed increase in the level of penalty charge is designed to increase the deterrent effect of receiving a PCN and ensure the continued effectiveness of both schemes in achieving their objectives. The proposals to remove the £10 Auto Pay annual registration fee per vehicle and increase the penalty charge level to £180 are not expected to have a significant impact on traffic or emissions.

Our independent consultants Jacobs have assessed the potential impacts of these proposals in relation to the ULEZ, and this can be found within the main IIA. For the impacts in respect of the Congestion Charge and LEZ⁶⁸, we have undertaken an impacts assessment on the economic impacts and, in line with our public sector equality duty, a combined Equalities Impact Assessment (EqIA) on the proposals. Since no potential impacts on health or the environment were identified for these proposals, they were scoped out of the assessment. This assessment including the EqIA can be found [here](#).

Assessment of impacts for proposal to remove £10 per vehicle Auto Pay annual registration fee for the Congestion Charge, ULEZ and LEZ

The impacts of the increase to the level of the penalty charge may be offset by the accompanying proposal of removing the £10 per vehicle registration and annual renewal fee for Auto Pay, and Fleet Auto Pay (which is available to businesses with six or more vehicles). Drivers will benefit in financial terms by registering for Auto Pay or Fleet Auto Pay without having to pay an annual fee because it means that they cannot inadvertently incur a PCN because they forgot to pay the charge; it may also have a small saving in avoiding the administration costs associated with paying individual charges.

It is expected that the removal of the £10 Auto Pay administration fee will lower the barrier for disabled people who are not eligible for a discount or exemption and people on low incomes (particularly younger people, older people, women and BAME people) to sign up to Auto Pay. This is particularly relevant for infrequent drivers or those who do not often enter charging zones, where the £10 fee may put off registration for infrequent or 'just in

⁶⁷ A PCN is a legal requirement to pay the amount stated, and this is reduced by 50 per cent if paid within 14 days. PCNs can be referred to independent adjudicators if disputed.

⁶⁸ Changes to Auto Pay for Congestion Charge and LEZ; changes to penalty charge levels for Congestion Charge.

case' use. Registering the vehicle(s) for Auto Pay removes the possibility of a customer receiving a PCN and the associated higher cost. However, the benefit of an Auto Pay account may not be accessible to those in the Gypsy and Traveller community who have no fixed address and do not have a bank account (and pay road user charges via another channel such as a pre-payment card). However, this group is small in size and the frequency at which it may be impacted is limited which mitigates these impacts to some extent.

Assessment of impacts for proposal to increase the penalty charge for the Congestion Charge and ULEZ

There is a potential positive economic impact on all users of London's streets from the proposal to increase the penalty charge level for the Congestion Charge and ULEZ as it is intended to help ensure the continued effectiveness of the scheme by making a PCN a proportionate deterrent against drivers actively avoiding paying the Congestion Charge and ULEZ charge. It is not envisaged that this change will lead to a reduction in vehicles entering the zones.

At the same time, the increase to the level of the penalty charge could have a disproportionate adverse financial impact on disabled people who are reliant on cars, younger and older people, women, people from BAME backgrounds, and people on low incomes (including those in the Gypsy and Traveller community) if they are issued a PCN for failing to pay the Congestion Charge or the ULEZ charge. It could cause financial difficulties and impact their ability to pay the PCN.

PCNs can be avoided if customers are registered for Auto Pay, for which, as part of this proposal, the £10 registration and annual renewal fee per vehicle are being removed. Auto Pay and Fleet Auto Pay help make the process of paying the Congestion Charge, ULEZ and LEZ charges easier and remove the risk of a PCN being issued for non-payment.

An overwhelming majority of drivers do not receive PCNs and so the scale of impact of changes to the PCN level is therefore likely to be small. At present, three quarters of those affected by the Congestion Charge, the LEZ charge and the ULEZ charge are already signed up to Auto Pay which mitigates the risk of receiving a PCN. The groups identified as being affected are small in size and generally have low levels of car ownership. As a result, the disproportionate impact on those groups would be limited, to some extent.

Representation and appeals processes are in place for drivers to challenge the Penalty Charge if they believe it was issued incorrectly or unfairly or there were mitigating circumstances.

Data Protection Impact Assessment (DPIA)

The proposed expansion of the ULEZ London-wide will require the use of 2,750 additional ANPR cameras and bring additional vehicles/journeys within the scope of the scheme. This means there will be an increase in the number of VRMs collected by our cameras and, most likely, more payments being made, more customer accounts and more PCNs being issued.

As a result, the volume of personal data we process will increase. However, it is not intended that we will carry out the processing in ways which are different to how we do it now or which bring new risks. We have drafted a [DPIA](#) which considers the possible privacy implications of an expanded zone and this will be reviewed following the consultation.

7. Shaping the future of road user charging

The case for further action

Delivering the proposals outlined above will help us to make London cleaner, greener and less congested. However, further action will be needed in the long-term to achieve the necessary levels of traffic and emissions reductions to continue to improve Londoners' health and to meet net zero carbon targets to tackle the climate emergency. This may require the introduction of London-wide road user charging by 2030 at the latest, as set out by an Element Energy analysis of a 2030 net zero target for London.⁶⁹ The analysis notes that all scenarios would benefit from London-wide road user charging being introduced as early as possible.

What is road user charging?

Road user charging involves charging drivers for the use of the roads they drive on.

The policy of road user charging in urban areas has existed worldwide for nearly half a century. Initially schemes were largely based on a cordon charge, where vehicles are charged for entering the charging zone (e.g. Singapore, Stockholm), or an area charge where vehicles are charged for circulating within the charging zone (e.g. London Congestion Charge Zone).

More recently, new technology has enabled users to be charged based on distance travelled.

In London, we currently have three road user charging schemes in operation: the Congestion Charge (central London), the Low Emission Zone (London-wide), and the Ultra Low Emission Zone (currently inner London).

In January 2022, the Mayor responded to the Element Energy report by announcing his preferred pathway to net zero carbon.⁷⁰ This would require a 27 per cent reduction in car kilometres travelled on London's roads by 2030. To help achieve this, London may need a new kind of road user charging system implemented by the end of the decade. This could

⁶⁹ Element Energy, Analysis of a Net Zero 2030 Target for Greater London, 2022:

https://www.london.gov.uk/sites/default/files/nz2030_element_energy.pdf

⁷⁰ London Net Zero 2030: An updated pathway, GLA, 2022:

https://www.london.gov.uk/sites/default/files/london_net_zero_2030_-_an_updated_pathway_-_gla_response_1.pdf

include replacing existing charges with a road user charging scheme that uses more sophisticated technology to make it as simple and fair as possible for customers.

This would be alongside wider action across the transport sector, including traffic and parking control measures, road space reallocation, public transport improvements, freight consolidation, and co-location of services to reduce the need to travel. Additional action would also be required in other sectors, including retro-fitting buildings to be more energy efficient and the installation of heat pumps.

We are already delivering some of these wider actions:

Active travel

We supported boroughs to deliver around 100 Low Traffic Neighbourhoods and there are now more than 500 School Streets⁷¹ in London. We have expanded our strategic cycle network by almost 250km since 2016, with one in five Londoners now living within 400m of a cycleway. We are also providing more cycle parking, including over 3,000 spaces delivered in 2020 and 2021 in a range of locations including town centres, rail stations and residential hangars. We continue to improve safety to make it easier for people to choose to walk or cycle. The Safer Junctions⁷² programme has improved 43 dangerous junctions in London and nearly half of the Capital's roads now operate on a 20mph speed limit.

Public transport

All TfL's bus fleet are ULEZ compliant, and we now have one of the largest electric bus fleets in western Europe, with more than 800 zero-emission buses on the road. We have introduced new electric buses with new customer features on route 63, and working with boroughs have delivered more than 5km of new and improved bus priority in the past year. This year we will open the Elizabeth Line, and an extension of the London Overground network to Barking Riverside.

Cleaner vehicles

We continue to work with taxi and private hire operators to support their conversion to zero emission capable vehicles.⁷³ More than a third of the active taxi fleet in London is now zero emission capable or fully zero emission. Since 1 January 2018, taxis presented for licensing for the first time have needed to be zero emission capable, and from 1 January 2023 all PHVs licensed for the first time must be zero emission capable and meet the Euro

⁷¹ Restricting access to the street outside a school at drop off and pick up times

⁷² Safer Junctions programme takes an evidence-based approach to target junctions on the TfL road network where high numbers of people have been killed or injured while walking, cycling or riding motorcycles

⁷³ <https://tfl.gov.uk/info-for/taxis-and-private-hire/emissions-standards-for-phvs>

6 emissions standard. We have worked with boroughs and the private sector to increase the number of EV charging points by 85 per cent between 2019 and 2021, with more than 9,000 publicly accessible charging points now available in London, accounting for a third of the UK total.

Greener and more efficient streets and freight

In recent years, we introduced and expanded the ULEZ, raised the Congestion Charge, and extended the Congestion Charge operating hours to weekends. We review the timings of 20 per cent of London's 6,000 traffic signals every year to ensure safe and efficient movement of people and vehicles on our streets. We are working with businesses and the freight sector to develop sustainable freight solutions.

We also have plans to procure more renewable energy, accelerate the electrification of the bus fleet subject to Government support, switch our support vehicles to zero-emission, and ensure freight and servicing vehicles under 3.5 tonnes delivering to TfL buildings are zero-emission.

Potential wider benefits of traffic reduction

Reducing traffic with a comprehensive strategy that includes London-wide road user charging would help us to address the triple challenges of toxic air pollution, the climate emergency, and traffic congestion. It could also be effective at improving:

Active travel

- A person who is physically active every day reduces their risk of chronic conditions including coronary heart disease, obesity and type 2 diabetes, mental health problems and social isolation.⁷⁴ Walking, cycling and accessing public transport is the main source of physical activity for Londoners.
- If everyone in London walked or cycled for 20 minutes a day, this would deliver at least an additional 60,000 years of healthy life in prevented illness and early death each year⁷⁵ but around one in five Londoners said '*too much traffic*' deterred them from walking in 2020/21⁷⁶.

⁷⁴ UK Chief Medical Officers' Physical Activity Guidelines, 2019:

<https://www.gov.uk/government/publications/physical-activity-guidelines-uk-chief-medical-officers-report>

⁷⁵ Mayor's Transport Strategy, GLA, 2018: <https://www.london.gov.uk/what-we-do/transport/our-vision-transport/mayors-transport-strategy-2018?intcmp=46686>

⁷⁶ TfL Customer Pulse survey 2020/21

- Similarly, around one in three Londoners who currently cycle say ‘*too much traffic*’ is a barrier to cycling, with 40 per cent of those who do not cycle saying the same⁷⁷.

Road danger

- Conflict with faster moving or larger vehicles puts people using London’s streets at risk. Cities across the world who have demonstrated the most progress in reducing casualties share one significant commonality: reducing exposure to motorised traffic. This has proven instrumental in driving down casualties in cities like Oslo and Helsinki, with both recording zero pedestrian and cyclist fatalities in 2019.

Noise

- Road traffic is the largest cause of noise pollution in London with almost 2.4 million people exposed to road traffic noise levels that are above WHO guidelines (55dB).⁷⁸ Persistent chronic noise exposure increases the risk of cardiometabolic diseases, including arterial hypertension, coronary artery disease, diabetes mellitus type 2, and stroke.⁷⁹ Reducing traffic volumes would help to reduce the health and wellbeing burden of London’s noise pollution.

Severance

- Physical barriers or heavy traffic can also make streets difficult to cross. This can disrupt social networks and lead to social isolation. People with weak social and community ties have worse health outcomes⁸⁰.

Local economies

- Low traffic streets that feel safe and comfortable for people to walk and spend time in bring economic benefits. High street walking, cycling and urban realm improvements have been shown to increase retail sales by up to 30 per cent⁸¹ and provide an uplift in office and retail rental values equivalent to an ‘additional’ four

⁷⁷ TfL Cycling Behaviour and Attitudes Survey P7 2021/22

⁷⁸ Mayor’s Transport Strategy, GLA, 2018: <https://www.london.gov.uk/what-we-do/transport/our-vision-transport/mayors-transport-strategy-2018?intcmp=46686>

⁷⁹ The adverse effects of environmental noise exposure on oxidative stress and cardiovascular risk, Münzel, T., Sørensen, M., Schmidt, F., Schmidt, E., Steven, S., Kröller-Schön, S., & Daiber, A., 2018, *Antioxidants & redox signaling*, 28(9), 873-908

⁸⁰ The urban built environment and mobility in older adults: a comprehensive review, Rosso, A. L., Auchincloss, A. H., & Michael, Y. L., 2011, *Journal of aging research*, 2011.

⁸¹ The Pedestrian pound: The business case for better streets and places, Lawlor, E, 2013: <https://www.livingstreets.org.uk/media/3890/pedestrian-pound-2018.pdf>

per cent and 7.5 per cent per annum respectively and decline in retail vacancy rates of up to 17 per cent⁸².

Wider economy

- In addition to the economic benefits of reduced congestion, traffic reduction can support London's wider economic competitiveness through its positive impacts on environment and quality of life, which are crucial factors in attracting people, capital, and enterprises from around the world.

Creating a virtuous cycle of benefits

Road user charging cannot deliver the change London needs on its own. We would need to improve alternatives to car travel, including walking, cycling, public transport and car clubs, so that more Londoners choose to use them. In parallel, we must also reduce the impact of TfL's own operations on air quality, climate and traffic congestion. If we do all of these things together, a new road user charging scheme could be part of an approach that creates a virtuous cycle of benefits for all Londoners:

- Reducing motorised traffic would make our streets safer
 - Cars were involved in 63 per cent of collisions that killed or seriously injured someone outside the vehicle in 2021, and HGVs and motorcycles are disproportionately involved in collisions which kill or seriously injure others.
- A safer, less traffic dominated experience would create streets where people want to walk and cycle
 - We know that safety concerns and too much traffic put people off walking and cycling. By addressing these concerns, we can help people switch from car, especially for shorter trips.
- At the same time, lower traffic volumes would improve the quality of public transport
 - We saw the dramatic impact that reduced traffic volumes can have on bus journey times during the first lockdown in 2020, when average bus speeds improved in all parts of the Capital, including by up to 50 per cent in central London.⁸³ Improving bus journey times would enable us to get more out of our bus network as we would need fewer buses to run a reliable schedule. We could then redeploy surplus buses to enhance frequencies or provide

⁸² Street appeal: The value of street improvements , Carmona, MP; Gabrieli, T; Hickman, R; Laopoulou, T; Livingstone, N, 2018: <https://content.tfl.gov.uk/street-appeal.pdf>

⁸³ Delivering the Mayor's Transport Strategy 2020/21: <https://content.tfl.gov.uk/the-mayors-transport-strategy-update-2020-21-acc.pdf>

new routes. Quicker journeys would also make bus travel an attractive option for more people.

- Surplus revenue from a road user charging scheme would be invested in the wider network to support the delivery of the Mayor’s Transport Strategy
 - This investment could make walking, cycling and public transport more attractive for more of people’s trips, and could support user benefits across all networks. We have done this before. For example, we enhanced the bus network following the implementation of the Central London Congestion Charge.

- In the long-run this can support the delivery of new homes and jobs, by improving public transport provision to enable more dense, less car dependent development in well-connected locations
 - This in turn could deliver further traffic reduction. The long-term overall impact of this ‘Good Growth’ on mode shift could be up to twice that of London-wide road user charging on its own.

What elements could be considered as part of future road user charging

As we start to consider how future road user charging could work, we want to hear what Londoners think about the elements of road use which could be included in setting a charge. Future road user charging could bring existing schemes such as the Congestion Charge, LEZ and ULEZ together into an integrated charge. The charge itself could be ‘smarter’ and vary according to a combination of elements, as set out in Table 18.

Table 18 Potential components of a new road user charging scheme

Component	How we consider this in existing schemes	Rationale for inclusion
How far you drive	We do not currently include distance driven in our road user charging schemes, but technology advances mean this could now be considered, meaning some people could pay less	<ul style="list-style-type: none"> ▪ NO_x, PM and CO₂ emissions are directly related to distance driven ▪ A reduction in overall vehicle kilometres on the network would typically result in reduced traffic congestion

Component	How we consider this in existing schemes	Rationale for inclusion
What time of day you drive	Currently the Congestion Charge is in operation 07:00 – 18:00 Monday – Friday, and 12:00 – 18:00 on Saturdays, Sundays and bank holidays. The LEZ operates 24 hours a day all year, and the ULEZ operates 24 hours a day except Christmas Day	<ul style="list-style-type: none"> ▪ NO_x and PM concentrations are higher at peak times ▪ Traffic congestion levels are typically highest in the morning and afternoon peaks
What type of vehicle you drive	We currently provide discounts and exemptions in our road user charging schemes for certain vehicles, for example emergency service vehicles or disabled tax class vehicles	<ul style="list-style-type: none"> ▪ In some cases it would be appropriate to provide discounts or exemptions to a charge
How polluting your vehicle is	All of our existing road user charging schemes consider vehicle emissions either in the charge level or discounts and exemptions from the charge	<ul style="list-style-type: none"> ▪ The majority of road transport NO_x, PM_{2.5} and CO₂ emissions in London come from cars and freight vehicles⁸⁴
Where you drive	All of our existing road user charging schemes cover a specific geographical area	<ul style="list-style-type: none"> ▪ Road transport emissions in outer London are higher than those in inner London⁸⁵ ▪ Congestion levels are typically highest in central London, and higher in inner London than in outer London.⁸⁶

⁸⁴ LAEI 2019

⁸⁵ LAEI 2019

⁸⁶ Travel in London Report 14, TfL, 2021: <https://content.tfl.gov.uk/travel-in-london-report-14.pdf>

Component	How we consider this in existing schemes	Rationale for inclusion
The alternatives available for walking, cycling or public transport	We do not directly consider availability of alternatives in our road user charging schemes, however this forms part of the rationale for some discounts and exemptions	<ul style="list-style-type: none"> ▪ It may be appropriate for charge levels to reflect the availability of alternatives to car use
Household income	We do not directly consider individual households' income in setting variable charge levels in our road user charging schemes	<ul style="list-style-type: none"> ▪ Ability to pay will be a consideration in developing a scheme that is fair for customers. It may also be appropriate to directly mitigate the impact of a charge for those who are less able to pay
Ability to choose between daily charges and pay as you go	Our existing schemes charge on daily basis only	<ul style="list-style-type: none"> ▪ Pay as you go could reflect usage in a more detailed way, and could mean some users pay less if they choose to opt in
How many journeys you make	Our existing schemes do not take this into consideration	<ul style="list-style-type: none"> ▪ It may be appropriate to consider frequency of travel when determining a charge
Other costs of driving	We do not directly consider other costs of driving (e.g. fuel duty, vehicle excise duty) in our road user charging schemes	<ul style="list-style-type: none"> ▪ It may be appropriate to consider the impact of these other costs when determining a charge

The design and operation of any potential future road user charging scheme would also need to protect individuals' privacy rights. This means that from the outset, respect for privacy rights and the protection of personal data would be incorporated into the objectives for a scheme, as well as the design of its implementation, and ensure throughout that a scheme can meet its objectives with the minimum possible collection and use of personal

data. We could also consider the role that privacy enhancing technologies can play in this. Some potential elements, for instance those relating to distance and/or route travelled and the time a journey is made, will require particular consideration and privacy risks will be mitigated by developing a scheme in accordance with the 'privacy by design' and 'data minimisation' requirements of the UK GDPR.

8. Next steps

The consultation runs for ten weeks and will close at midnight on 29 July 2022. We encourage everyone to take part in the consultation and have your say on whether you support these proposals. The consultation questionnaire can be found [here](#) on our website.

In addition to this document, you can read more about the expected impacts, both positive and negative, of these proposals in the IIA, which can be found [here](#).

Following the consultation, we will analyse the responses received from the public and stakeholders. The results from the consultation and our analysis will be available online.

Appendix A: Feedback from statutory bodies on the proposed MTS amendment (SEA requirement)

Consultee	Summary of Comments	Transport for London Response
Historic England	In addition to the National Planning Policy Framework (NPPF) and Planning Practice Guidance, we would advise that the IIA for the strategy should be reviewed in the context of Historic England's advice on <i>Strategic Environmental Assessment, Sustainability Appraisal and The Historic Environment</i> .	Noted. Taken into the consideration in development of this IIA.
	<p>The key issues in relation to the historic environment on page 18 differ from those on page 136 of the adopted IIA. Furthermore, the assessment guide questions on the historic environment page 28 also differ from those on page 168 of the adopted IIA.</p> <p>We recommend that the key issues and guide questions from the adopted IIA are reinstated, as these are clearly derived from appropriate baseline information and more closely aligned with the NPPF's requirements in relation to the historic environment</p>	Amended to ensure the guide questions accurately reflect the published 2018 MTS IIA.
	<p>We would however suggest one amendment to reflect NPPF terminology to the 2017 questions:</p> <p>Will the strategy Conserve and enhance <i>the heritage significance of sites, features and areas of historical, archaeological and cultural value/potential?</i></p>	The IIA assessment framework including all existing objectives and guide questions that were set out in the 2018 MTS IIA ⁸⁷ have been retained. This will ensure a consistent approach is taken to the assessment and the findings can be read

⁸⁷ <https://tfl.gov.uk/cdn/static/cms/documents/integrated-impact-assessment-report.pdf>

		alongside the previous IIA Environmental Report findings.
Environment Agency	A review of the current IIA Scoping Report shows that alternatives (to expanding the ULEZ) are proposed to be considered in the IIA. However, there is no clear reference to addressing trans-boundary / cumulative impacts. It would be logical to anticipate that a consequence of ULEZ expansion could be increased parking and road traffic on the periphery of the expanded ULEZ. This may be difficult to quantify, but appropriate to acknowledge and identify mitigation for to prevent poor air quality simply being an issue transferred from one area to another	The geographical scope of this assessment extends beyond the previous MTS 2018 which considered the area within the GLA to include potential impacts in areas adjacent to London.
	Also, we would like reassurance that the ULEZ expansion has considered the Environment Agency's regulation of sites (principally, waste sites), under the Environmental Permitting regime. The expanded ULEZ may have additional implications for London's waste industry, including for transport to and from regulated site. The proposals may conceivably result in the displacement of some waste operations to locations beyond the ULEZ, and increase fly-tipping. There are implications for the delivery of the Mayor's Environment Strategy, and London Plan aims for net zero waste and other waste targets, and potential for environmental impacts from increased waste crime.	Impacts to waste operations were considered as part of the assessment that accompanied the introduction of the London – wide Low Emission Zone. All successful applicants for TfL's proposed scrappage scheme will be required to prove they have scrapped their vehicles at an Authorised Treatment Facility in order to qualify for a grant. For owners of non-compliant vehicles that do not qualify for scrappage, the risk of illegal fly tipping is considered to be low.
	Other implications for the IIA to consider include those for rail travel, where in	The traffic modelling informing the proposals for

	increased passenger numbers potentially displace rail freight capacity, producing unintended environmental, economic and social impacts. We suggest that trans-shipment hubs should be preserved and enhanced within the ULEZ proposals for rail and water borne freight, thus supporting the move to more sustainable modes of transport.	a London-wide ULEZ indicates a 1.2 per cent increase in daily passenger trips by rail in 2023 compared with the reference case forecast. This relatively small change is not considered to have any implications for rail freight capacity.
Natural England	No comments on the Scoping Report	Noted

Appendix B: Modelling methodology and data sources

Methodology and assumptions

The assessment of how people might respond to the proposed changes is based on estimates of the number of vehicles in the zone, the compliance of those vehicles and how those who own non-compliant vehicles may switch to a compliant vehicle, sustainable mode or not travel to the zone at all. This assessment is then used to understand the impacts on compliance, vehicle kilometres, mode shift, air quality and carbon.

To understand the impacts of the scheme on vehicles travelling in London, we have provided estimates for London-wide daily unique vehicles and compliance rates.

London-wide unique vehicle estimates

Unique vehicle estimates were calculated based on a number of datasets including:

- The London Travel Demand Survey (2019/20). An annual survey on the travel patterns of 8,000 London households.
- EDMOND. Aggregated and anonymised mobile phone data collected by Telefonica in 2016 which provides information on travel, mode and journey purpose inferred through trip patterns.
- Average annual daily flow (AADF) data. Daily vehicle volumes based on DfT count data, by vehicle type.
- Aggregated ANPR camera data from our current network to identify totals of unique vehicles by type and spatial area.

The volumes data used in this analysis is based on the following assumptions:

- Capture rates and number of unique vehicles compared to the number of car driver trips are similar to those in the current ULEZ area.
- Most of the data used is from autumn 2021 onwards, so accounts for pandemic changes to travel demand.

Compliance rates

Forecast compliance rates for 2023 with the proposed changes are based on work undertaken as part of on-going preparation of the LAEI (London Atmospheric Emissions Inventory) which focuses on 2019, 2025 and 2030. Compliance rates are based on the fleet compositions which are prepared as part of the LAEI which include information on age and Euro standards, alongside fuel type and vehicle type across London. This information is initially derived from cross referencing anonymised ANPR camera observations in London with the DVLA record of vehicle information, alongside vehicle kilometre estimates in London. In this way the different types and ages of vehicles along with correlated Euro standards can be determined. This method has been used in the LAEI 2016, and again for the LAEI 2019 which includes recent information across 2019, 2020 and 2021. This allows TfL to represent changes in the fleet overtime, for example observed reductions in pre-Euro 6 diesel vehicles can be seen, alongside increasing proportions of electric vehicles. To forecast the fleet compositions TfL use information on existing pathways of Euro standards which increase most rapidly when a new Euro standard is introduced, and rate of update reduces over time towards 100 per cent. In addition, work undertaken by Element Energy for the LAEI 2019 forecasts (still in

progress) alongside GLA carbon projections has been used to estimate the increasing proportion of electric and plug-in vehicles in 2023. Together the overall compliance rate by vehicle type in 2023 can be determined, and then this data is adjusted based on the uplift that is forecast from the TfL ULEZ vehicle response tool as described below.

Compliance rates are then used to understand the volumes of non-compliant vehicles that would be affected by London-wide ULEZ. This assumes that proportions of compliant and non-compliant vehicles based on the existing camera network are suitable to estimate unique vehicles, although changes to the camera network will increase the density of observations over time.

Vehicle switching and travel behaviour change

There are two main tools to understand the potential behavioural changes in response to the proposed changes. Firstly, to understand how the proposed changes may encourage owners of non-compliant vehicles to switch to compliant vehicles, a ULEZ vehicle response tool is used. This tool estimates the percentage of non-compliant vehicles that might switch to compliant vehicles using a breakeven analysis based on cost of upgrade versus cost of paying a charge. Secondly, TfL's demand and assignment models, MoTiON and LoHAM, together estimate how the remaining non-compliant vehicles might respond to a charge by changing travel behaviour. For example, deciding not to travel, changing mode or where possible changing the destination to avoid the charge. Together these behavioural responses drive the changes in compliance, vehicle kilometres, mode shift and ultimately air quality and carbon impacts.

The ULEZ vehicle response tool provides an estimate for how operators of non-compliant vehicles, including cars, LGVs, HGVs and coaches, might respond by upgrading their vehicle to a compliant vehicle. Updates were made to the ULEZ vehicle response tool since the previous ULEZ expansion to reflect current vehicle market trends and to include hybrid and zero-emission vehicles. The ULEZ vehicle response tool takes the percentage of compliant and non-compliant vehicles from the London Atmospheric Emissions Inventory (LAEI) 2019 fleet compositions. The non-compliant portion that would upgrade is calculated based on the estimated remaining market value left in a vehicle and divided by the number of days of useful life remaining. This is then compared with the cost of the ULEZ daily charge, based on frequency of visiting the zone (derived from ANPR camera data). A frequency distribution for outer London is challenging to estimate without a full camera network in place so a range has been considered that forms the one aspect of the sensitivities assessed, which are discussed later.

The main output from the tool is the change in percentage of non-compliant vehicles as a result of vehicle switching. This is then applied to MoTiON and LoHAM to understand how introducing a daily charge would impact travel behaviour for the remaining non-compliant

cars that would incur the charge. There have been sensitivities run that represent a range of possible compliance rates.

MoTiON is TfL's strategic transport model and consists of a demand model and three assignment models, one of which is LoHAM. MoTiON can forecast personal journeys for highway, public transport and active travel to, from and within London. The model can be used to assess forecasts of behavioural choices such as trip frequency, mode and destination choices as well as route choice by highway, public transport and cycle modes in response to a charge. Impacts presented on traffic, mode shift and vehicle kilometres are based on MoTiON and LoHAM outputs.

Travel behaviour choices for those owning vans is limited to rerouting and the overall number of trips is assumed to remain constant. This is primarily because it is expected that any businesses that leave the market as a result of the new emissions standards will be replaced by other businesses that have compliant vehicles or are willing to pay the charge. However, there may be a small change in demand for those that use their van for discretionary (and/or infrequent) purposes or those that could feasibly switch to using a cargo bike instead of a van.

Compliance rates in 2023 with proposed changes

Estimates of forecast compliance rates with the proposed changes is based on a combination of the vehicle switching and the travel behaviour change. The time it could take for this compliance rate to be achieved is assumed based on monitoring of the ULEZ expansion to inner London, which suggested that the majority of the behavioural response takes place before the scheme is launched (called pre-compliance) and within six to 12 months of the scheme launch. However, lower levels of pre-compliance could be attributed to a shorter notice period. The wider economic context could impact upon compliance, such as the increase in fuel costs, inflation, as well as the scale of a scrappage scheme.

Sensitivities were undertaken to represent this uncertainty. The sensitivities consider variations in the frequency distribution into the proposed area, the rate of pre-compliance and how quickly compliance is reached after scheme launch. At the lower end of the range, a London-wide compliance rate of around 95 per cent for cars and 87 per cent for vans was estimated around six months after scheme launch. A higher overall response and more rapid pre-compliance could see estimates of around 97 per cent for cars and 92 per cent for vans around three months after scheme launch, which would bring forward benefits at an earlier stage. On balance an estimate of 95 per cent for cars and 91 per cent for vans after three months was used for the emissions, air quality and carbon modelling and impacts.

Hybrid Forecast

In recent years, TfL has increasingly been thinking about how we deal with uncertainty when planning for London's future.

As we emerge from the pandemic, new evidence is regularly being published that provides insight into the direction of London's recovery. We need to reflect this changing landscape in our strategic planning. We are doing this through the periodic derivation of a Hybrid travel demand forecast, based on a regular review of this emerging evidence.

In summary, the Hybrid Forecast used in this analysis is informed by the following evidence on London's recovery from the pandemic:

- Population. Estimates based on the 'low' and 'low central' GLA population forecasts, resulting in a 2030 population of 9.5 million.
- Employment. A short to medium term impact on employment as a result of the pandemic, focused in industries impacted the greatest by pandemic restrictions.
- Inequality and disposable income: In the short term some groups, particularly those in 'blue collar' jobs are likely to be disproportionately impacted by job losses as a result of the pandemic and the cost of living crisis. In the long term high costs of housing will remain and have a subsequent impact on discretionary and leisure activities.
- Home working: Only available to some office-based sectors, predominantly those on higher incomes and working in central London. Overall, this leaves commuting trip rates at 75 to 85 per cent of 2018 levels over the longer term.
- Localism: With greater flexibility during the working day, trips from home for discretionary purposes are likely to hold up despite some activities being possible online, but there is a reduction in travel from non-home locations like offices. An accelerated shift towards online shopping during the pandemic means that overall shopping trip rates decline over the medium term.
- Propensity to cycle: We have assumed that some who enjoyed cycling during lockdown make a permanent change in the early 2020s but by the 2030s this is indistinguishable from a general increase in the propensity to cycle.
- Car ownership and use: Assumptions about London's population and housing stock, of which slower growth could result in higher overall car ownership. Therefore, the Hybrid Forecast accounts for higher car ownership than the reference case (largely due to lower house building) and that some of those who have been put off public transport will switch to car.

Further information on the Hybrid Forecast is available in Travel in London 14 <https://content.tfl.gov.uk/travel-in-london-report-14.pdf>

Despite lower traffic volumes in the 2023 Hybrid Forecast compared to the 2023 reference case, the reduction in the number of car driver trips with ULEZ expansion is forecast to be only slightly lower than the reference case. Consequentially, the percentage change in trips is slightly higher than the assessment of the proposed changes in the reference case. This is because the discretionary journey purposes, which are most sensitive to the charge, are affected least by changes in travel behaviour in the Hybrid Forecast. Overall, whether assessed in the reference case or the Hybrid Forecast, the outcomes are unlikely to vary significantly.

Appendix C: Air quality modelling

Introduction

Modelled air pollutant concentrations of NO_x, PM₁₀ and PM_{2.5} have been based on the same dispersion model used as part of the LAEI. The LAEI (London Atmospheric Emissions Inventory) is a comprehensive inventory of all emissions across London and up to and including the M25, including:

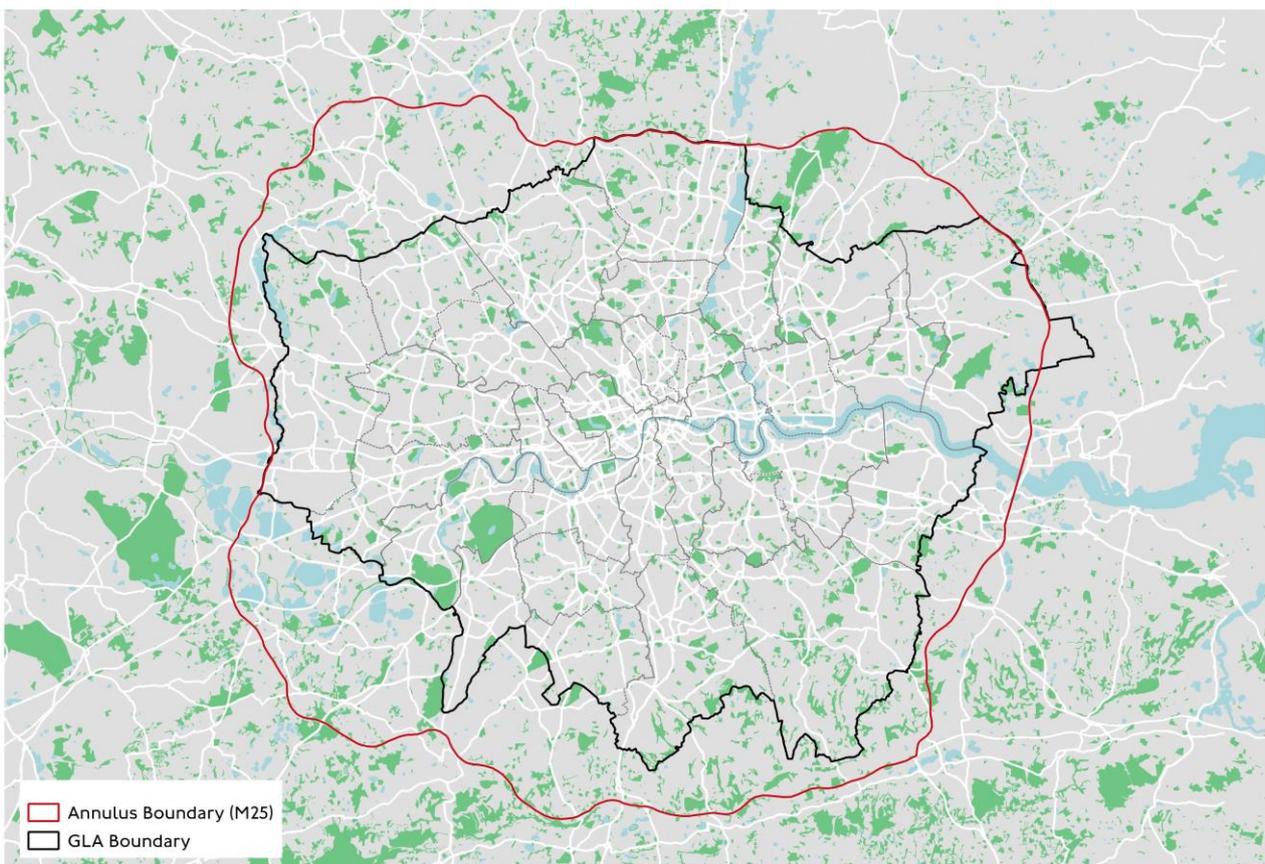
- Transport sources (road, rail, aviation and shipping);

- Industrial and Commercial sources (combustion of gas and other fuels, large industrial sites, waste, construction, non-road mobile machinery);
- Domestic sources (combustion of gas and other fuels, biomass wood burning); and
- Other miscellaneous sources such as agriculture or accidental fire.

The dispersion model requires, as input, detailed emissions for all the above sources at a high spatial resolution, represented as a mix of line sources (for roads, rail, shipping), point sources (stacks from large industrial sites) or area/volume sources.

The LAEI covers the Greater London area, within the GLA boundary, as well as up to and including the M25 (shown in Figure 32). The area from the GLA boundary up to and including the M25 is defined as 'non- GLA' in the air quality impact analysis.

Figure 32 Map of the GLA boundary and the M25



Road Transport Emissions

Road transport emissions were estimated on the LAEI Major Roads network (which consists of around 90,000 road links) using traffic data from TfL's transport model LoHAM, combined with zonal fleet composition by engine type (petrol, diesel, hybrid and electric) and Euro standard, for all vehicle types (distinct for central, inner and outer London, the M25 and outside London). Additional emissions on minor roads were derived LAEI vehicle-kilometre data from the LAEI 2019 baseline scaled to 2023.

The LoHAM transport model provides average peak hour flows and speeds for AM, PM and interpeak hours, for all vehicle types and all major road links across London.

ATC (automatic traffic counts) hourly data from TfL and Highways England (for the M25 and other London motorways) are used to derive expansion factors by zone (Central/Inner/Outer London and Non-GLA) and road types (M25, other motorways, A-Roads, B-Roads and Unclassified/C-Roads), so that AADT (Annual Average Daily Traffic) flows and daily average speeds can be estimated from the LoHAM peak hour flows and speeds.

For London buses, LoHAM flows and speeds were revised using TfL's iBus database, which provides more detailed bus flows and speeds for each bus route and between each bus stops across London.

The total HGV AADT flows estimated from the LoHAM transport model for each road link is further split between Rigid and Articulated HGVs using the average percentage of each HGV class by zone and road type, derived from detailed DfT AADT counts by vehicle type across London.

Motorcycle flows were also derived from the average Motorcycles/Cars ratio from DfT ATC data, as LoHAM does not include motorcycles

Other Emissions

Whilst most of the small sources of emissions were not revised and kept as in the LAEI 2019, emissions from a number of key sources were scaled from the LAEI 2019 and 2025 forecast emissions recently developed as part of the LAEI, wherever possible. Assumptions for these are described below.

Aviation

Aviation emissions were derived from the forecast emissions 2025 for the LAEI, which assumes aircraft activity to be back to pre-Covid level. In line with the most recent forecast, 2023 emissions were estimated to be 70 per cent and 60 per cent of 2025 forecast emissions for Heathrow and City airport, respectively.

Rail

Rail emissions were interpolated from the 2019 baseline and forecast 2025 emissions prepared for the LAEI.

Waste

Emissions from waste (sewage treatment works, landfill, waste transfer stations and small-scale waste burning) were interpolated from the 2019 baseline and the forecast 2025 emissions produced as part of the LAEI.

Domestic and Industrial/Commercial Gas

Emissions from the combustion of gas from the industrial, commercial and domestic sectors were derived from gas consumption projections provided by the GLA for 2025 as part of the London Environment Strategy (LES), revised using the latest baseline consumption from BEIS. 2023 gas consumption was then interpolated from the 2019 and the revised 2025 forecast.

NRMM Exhaust and Construction Dust

Emissions from NRMM exhaust (both from industrial sites and on construction sites) and construction dust emissions were interpolated between the LAEI 2019 baseline and recent projections to 2025. Construction NRMM exhaust and dust are based on a combination of GLA's NRMM registry data and estimates of development locations from the Building Development Model (BDM) outputs, as well as NRMM compliance rates estimates. Forecast industrial NRMM emissions take into account of improvements in machinery used on industrial sites, resulting in a cleaner NRMM fleet across London.

Background Concentrations

Background concentrations include the contribution of air pollutants not explicitly included in the dispersion modelling. These typically include emissions from all sources outside the LAEI (i.e. beyond the M25), which contribute to background levels. These are added to modelled concentrations from emissions across London, to estimate total concentrations.

Background concentrations used for 2023 are shown in Table 19 below. These have been estimated using the CMAQ model used as part of the Clean Air Fund (CAF) study based on UK air pollution modelling forecasts to 2030⁸⁸.

Table 19 Background air pollutant concentrations, 2023

Year	Background NO_x (µg/m³)	Background PM₁₀ (µg/m³)	Background PM_{2.5} (µg/m³)
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⁸⁸ [Pathway to WHO: achieving clean air in the UK](#)

2023	8.53	10.11	7.59
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Appendix D: Air quality impacts

Air pollutant emissions

Nitrogen Oxides (NO_x)

Road transport NO_x emissions (based on major road network in LAEI), 2023 with expanded ULEZ and without.

Table 20 Annual Road Transport NO_x emissions

	Base 2023			London-wide ULEZ 2023		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	28	41	235	26	40	233
Inner	676	484	1,836	652	472	1,799
Outer	2,488	1,280	4,655	2,249	1,195	4,332
Non-GLA	2,150	1,163	3,852	1,975	1,124	3,638
GLA	3,191	1,804	6,726	2,927	1,707	6,364
LAEI	5,342	2,967	10,578	4,903	2,832	10,002

Table 21 Change in road transport NO_x emissions, 2023 with scheme vs without

	Total			%		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	-1	-1	-2	-5.1%	-1.6%	-0.9%
Inner	-24	-12	-37	-3.6%	-2.5%	-2.0%
Outer	-239	-84	-323	-9.6%	-6.6%	-6.9%
Non-GLA	-175	-38	-214	-8.1%	-3.3%	-5.5%

GLA	-264	-97	-362	-8.3%	-5.4%	-5.4%
LAEI	-439	-135	-576	-8.2%	-4.6%	-5.4%

Table 22 Change in road transport NO_x emissions 2023 with scheme vs without

Borough	Cars	Vans	All vehicles
Barking and Dagenham	-10.4%	-7.3%	-7.2%
Barnet	-9.5%	-6.4%	-6.9%
Bexley	-10.7%	-7.0%	-7.7%
Brent	-8.2%	-6.2%	-5.9%
Bromley	-10.8%	-7.1%	-8.1%
Camden	-4.5%	-2.2%	-1.7%
City of London	-5.6%	-1.8%	-0.9%
Croydon	-10.8%	-7.3%	-7.8%
Ealing	-8.6%	-5.9%	-5.7%
Enfield	-7.2%	-5.1%	-5.3%
Greenwich	-6.8%	-5.2%	-4.7%
Hackney	-4.3%	-2.4%	-2.2%
Hammersmith and Fulham	-3.9%	-2.6%	-2.2%
Haringey	-3.2%	-2.5%	-2.1%
Harrow	-11.4%	-7.0%	-8.4%
Havering	-7.4%	-4.7%	-5.3%
Hillingdon	-9.4%	-6.4%	-6.9%
Hounslow	-9.5%	-6.7%	-6.4%
Islington	-4.5%	-2.3%	-1.8%
Kensington and Chelsea	-4.7%	-2.3%	-2.0%
Kingston	-10.6%	-6.9%	-8.0%
Lambeth	-6.2%	-4.4%	-3.3%
Lewisham	-6.7%	-5.1%	-4.3%
Merton	-11.2%	-7.4%	-7.7%
Newham	-4.4%	-3.8%	-2.9%
Redbridge	-9.0%	-6.7%	-6.7%
Richmond	-9.8%	-6.8%	-7.1%
Southwark	-4.4%	-2.6%	-2.1%
Sutton	-11.5%	-7.5%	-8.5%
Tower Hamlets	-4.4%	-2.6%	-2.4%
Waltham Forest	-6.1%	-4.6%	-4.3%

Wandsworth	-8.2%	-6.2%	-5.5%
Westminster	-5.0%	-2.2%	-1.5%

Particulate Matter (PM_{2.5} and PM₁₀)

Road transport PM_{2.5} and PM₁₀ emissions (based on major road network in LAEI) 2023 with expanded ULEZ and without.

Table 23 PM_{2.5} total road transport emissions (including exhaust and non-exhaust)

	Base 2023			London-wide ULEZ 2023		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	2	2	12	2	2	12
Inner	68	26	143	68	26	143
Outer	225	61	379	219	59	372
Non-GLA	141	40	254	138	39	250
GLA	295	89	534	289	87	526
LAEI	434	127	776	425	124	765

Table 24 Change in road transport PM_{2.5} emissions, 2023 with scheme vs without

	Total			%		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	0.0	0.0	-0.1	-1.7%	-0.2%	-0.4%
Inner	0.0	-0.2	-0.2	0.0%	-0.8%	-0.2%
Outer	-6.1	-1.5	-7.5	-2.7%	-2.4%	-2.0%
Non-GLA	-2.7	-0.7	-3.5	-1.9%	-1.8%	-1.4%
GLA	-6.1	-1.7	-7.8	-2.1%	-1.9%	-1.5%
LAEI	-8.8	-2.4	-11.2	-2.0%	-1.9%	-1.4%

Table 25 Change in road transport PM_{2.5} emissions with scheme, vs 2023 without

Borough	Cars	Vans	All vehicles
Barking and Dagenham	-2.7%	-2.5%	-1.9%
Barnet	-2.2%	-2.8%	-1.8%
Bexley	-3.1%	-2.3%	-2.2%
Brent	-1.6%	-1.9%	-1.2%

Bromley	-3.2%	-2.3%	-2.4%
Camden	-1.0%	-0.5%	-0.5%
City of London	-2.2%	-0.5%	-0.5%
Croydon	-3.2%	-2.2%	-2.3%
Ealing	-1.6%	-1.8%	-1.3%
Enfield	-2.2%	-2.2%	-1.6%
Greenwich	-0.7%	-1.8%	-0.8%
Hackney	-0.6%	-0.6%	-0.4%
Hammersmith and Fulham	-0.5%	-0.9%	-0.5%
Haringey	0.3%	-0.8%	0.0%
Harrow	-3.8%	-2.7%	-2.8%
Havering	-2.7%	-2.4%	-1.8%
Hillingdon	-2.8%	-2.4%	-2.0%
Hounslow	-2.3%	-2.4%	-1.7%
Islington	-1.0%	-0.6%	-0.5%
Kensington and Chelsea	-1.1%	-0.5%	-0.6%
Kingston	-2.9%	-2.0%	-2.2%
Lambeth	-0.6%	-1.5%	-0.6%
Lewisham	-0.9%	-1.8%	-0.8%
Merton	-3.5%	-2.5%	-2.5%
Newham	0.2%	-1.1%	-0.2%
Redbridge	-1.7%	-2.3%	-1.4%
Richmond	-2.6%	-2.0%	-1.9%
Southwark	-0.4%	-0.7%	-0.3%
Sutton	-4.0%	-2.4%	-3.0%
Tower Hamlets	-0.8%	-0.8%	-0.6%
Waltham Forest	-0.6%	-1.4%	-0.6%
Wandsworth	-1.5%	-2.2%	-1.3%
Westminster	-1.5%	-0.5%	-0.6%

Table 26 PM_{2.5} total road transport emissions (exhaust only)

	Base 2023			London-wide ULEZ 2023		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	0.3	0.1	1.6	0.2	0.1	1.6
Inner	6.3	1.6	13.8	5.7	1.5	13.0
Outer	25.7	6.1	41.0	21.6	4.6	35.5

Non-GLA	18.8	5.4	31.0	16.4	4.6	28.0
GLA	32.3	7.9	56.4	27.6	6.2	50.0
LAEI	50.8	13.1	85.9	43.8	10.7	76.5

Table 27 Change in road transport PM_{2.5} emissions (exhaust only), 2023 with scheme vs without

	Total			%		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	0.0	0.0	0.0	-8.2%	-3.8%	-1.8%
Inner	0.6	-0.1	-0.8	-9.7%	-8.8%	-5.5%
Outer	-4.1	-1.5	-5.6	-15.8%	-24.5%	-13.6%
Non-GLA	-2.3	-0.7	-3.1	-12.5%	-13.4%	-9.9%
GLA	-4.7	-1.6	-6.4	-14.6%	-20.9%	-11.3%
LAEI	-7.0	-2.4	-9.4	-13.8%	-18.0%	-10.9%

Table 28 PM₁₀ total road transport emissions (including exhaust and non-exhaust)

	Base 2023			London-wide ULEZ 2023		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	4	4	21	4	4	21
Inner	123	47	261	124	47	261
Outer	400	109	680	392	107	670
Non-GLA	240	67	433	237	66	429
GLA	527	160	962	519	158	952
LAEI	763	223	1,373	752	221	1,360

Table 29 Change in road transport PM₁₀ emissions, 2023 with scheme vs without

	Total			%		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	0.1	0.0	-0.1	-1.4%	-0.1%	-0.3%
Inner	0.5	-0.2	0.2	0.4%	-0.5%	0.1%
Outer	-8.0	-1.5	-9.5	-2.0%	-1.4%	-1.4%
Non-GLA	-3.2	-0.8	-4.0	-1.3%	-1.2%	-0.9%

GLA	-7.6	-1.8	-9.4	-1.4%	-1.1%	-1.0%
LAEI	-10.7	-2.6	-13.3	-1.4%	-1.2%	-1.0%

Table 30 PM₁₀ Total Road Transport emissions (exhaust only)

	Base 2023			London-wide ULEZ 2023		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	0.3	0.2	1.7	0.3	0.1	1.6
Inner	6.7	1.7	14.5	6.0	1.5	13.7
Outer	27.0	6.4	43.2	22.8	4.9	37.3
Non-GLA	19.8	5.6	32.7	17.3	4.9	29.4
GLA	34.0	8.3	59.4	29.1	6.5	52.7
LAEI	53.5	13.8	90.4	46.1	11.3	80.5

Table 31 Change in road transport PM₁₀ emissions (exhaust only), 2023 with scheme vs without

	Total			%		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	0.0	0.0	0.0	-8.2%	-3.8%	-1.8%
Inner	-0.6	-0.1	-0.8	-9.7%	-8.8%	-5.5%
Outer	-4.3	-1.6	-5.9	-15.8%	-24.5%	-13.6%
Non-GLA	-2.5	-0.8	-3.2	-12.5%	-13.4%	-9.9%
GLA	-5.0	-1.7	-6.7	-14.6%	-20.9%	-11.3%
LAEI	-7.4	-2.5	-9.9	-13.8%	-18.0%	-10.9%

Carbon Dioxide (CO₂)

Table 32 Total CO₂ road transport emissions

	Base 2023			London-wide ULEZ 2023		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	27,400	20,800	163,000	27,200	20,800	162,800
Inner	628,900	212,000	1,455,300	634,000	211,700	1,459,600
Outer	1,861,200	455,500	3,491,800	1,834,700	455,500	3,465,100
Non-GLA	1,257,700	378,300	2,764,600	1,214,500	378,400	2,721,700

GLA	2,517,500	688,300	5,110,100	2,495,800	687,900	5,087,400
LAEI	3,775,200	1,066,500	7,874,700	3,710,400	1,066,300	7,809,200

Table 33 Change in road transport CO₂ emissions, 2023 with scheme vs without

	Total			%		
	Cars	Vans	All Vehicles	Cars	Vans	All Vehicles
Central	-200	0	-300	-0.8%	0.1%	-0.2%
Inner	5,100	-400	4,300	0.8%	-0.2%	0.3%
Outer	-26,500	0	-26,700	-1.4%	0.0%	-0.8%
Non-GLA	-43,200	100	-42,900	-3.4%	0.0%	-1.6%
GLA	-21,600	-300	-22,700	-0.9%	0.0%	-0.4%
LAEI	-	-	-	-1.7%	0.0%	-0.8%
	64,800	200	65,500			

Table 34 Change in road transport CO₂ emissions with scheme vs without

Borough	Cars	Vans	All vehicles
Barking and Dagenham	-1.5%	-0.2%	-0.8%
Barnet	-0.9%	0.0%	-0.5%
Bexley	-1.9%	0.1%	-1.0%
Brent	-0.4%	-0.4%	-0.3%
Bromley	-1.9%	0.2%	-1.1%
Camden	-0.1%	0.1%	0.0%
City of London	-1.5%	-0.3%	-0.3%
Croydon	-1.9%	0.1%	-1.1%
Ealing	-0.2%	0.3%	0.0%
Enfield	-1.0%	-0.1%	-0.5%
Greenwich	0.3%	-0.3%	0.0%
Hackney	0.1%	-0.1%	0.0%
Hammersmith and Fulham	0.6%	-0.1%	0.2%
Haringey	1.3%	0.0%	0.7%
Harrow	-2.5%	0.1%	-1.5%
Havering	-1.4%	0.1%	-0.6%
Hillingdon	-1.7%	0.0%	-0.9%
Hounslow	-1.0%	0.0%	-0.5%
Islington	-0.1%	0.0%	0.0%

Kensington and Chelsea	-0.3%	0.0%	-0.1%
Kingston	-1.9%	0.2%	-1.1%
Lambeth	0.6%	-0.1%	0.2%
Lewisham	0.4%	-0.2%	0.1%
Merton	-2.3%	-0.2%	-1.3%
Newham	1.1%	-0.1%	0.5%
Redbridge	-0.5%	-0.1%	-0.3%
Richmond	-1.3%	0.1%	-0.7%
Southwark	0.6%	0.0%	0.3%
Sutton	-2.7%	-0.1%	-1.7%
Tower Hamlets	-0.1%	-0.3%	-0.2%
Waltham Forest	0.6%	-0.1%	0.3%
Wandsworth	-0.1%	-0.2%	-0.2%
Westminster	-0.8%	-0.1%	-0.3%
Non-GLA	-3.4%	0.0%	-1.5%

Road network (TLRN and Borough roads)

Table 35 Change in road network emissions by borough and road type, 2023 with scheme vs without

	NO _x		PM _{2.5} (All Sources)		PM _{2.5} (Exhaust)	
	TLRN	North and South Circular	TLRN	North and South Circular	TLRN	North and South Circular
Barking and Dagenham	-6.8%	-5.3%	-1.3%	-0.4%	-14.3%	-11.7%
Barnet	-6.4%	-4.4%	-1.3%	-0.5%	-13.9%	-10.3%
Bexley	-7.2%	-	-1.5%	-	-15.9%	-
Brent	-7.0%	-4.2%	-1.3%	-0.5%	-14.2%	-9.0%
Bromley	-7.7%	-	-2.1%	-	-15.8%	-
Camden	-1.6%	-1.7%	-0.4%	-0.5%	-4.5%	-4.6%
City of London	-0.9%	-0.9%	-0.5%	-0.5%	-1.9%	-1.8%
Croydon	-7.5%	-	-2.0%	-	-14.4%	-
Ealing	-5.3%	-2.8%	-0.9%	-0.1%	-12.1%	-7.3%
Enfield	-7.1%	-6.2%	-1.6%	-1.3%	-14.0%	-12.5%
Greenwich	-4.2%	-2.3%	-0.4%	0.1%	-9.8%	-6.5%
Hackney	-2.1%	-2.2%	-0.5%	-0.4%	-5.5%	-5.6%

Hammersmith and Fulham	-2.3%	-2.2%	-0.5%	-0.5%	-6.1%	-5.7%
Haringey	-2.0%	-2.1%	-0.2%	0.0%	-5.7%	-5.9%
Havering	-7.5%	-	-2.0%	-	-16.7%	-
Hillingdon	-7.6%	-	-1.9%	-	-15.2%	-
Hounslow	-5.9%	-2.6%	-1.6%	-0.5%	-12.5%	-7.4%
Islington	-1.7%	-1.8%	-0.4%	-0.5%	-4.4%	-4.6%
Kensington and Chelsea	-2.1%	-2.0%	-0.6%	-0.6%	-5.6%	-5.2%
Kingston	-7.9%	-	-1.9%	-	-15.7%	-
Lambeth	-2.9%	-2.1%	-0.5%	-0.2%	-7.2%	-5.4%
Lewisham	-4.2%	-2.6%	-0.8%	-0.2%	-9.2%	-6.7%
Merton	-8.0%	-	-2.4%	-	-15.3%	-
Newham	-3.9%	-2.5%	-0.4%	0.0%	-9.4%	-6.8%
Non-GLA	-8.6%	-	-1.8%	-	-17.3%	-
Redbridge	-6.4%	-4.4%	-1.1%	-0.4%	-13.5%	-10.4%
Richmond	-6.6%	-4.1%	-1.2%	-0.7%	-13.4%	-9.3%
Southwark	-1.9%	-2.0%	-0.4%	-0.3%	-4.8%	-5.1%
Sutton	-9.1%	-	-3.5%	-	-16.0%	-
Tower Hamlets	-2.5%	-2.4%	-0.6%	-0.6%	-5.9%	-5.8%
Waltham Forest	-5.1%	-2.9%	-0.7%	-0.1%	-11.5%	-7.6%
Wandsworth	-5.5%	-3.1%	-1.1%	-0.4%	-11.6%	-7.5%
Westminster	-1.8%	-1.5%	-0.7%	-0.6%	-4.1%	-3.5%

Air pollutant concentrations

NO₂ concentrations

Table 36 Schools meeting WHO interim targets for NO₂ (30µg/m³ and 20µg/m³) 2023 with ULEZ expansion and without

	Schools meeting NO ₂ 30 µg/m ³			Schools meeting NO ₂ 20 µg/m ³		
	2023 base	London-wide ULEZ 2023	Additional schools meeting target	2023 base	London-wide ULEZ 2023	Additional schools meeting target
Central	32	35	3	0	0	0
Inner	1,317	1,329	12	0	3	3

Outer	1,785	1,785	0	886	1,028	142
Greater London	3,134	3,149	15	886	1,031	145

Table 37 Population living in areas of NO₂ exceedance, WHO interim targets (30µg/m³ and 20µg/m³) by borough, 2023 with ULEZ expansion and without

	% Exceeding 30 µg/m ³			% Exceeding 20 µg/m ³		
	Base 2023	GLULEZ 2023	Reduction in exposure over 30 µg/m ³	Base 2023	GLULEZ 2023	Reduction in exposure over 20 µg/m ³
City of London	91%	89%	-200	100%	100%	0
Barking & Dagenham	0%	0%	0	44%	36%	-17,600
Barnet	0%	0%	0	72%	64%	-31,400
Bexley	0%	0%	0	15%	10%	-11,400
Brent	0%	0%	-300	97%	93%	-12,500
Bromley	0%	0%	0	13%	8%	-18,500
Camden	20%	18%	-5,000	100%	100%	0
Croydon	0%	0%	0	46%	36%	-35,900
Ealing	0%	0%	-400	99%	97%	-7,300
Enfield	0%	0%	0	55%	50%	-17,000
Greenwich	0%	0%	-300	78%	74%	-14,400
Hackney	3%	2%	-1,400	100%	100%	0
Hammersmith & Fulham	2%	2%	-500	100%	100%	0
Haringey	0%	0%	0	100%	100%	0
Harrow	0%	0%	0	27%	18%	-23,000
Havering	0%	0%	0	4%	2%	-3,000
Hillingdon	0%	0%	0	53%	48%	-15,900
Hounslow	1%	0%	-1,900	89%	86%	-7,800
Islington	10%	9%	-3,800	100%	100%	0
Kensington & Chelsea	8%	7%	-2,000	100%	100%	0
Kingston upon Thames	0%	0%	0	39%	30%	-17,500
Lambeth	5%	3%	-4,100	100%	100%	-800

Lewisham	0%	0%	0	85%	80%	-14,000
Merton	0%	0%	0	83%	69%	-29,800
Newham	1%	1%	0	100%	100%	0
Redbridge	0%	0%	0	59%	48%	-31,400
Richmond upon Thames	0%	0%	0	64%	59%	-10,700
Southwark	5%	5%	-1,000	100%	100%	0
Sutton	0%	0%	0	13%	6%	-13,300
Tower Hamlets	8%	7%	-2,700	100%	100%	0
Waltham Forest	0%	0%	0	90%	86%	-9,400
Wandsworth	0%	0%	0	100%	100%	0
Westminster	26%	24%	-5,100	100%	100%	0
Thurrock (B) *	6%	6%	0	6%	6%	0
Slough (B) *	100%	100%	0	100%	100%	0
Windsor and Maidenhead (B) *	51%	51%	0	100%	51%	-400
Chiltern District *	0%	0%	0	100%	100%	0
South Bucks District *	15%	15%	0	33%	33%	0
Brentwood District (B) *	20%	20%	0	20%	20%	0
Epping Forest District *	3%	3%	0	5%	5%	0
Dacorum District (B) *	0%	0%	0	100%	100%	0
Hertsmere District (B) *	1%	1%	0	3%	3%	-500
St. Albans District (B) *	26%	26%	0	39%	39%	0
Three Rivers District *	1%	1%	0	4%	4%	0
Watford District (B) *	0%	0%	0	1%	1%	0
Dartford District (B) *	0%	0%	0	11%	11%	-400
Sevenoaks District *	6%	6%	0	9%	9%	0
Elmbridge District (B) *	0%	0%	0	0%	0%	-300
Epsom and Ewell District (B) *	0%	0%	0	1%	1%	-400
Guildford District (B) *	0%	0%	0	71%	71%	0
Mole Valley District *	11%	9%	-200	20%	18%	-400

Reigate and Banstead District (B) *	2%	2%	0	3%	3%	0
Runnymede District (B) *	10%	10%	0	19%	19%	-300
Spelthorne District (B) *	0%	0%	0	12%	9%	-2,700
Tandridge District *	2%	2%	0	2%	2%	0
Woking District (B) *	0%	0%	0	15%	15%	0

* partial area within LAEI

PM_{2.5} concentrations

Table 38 Schools meeting WHO interim targets for PM_{2.5} (10µg/m³) 2023 with ULEZ expansion and without

	Schools meeting PM_{2.5} 10 µg/m³		
	2023 base	London-wide ULEZ 2023	Additional schools meeting
Central	0	0	0
Inner	232	232	0
Outer	1602	1602	0
Greater London	1834	1834	0

Table 39 Population living in areas of PM_{2.5} exceedance, WHO interim targets 10µg/m³) by borough, 2023 with ULEZ expansion and without

	% Exceeding 10µg/m³		
	Base 2023	GLULEZ 2023	Reduction in exposure over 10µg/m³
City of London	100%	100%	0
Barking & Dagenham	18%	17%	-1,500
Barnet	28%	27%	-800
Bexley	4%	4%	- 200
Brent	62%	61%	-3,800
Bromley	3%	2%	-2,000
Camden	99%	99%	0

Croydon	16%	15%	-4,100
Ealing	40%	39%	-2,500
Enfield	15%	15%	-700
Greenwich	37%	37%	-900
Hackney	96%	96%	-1,100
Hammersmith & Fulham	100%	99%	-300
Haringey	56%	55%	-1,500
Harrow	3%	3%	-1,000
Havering	2%	2%	-200
Hillingdon	3%	3%	0
Hounslow	23%	22%	-2,700
Islington	100%	100%	0
Kensington & Chelsea	100%	100%	0
Kingston upon Thames	9%	8%	-1,600
Lambeth	77%	76%	-2,300
Lewisham	39%	38%	-3,500
Merton	25%	23%	-3,500
Newham	87%	86%	-1,000
Redbridge	23%	22%	-1,500
Richmond upon Thames	16%	15%	- 1,600
Southwark	91%	90%	-300
Sutton	2%	2%	- 600
Tower Hamlets	100%	100%	0
Waltham Forest	47%	47%	-1,800
Wandsworth	70%	69%	-3,500
Westminster	100%	100%	0
Thurrock (B) *	6%	6%	0
Slough (B) *	100%	100%	0
Windsor and Maidenhead (B) *	51%	51%	0
Chiltern District *	0%	0%	0
South Bucks District *	15%	15%	0
Brentwood District (B) *	20%	20%	0
Epping Forest District *	3%	3%	0
Dacorum District (B) *	100%	100%	0
Hertsmere District (B) *	1%	1%	0
St. Albans District (B) *	26%	26%	0
Three Rivers District *	1%	1%	0
Watford District (B) *	0%	0%	0

Dartford District (B) *	6%	6%	0
Sevenoaks District *	5%	5%	0
Elmbridge District (B) *	0%	0%	0
Epsom and Ewell District (B) *	0%	0%	0
Guildford District (B) *	0%	0%	0
Mole Valley District *	11%	11%	0
Reigate and Banstead District (B) *	2%	1%	-400
Runnymede District (B) *	10%	10%	0
Spelthorne District (B) *	0%	0%	0
Tandridge District *	2%	2%	0
Woking District (B) *	0%	0%	0

* partial area within LAEI