Lead Officer: Adrian Ash, Director of Environment and Regeneration
Lead Member: Councillor Stephen Alambritis

Contact Officer: Jason Andrews Air Quality and Contaminated Land Manager

PURPOSE OF REPORT AND EXECUTIVE SUMMARY

This report is intended to provide information on the current air quality monitoring arrangements, trends in data and outline hot spots in the borough of Merton.

It is important to note that the UK air quality objectives include measurements on an annual basis, this annual period being per calendar year. As such the data for 2022 is not being presented as this needs to be collated and ratified in accordance with Defra guidelines.

The Council will publish its Annual Status Report 2023 in full, in the Summer, and this will contain a full data summary for 2022 and achievements against our existing Air Quality Action Plan.

In addition, and throughout 2022, Merton Council piloted new innovative low-cost real-time monitors across the borough in partnership with Imperial College, as part of the Breathe London network, a project funded through the South London Partnership.

This air quality monitoring included the use of the latest technology to review transport movements, by type, and at 68 key locations in the borough. This pilot project will show pollution in the borough at detailed level and help influence our new Air Quality Action Plan for 2023.

Part of this paper will also review HGV's in the borough, their 'modelled' impact on air pollution and a review of two data points captured over the past 6months.

Merton are committed to delivering cleaner air in the borough and using data to help influence and guide a new Air Quality Action Plan.

INTRODUCTION

1.1 Air Quality in London, as with many cities in the UK and across the world continues to be a major health concern and is considered the most significant environmental risk to public health. This has been reiterated by the World Health Organization's (WHO) move to dramatically reduce its own guidance levels for air quality health exposure.

1.2 To illustrate the scale of the challenge required to meet the WHO guidance, parks and open spaces throughout London measure some of the lowest levels of pollution for nitrogen dioxide (NO_2) and Particulate Matter (PM10 and PM2.5), however these would still not comply with the new WHO guidance levels. Background monitoring sites across London measure around double the new WHO guidance objectives, with many town centres being 6 times the guidance levels for NO_2.

1.3 During the height of lockdown in 2020 with dramatic reductions in traffic volumes, many parts of London still recorded levels of NO2 three to four times higher than the new WHO objectives, with increases of particulate levels being caused by pollution being blown into London from agriculture.

1.4 The degree of step change needed to deliver compliance with these levels equivalent with that needed of the climate change agenda. Many actions that tackle climate change also deliver cleaner air, including the way homes are heated/insulated, reducing burning of fossil fuels and active travel.

1.5 Air pollution comes from a number of sources, including transportation, construction, industrial processes, domestic and commercial heating and power. The quantities by source vary by type of pollution. the estimated breakdown by source for type of emission is set out in Appendix C

1.5 In understanding the sources of pollution in the Borough this provides an opportunity to target the ones that we can control and influence.

Existing Air Quality Monitoring Regime

2.1 Merton measures air pollution in accordance with the Defra guidance and reports annually through its Annual Status Report (ASR). As well as being a statutory obligation, the monitoring of air quality is vital to assess our compliance with the air quality objectives, evaluate the impact of policies and projects and to better inform actions and future planning and policy.

2.2 There are generally two existing methods of monitoring air pollution, these are automated monitoring stations and diffusion tubes.

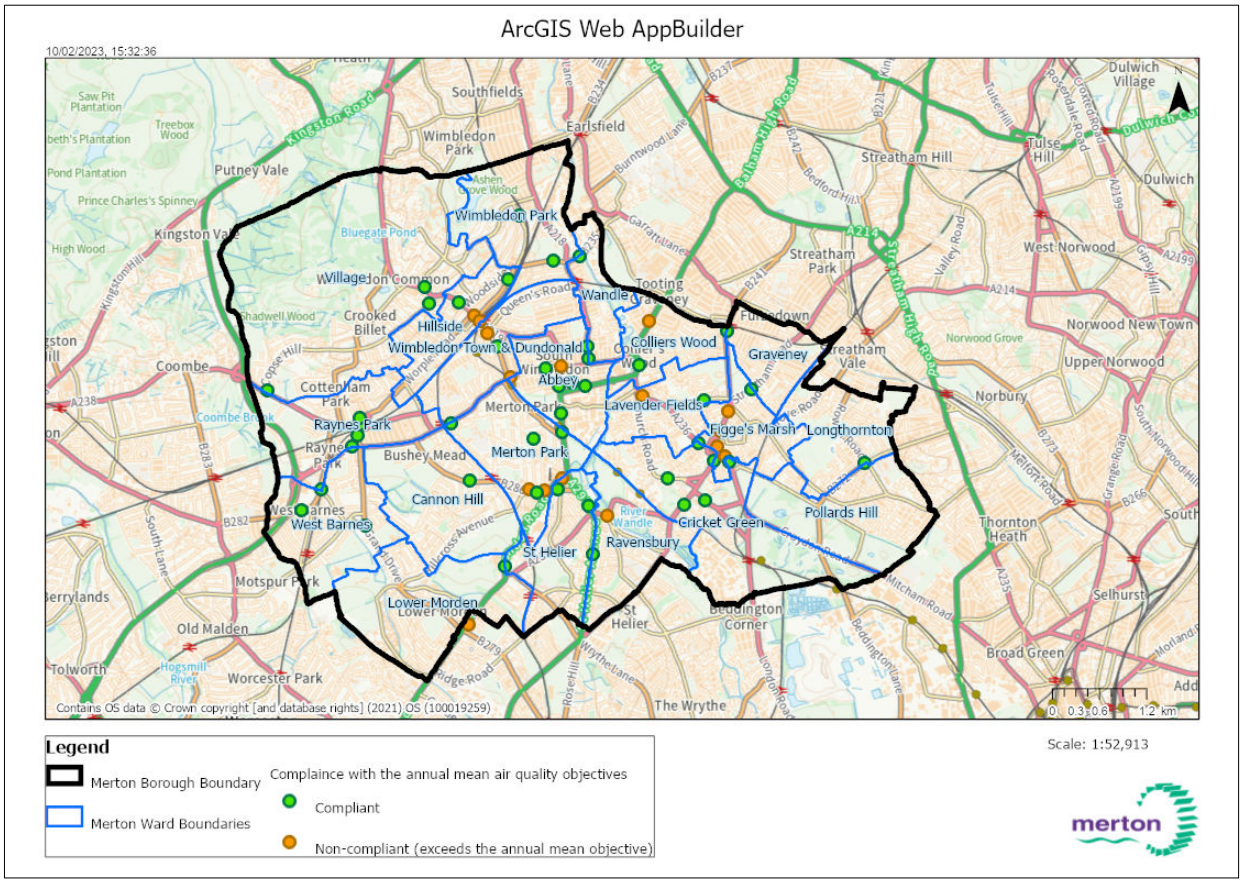
2.3 Automated stations form the core of the existing air quality monitoring network and provide detailed, localised information on real-time air pollution using calibrated complex technology. The Council currently operates two automatic monitoring stations.

2.4 The existing automated monitoring regime does not allow for the capture of information relating to the fine particulates ($PM_{2.5}$). These particulates are one of the most damaging pollutants to public health.

2.5 In 2021 the Borough had around 50 nitrogen dioxide (NO_2) diffusion tube monitoring locations. Diffusion tubes are specifically used to gather information on our annual exceedances of NO2. This form of monitoring is a cheap and reliable technology; however, it is labour intensive and crucially does not provide real-time data to allow the tracking and analysis of pollutants over short time.

2.6 The diffusion tube network is assessed annually and has been expanded over the past couple of years through requests to add locations, and our community projects that work with local groups around monitoring in the Borough.

Map 1: Diffusion tube monitoring locations 2021



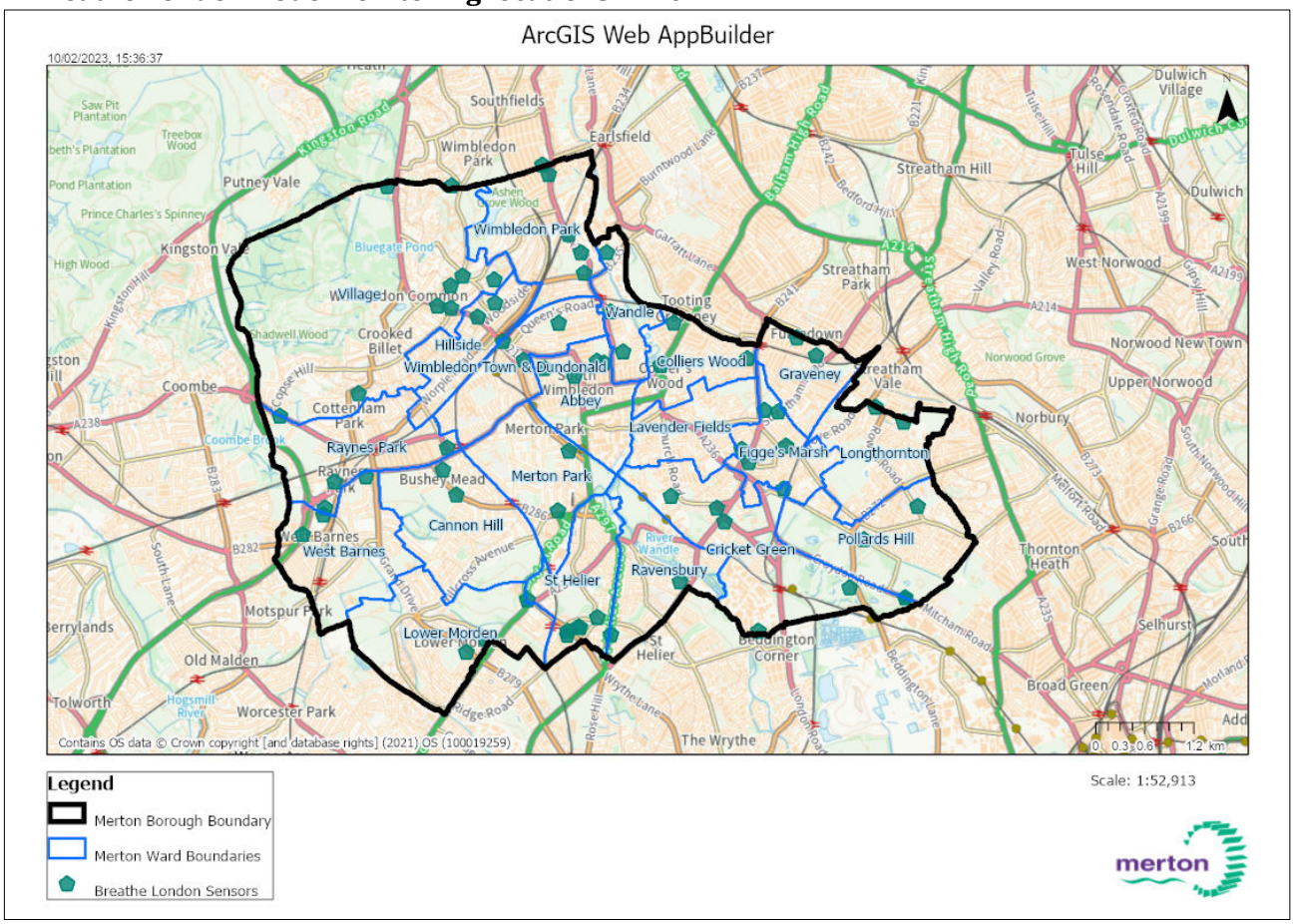
2.7 Technological innovation in air quality monitoring is allowing for development of relatively inexpensive and reliable real-time monitors available to monitor air quality. Merton were the first borough to pilot this on a large scale and funded through the South London Partnerships Innovate project and in partnership with Imperial college we took the opportunity to review air quality in the borough in detail including $PM_{2.5}$.

2.8 This monitoring was delivered through Imperial Colleges Breathe London network and covered 68 locations in the borough, in addition to existing monitoring.

2.9 The considerable amount of data gathered is currently being reviewed by external experts to help us understand the causes and contributing factors to pollution in the borough, in detail that we haven't seen before.

2.10 This data will help shape our new Air Quality Action Plan and can help us identify causes that we can tackle as a borough, and if not will provide opportunities to lobby those that do.

Map 2: Breathe London Node monitoring locations in 2022



2.11 The more understanding the Council has of the picture of pollution, its causes and impact, the more targeted and evidence driven interventions and policy can be.

2022 Air Quality Annual Status Report

3.1 On the 31st May 2022, Merton published its 2021 Annual Status Report (ASR) for quality in the Borough. This report provides a detailed overview of monitored air pollution in the Borough during 2021. It has been produced to meet the requirements of the London Local Air Quality Management (LLAQM) statutory process.

3.2 As well as the results of air quality monitoring in the Borough, this report provides an update on the council's AQAP and outlines the steps that are being taken throughout the many council departments to tackle air pollution in the Borough.

3.3 Although pollution in the Borough is improving, a number of areas still exceeds the current UK national objectives for NO2 in the following areas of the Borough.

3.4 The original diffusion tube network of 20 monitoring locations was incorporated into the 2017 revised network to help assess trends over time. For London boroughs, as per LLAQM.TG(19) paragraph 3.10, current guidance states that the last four years of monitoring data should be considered, and a trend analysis undertaken to

identify any significant changes. Over the last four years nitrogen dioxide concentrations have generally decreased across Merton.

3.5 In 2021 the nitrogen dioxide annual mean objective of 40 mgm^{-3} was exceeded at 15 of the 50 monitoring locations, which is 33% of sites, a visual overview of compliance is provided in Map 1. The impact of COVID-19 manifested in a steep drop in NO_2 at all monitoring locations. Most significantly, all annual mean NO_2 concentrations were below an annual mean of 60 mgm^{-3} indicating that the 1 hour-mean objective is likely to have been achieved across the borough and in all town centres, this was first achieved in 2020 and was maintained in 2021.

3.6 The following 4 charts present diffusion tube trend data from the original diffusion tube network between 2017 and 2021, grouped geographically. It can be seen that while NO2 rebounded in 2021 after the steep drop in 2020, overall the downward trend holds true. Data for 2022 cannot be included at this time as it is provisional and has not yet been adjusted for bias a process which a national process that is undertaken in March/April annually.

Chart 1: Nitrogen dioxide trend data in Morden

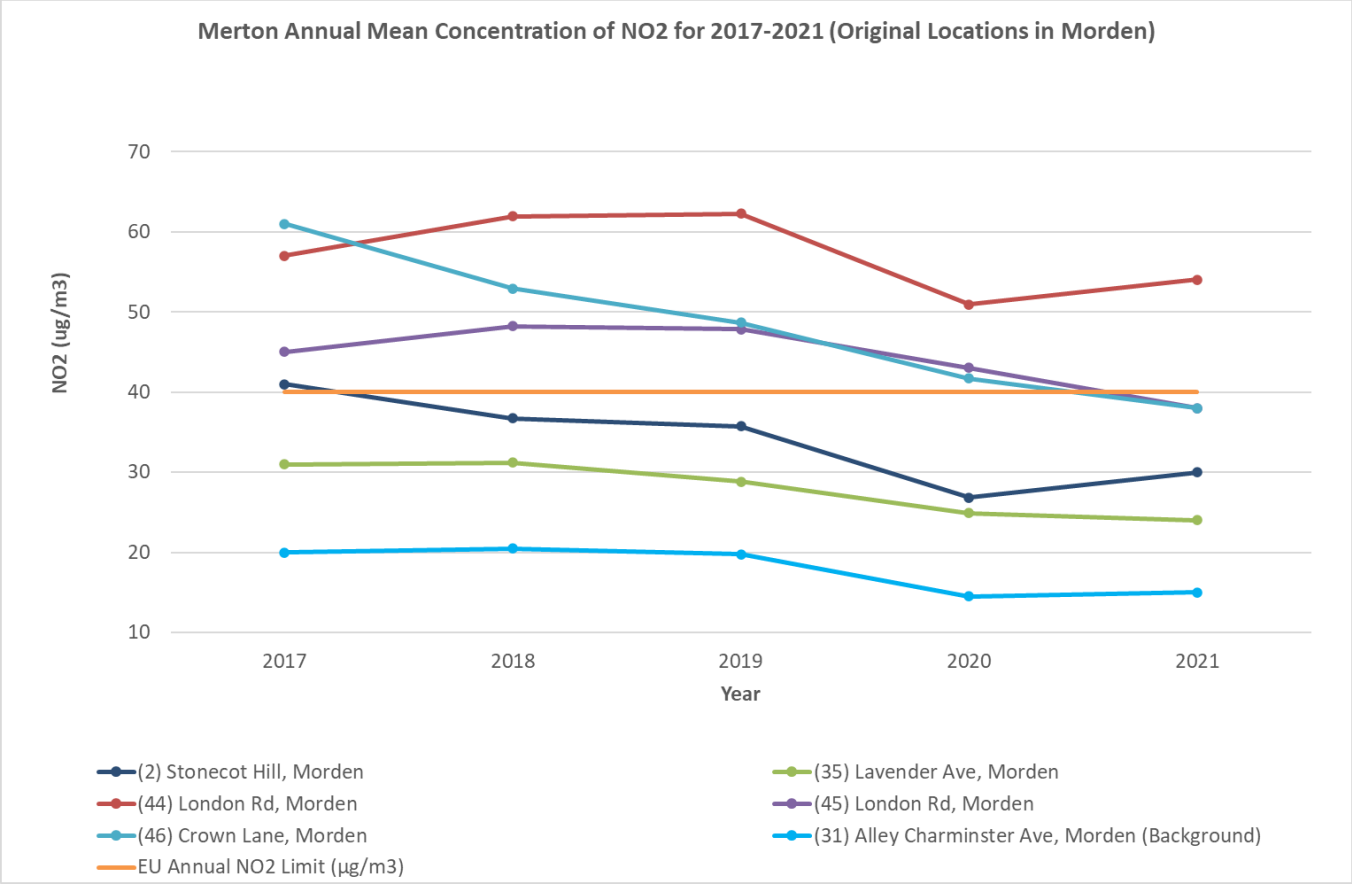


Chart 2: Nitrogen dioxide trend data for Mitchem & Tooting

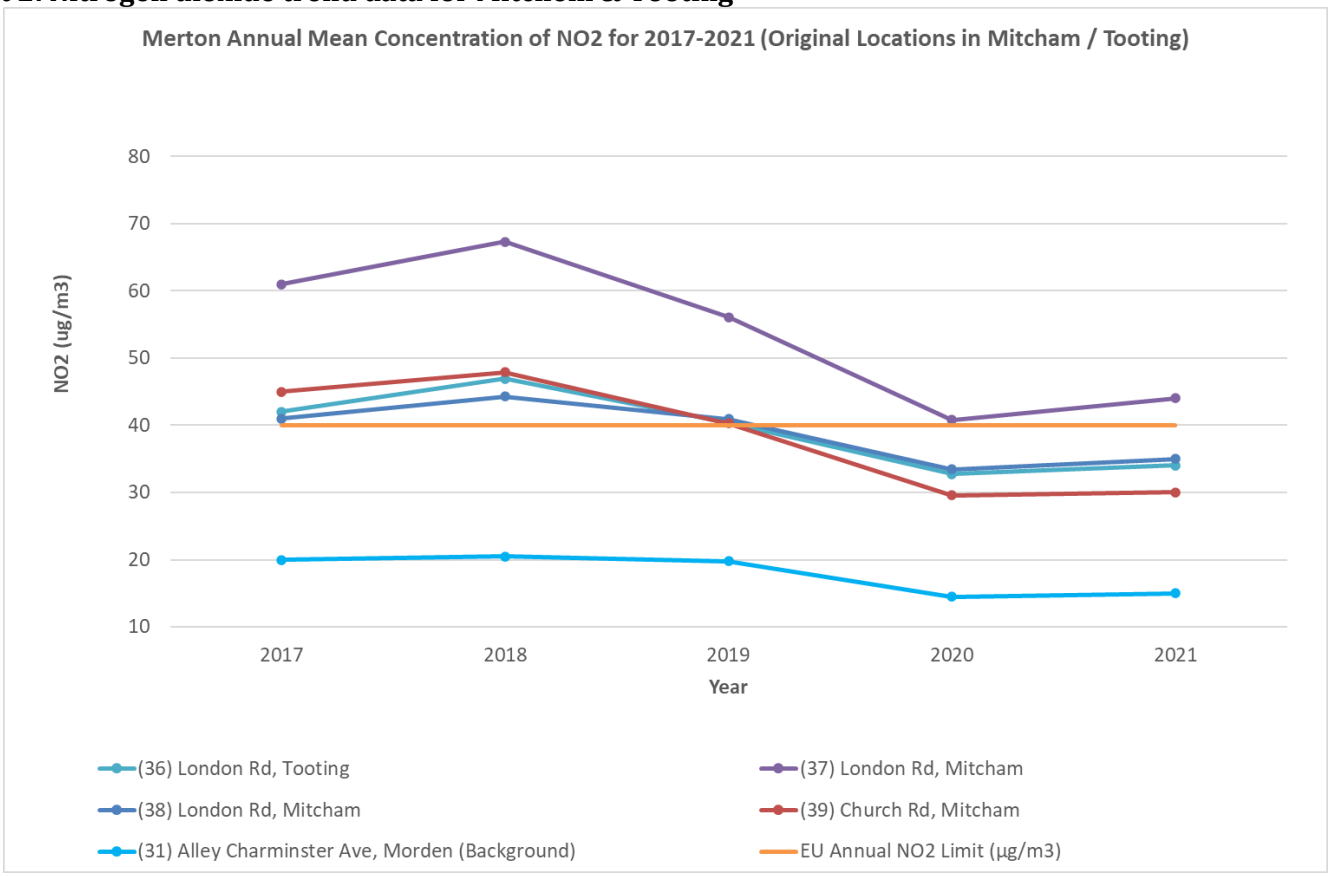


Chart 3: Nitrogen dioxide trend data for Wimbledon, South Wimbledon and Colliers Wood

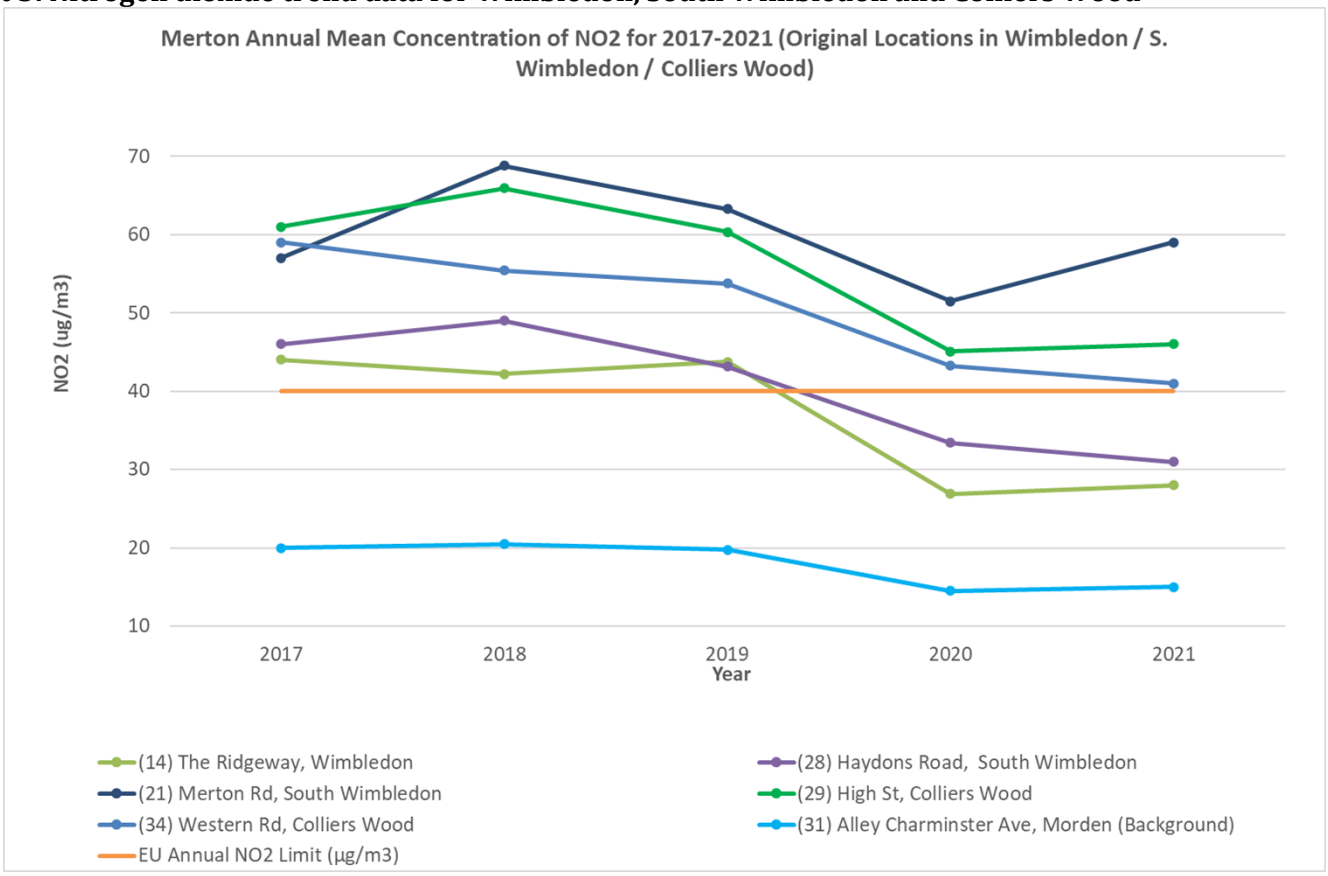
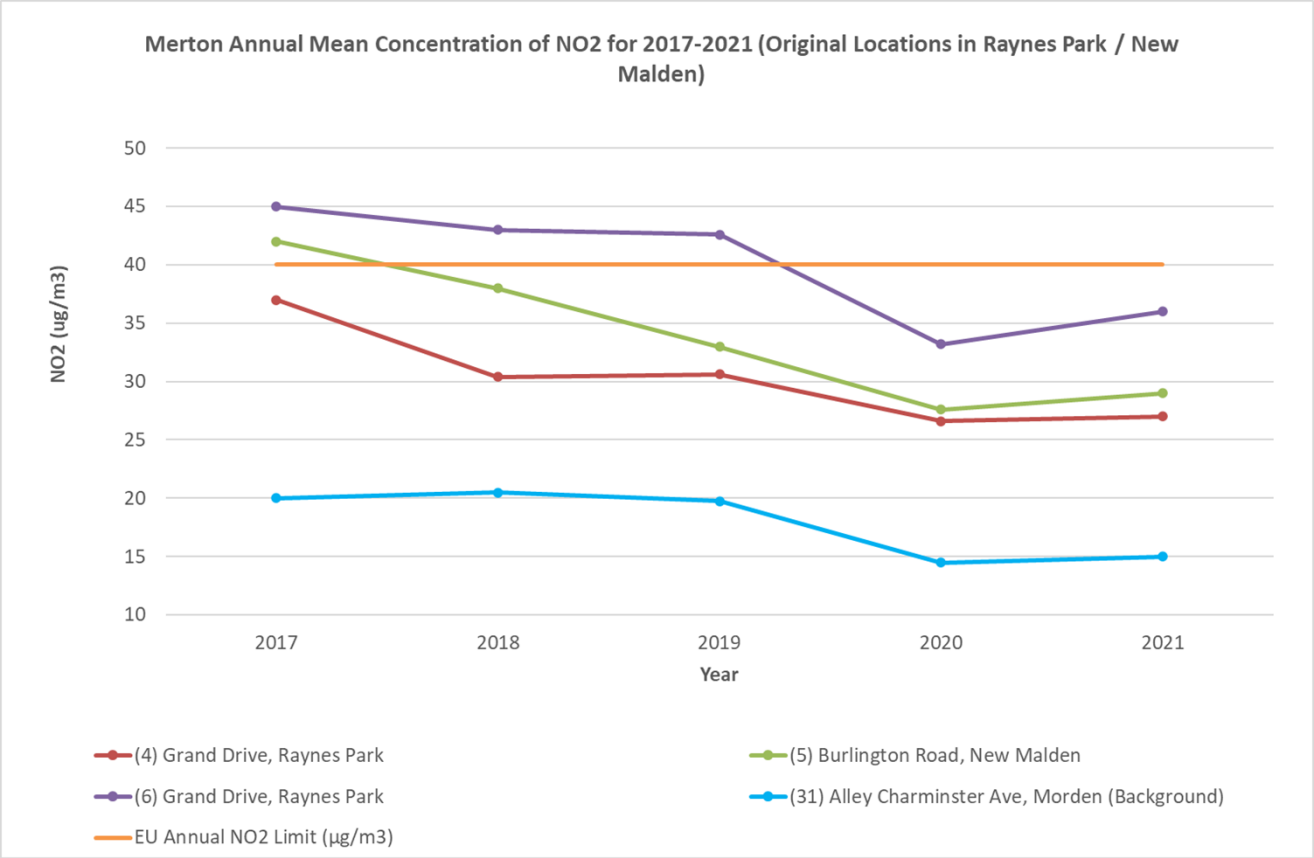


Chart 4: Nitrogen dioxide trend data for Raynes park and New Malden



3.7 It was stated in the 2020 Annual Status Report (ASR) that all results for 2020 should be treated with caution due to the COVID-19 pandemic affecting traffic volume and in turn pollutant concentrations. Although restrictions were not as strict in 2021 the influence on COVID-19 was still very much present and continued to influence behaviour, as such a similar note of caution is applied to the 2021 data.

3.8 The main source of pollution in town centres remains road traffic, it is essential that bold measures are taken to remove the dirtiest vehicles and reduce vehicle numbers to relieve congestion so that pollution does not return to pre-COVID-19 concentrations.

3.9 PM10 data shows compliance with the UK emission objectives, however the picture for this pollutant is limited, and restricted to automated stations only. In Merton there is currently one automated monitoring site for PM10 at Merton Road (ME2).

3.10 In 2021, the annual mean objective of 40 mgm^{-3} was achieved at the Merton Road (ME2) site, with an annualised annual mean concentration of 21.9 mgm^{-3}. As data capture was below low no firm conclusions can be drawn as the result may not be representative and is indicative only.

3.11 The data from Merton Road indicates there has been no significant change to annual mean PM10 concentrations over the last 7 years (excluding 2018). It is important to highlight that despite reduced traffic during 2020 and 2021 due to COVID-19 a marked reduction in PM10 is not observed.

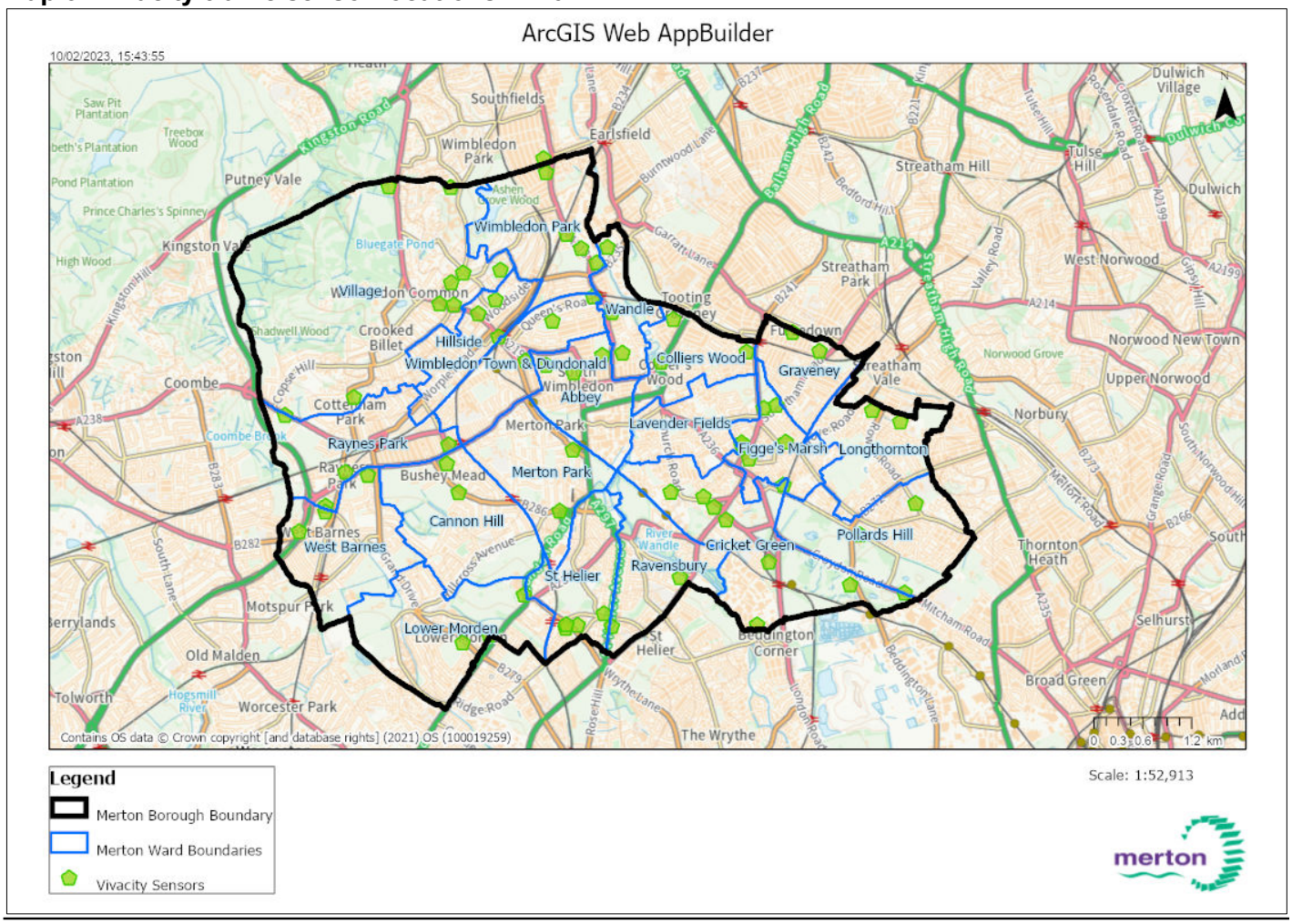
3.12 The annual Air Quality Objective is comfortably achieved however, in London a focus is required to be maintained on Particulate Matter even when meeting the PM10 targets, because the London boroughs are collectively working to meet the recent Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 PM2.5 limits by 2030. Further details are provided in Appendix A.

3.13 It is clear that it will be a huge challenge to drive down particulate matter concentrations to these levels in Merton based on borough monitoring data from 2015 to date. The same can be said for all London Boroughs.

Traffic and transport sensors

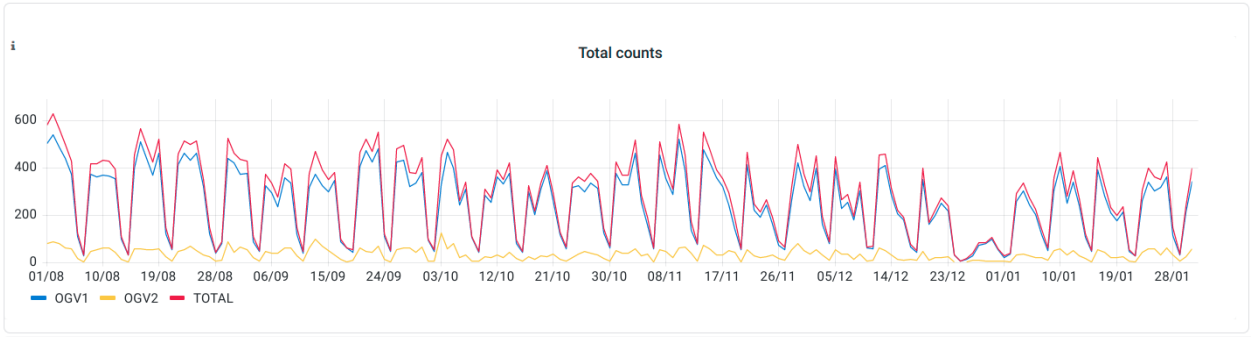
4.1 As part of the South London Innovate Project 68 Vivacity traffic monitoring sensors was set up throughout the borough to help us understand transport composition and traffic movements in the borough.

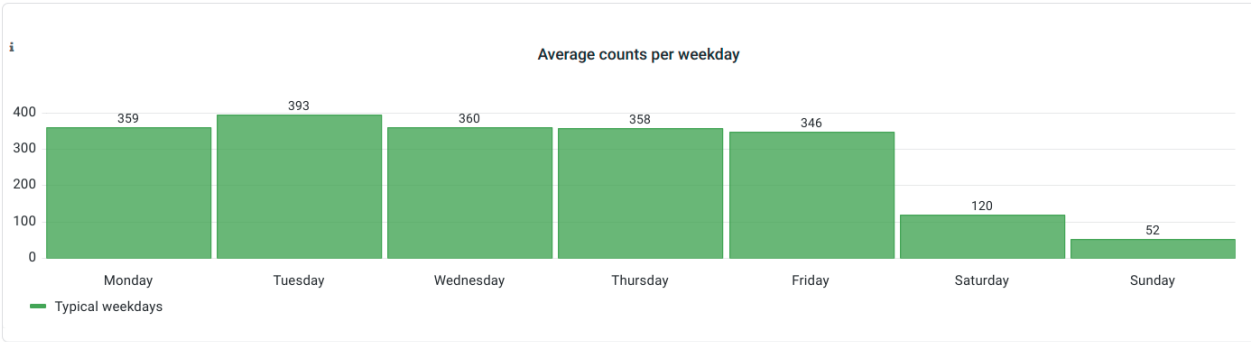
Map 3: Vivacity traffic sensor locations in 2022



4.2 For the purpose of indication only we have highlighted two sites to focus on, these graphs show the number and trends in 'heavy goods' vehicles captured by these sensors. More in-depth information is available at all locations.

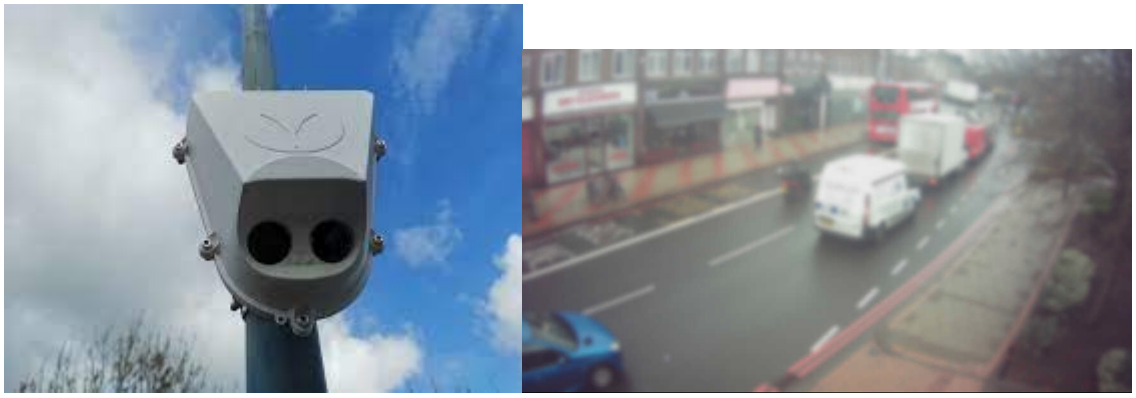
S149 - Plough Lane 01/08/22 -> 31/01/23

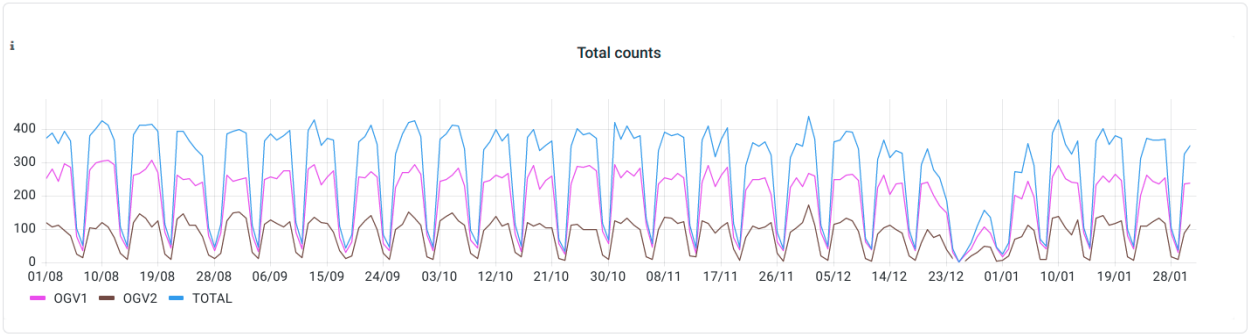


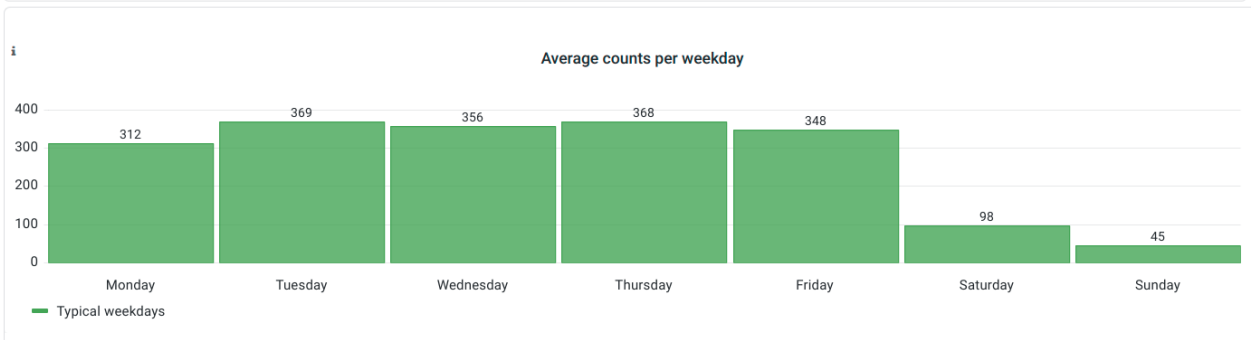


- Total HGV counts in 6 month window = 45713
- Total car counts = 2551795
- 1 HGV per 56 cars

S261 - Crown Lane 01/08/22 -> 31/01/23







- Total counts in 6 month window = 49930
- Total car counts = 2692787
- 1 HGV per 54 cars

APPENDIX A

UK National and WHO Air Quality Objectives

In September 2021 and in order to focus attention onto the global issue of air pollution and its impact on health, the World Health Organization amended its guidance levels for human exposure for a number of key pollutants.

These changes although 'guidance levels' are yet to be translated into UK objectives; however, it does signal the importance of air pollution and the direction that we must be moving in to deliver clean air.

Annex A outlined the 2005 and 2021 Guidance levels.

Annexe A

Pollutant	Averaging time	2005 air quality guideline	2021 AQC level
$PM_{2.5}$, µg/m^3	Annual	10	5
	24-hour*	25	15
PM_{10}, µg/m^3	Annual	20	15
	24-hour*	50	45
O_3, µg/m^3	Peak season**	-	60
	8-hour*	100	100
NO_2, µg/m^3	Annual	40	10
	24-hour*	-	25
SO_2., µg/m^3	24-hour*	20	40
CO, mg/m^3	24-hour*	-	4

*99th percentile (3 to 4 exceedance days per year).
**Average of daily maximum 8-hour mean O_3 concentration in the 6 consecutive months with the highest 6-month running-average O_3 concentration.

Last week the The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

These Regulations, which apply to England, set—
- a target in respect of the annual mean concentration of PM2.5 (fine particulate matter) in ambient air under section 2 of the Environment Act 2021 (c.30) ("the annual mean concentration target"), and
- a long-term target to reduce population exposure to PM2.5 (fine particulate matter), within the priority area of air quality under section 1 of that Act ("the population exposure reduction target").

The annual mean concentration target is that by the end of 31st December 2040 the annual mean level of $PM_{2.5}$ in ambient air must be equal to or less than 10 $\mu g/m^3$ ("the target level").

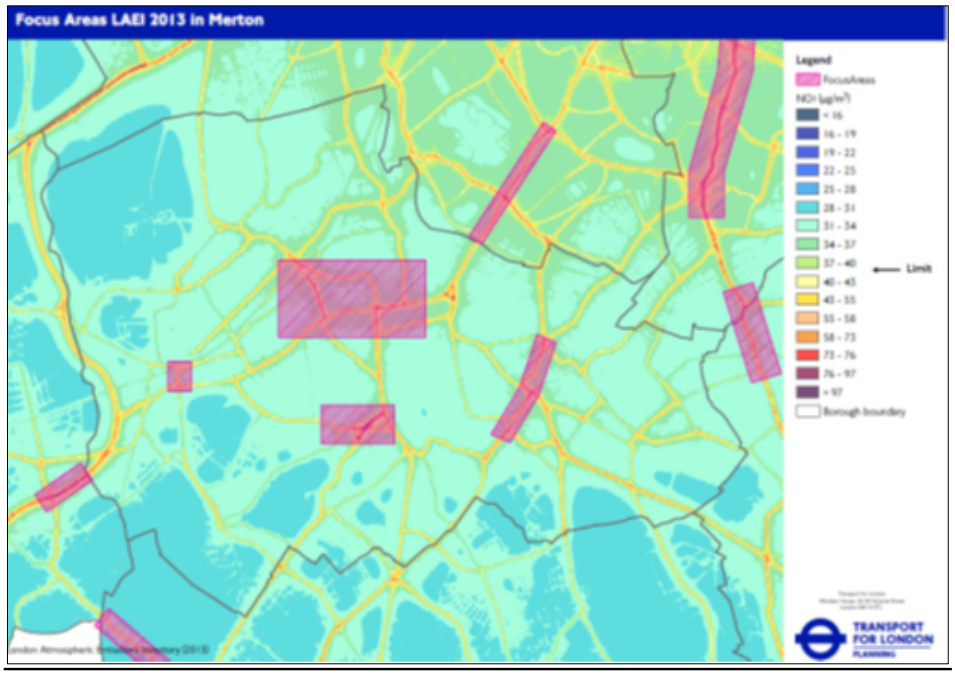
APPENDIX B

Air Quality Focus Areas (AQFA) are locations that not only exceed the EU annual mean limit value for nitrogen dioxide (NO2) but are also locations with high human exposure. AQFAs are not the only areas with poor air quality but they have been defined to identify areas where currently planned national, regional and local measures to reduce air pollution may not fully resolve poor air quality issues.

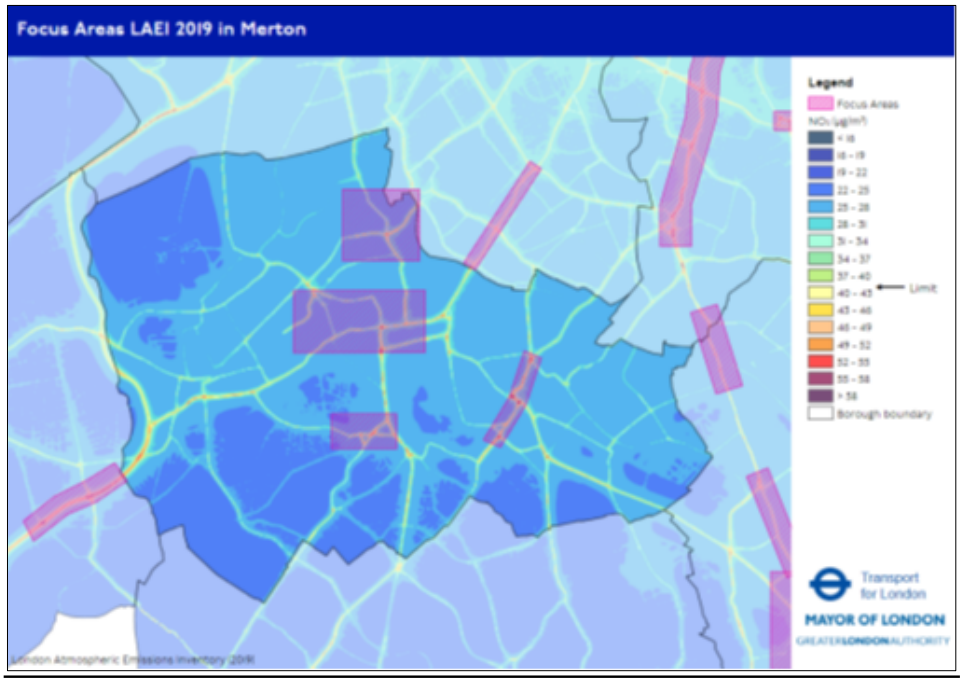
The list of Air Quality Focus Areas is updated from time to time as the London Atmospheric Emissions Inventory (LAEI) is reviewed. The most recent update to AQFAs was published in December 2022.

In Merton an AQFA was removed in Raynes Park and a new area was created in Wimbledon Park. The 2013 and 2019 Focus Areas are provided below for comparison.

Merton Air Quality Focus Areas 2013



Merton Air Quality Focus Areas 2019 (Published December 2022)


Focus Areas LAEI 2019 in Merton
Legend
Focus Areas
Limit
Borough boundary
Transport for London
MAYOR OF LONDON

APPENDIX C

The LAEI 2019 is the latest version of the London Atmospheric Emissions Inventory and replaces previous versions of the inventory. The LAEI estimates ground level concentrations of key pollutants NO_x, PM_{10} and $PM_{2.5}$ across Greater London for year 2019, using an atmospheric dispersion model.

It is important to note that this is generic apportionment model and does not represent impact to receptors. For instance, an uncontrolled construction site and its emissions can have a significantly disproportional impact on a local community, an impact would not be shown on a generalised apportionment model.

Figure 1: This outlines the contribution of NOx (oxides of nitrogen) by vehicle type in the Borough.

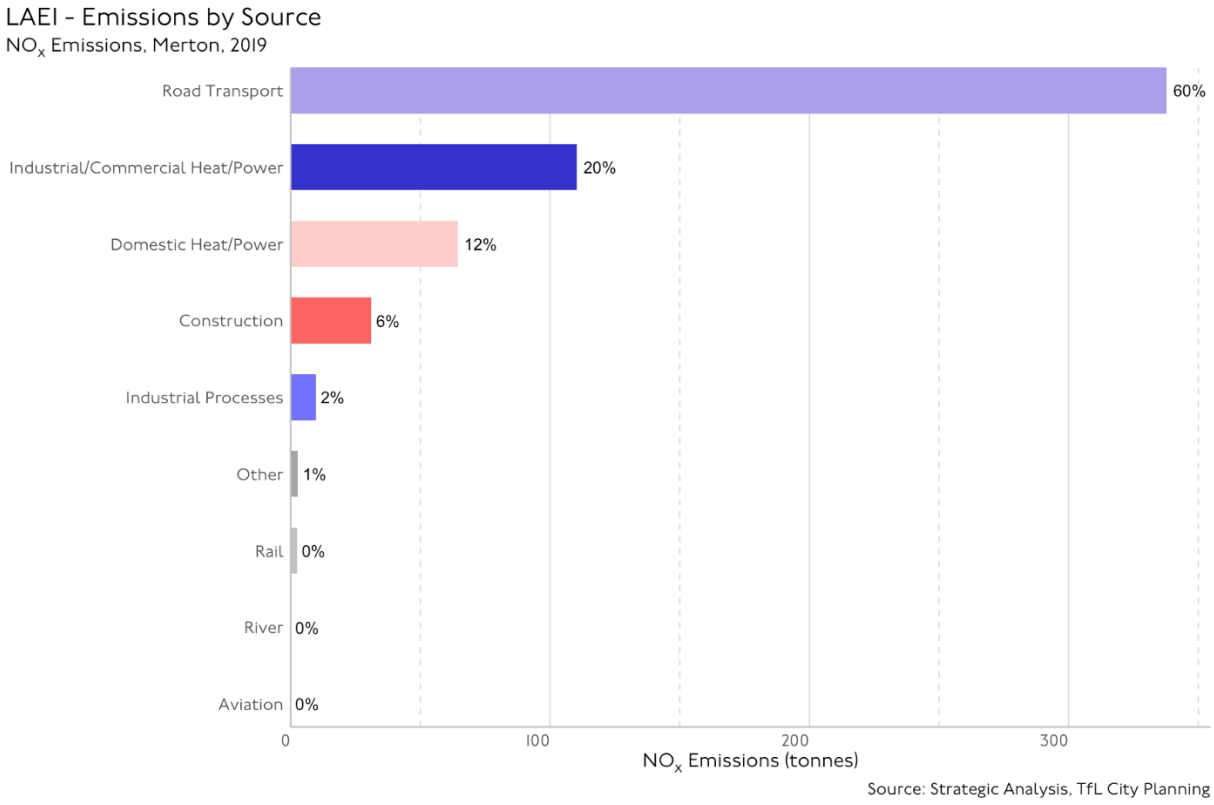


Figure 2: This outlines the contribution of PM2.5 (fine particulate matter) by vehicle type in the Borough.

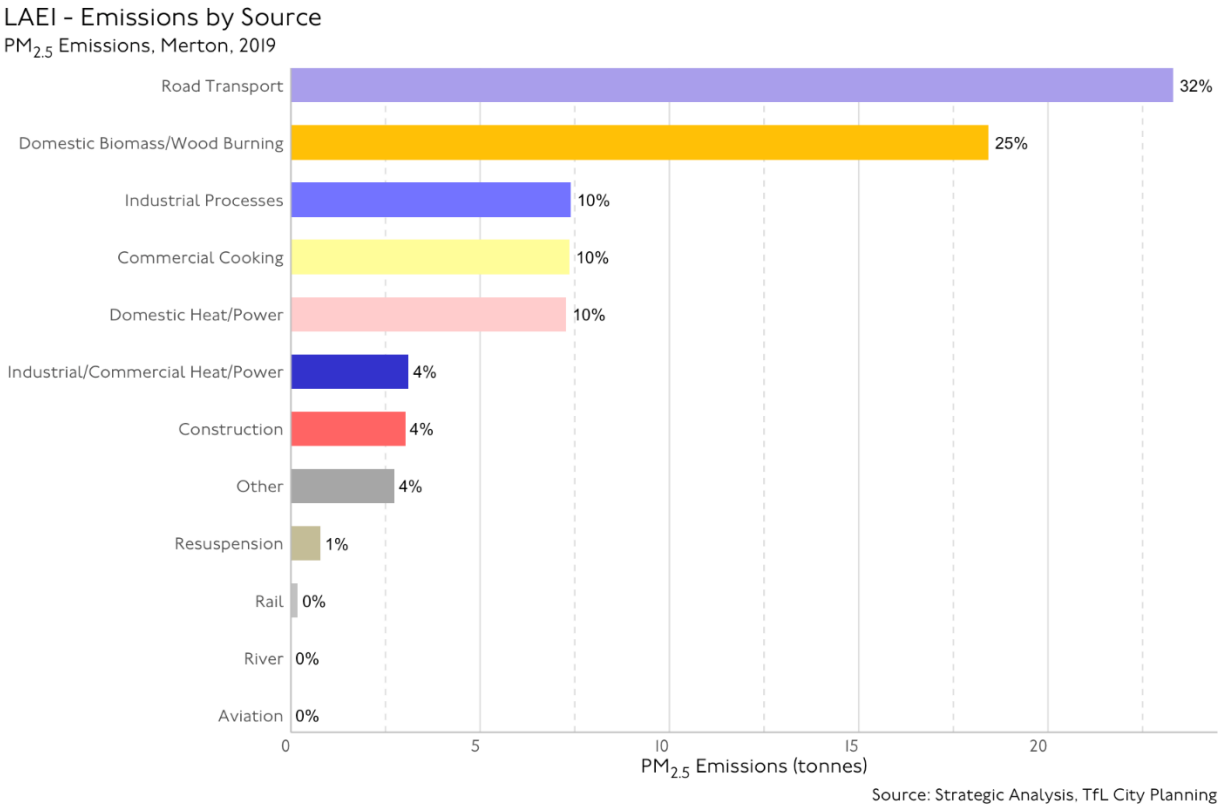


Figure 3: This outlines the contribution of PM10 (course particulate matter) by vehicle type in the Borough.

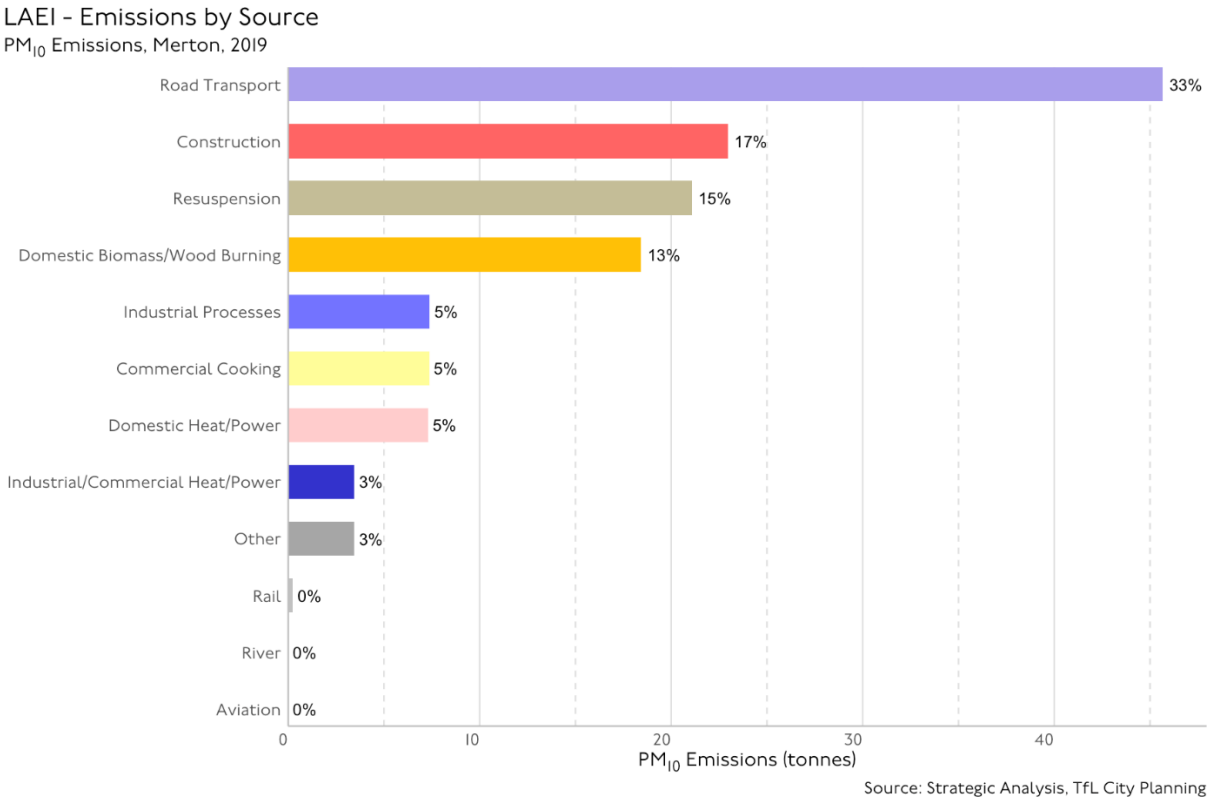
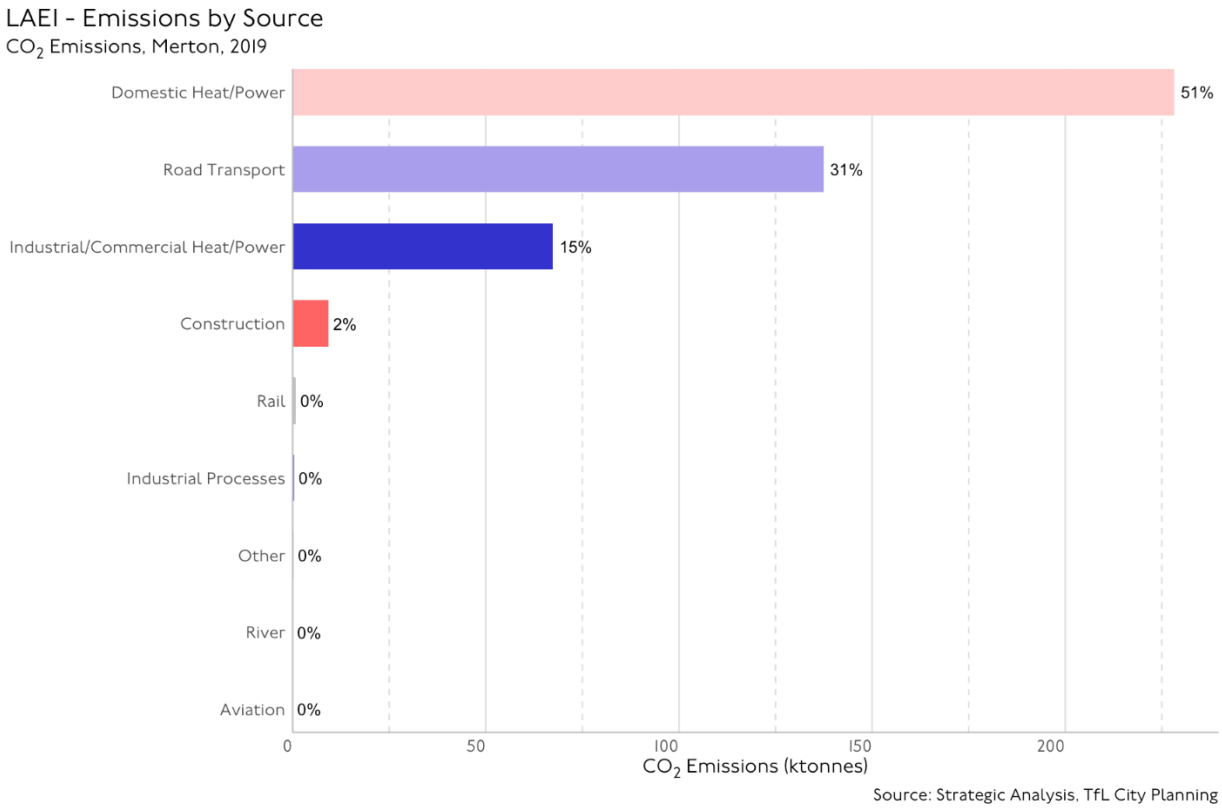


Figure 4: This outlines the contribution of CO2 (carbon dioxide) by source in the Borough.



In Merton Road Transport is the highest contributor of NO_x, PM_{10} and $PM_{2.5}$ emissions, Figures 5-8 outline the split of emissions per vehicle type.

It should be noted that the emissions charted below are for tail pipe emissions and as such electric vehicles have a nil contribution to all emissions. There are other considerations around particulate emissions from brake and tyre wear and resuspension of road dust, which can be attributed to all vehicle types however they are not considered here.

Figure 5: This outlines the contribution of NO_x (oxides of nitrogen) by vehicle type in the Borough.

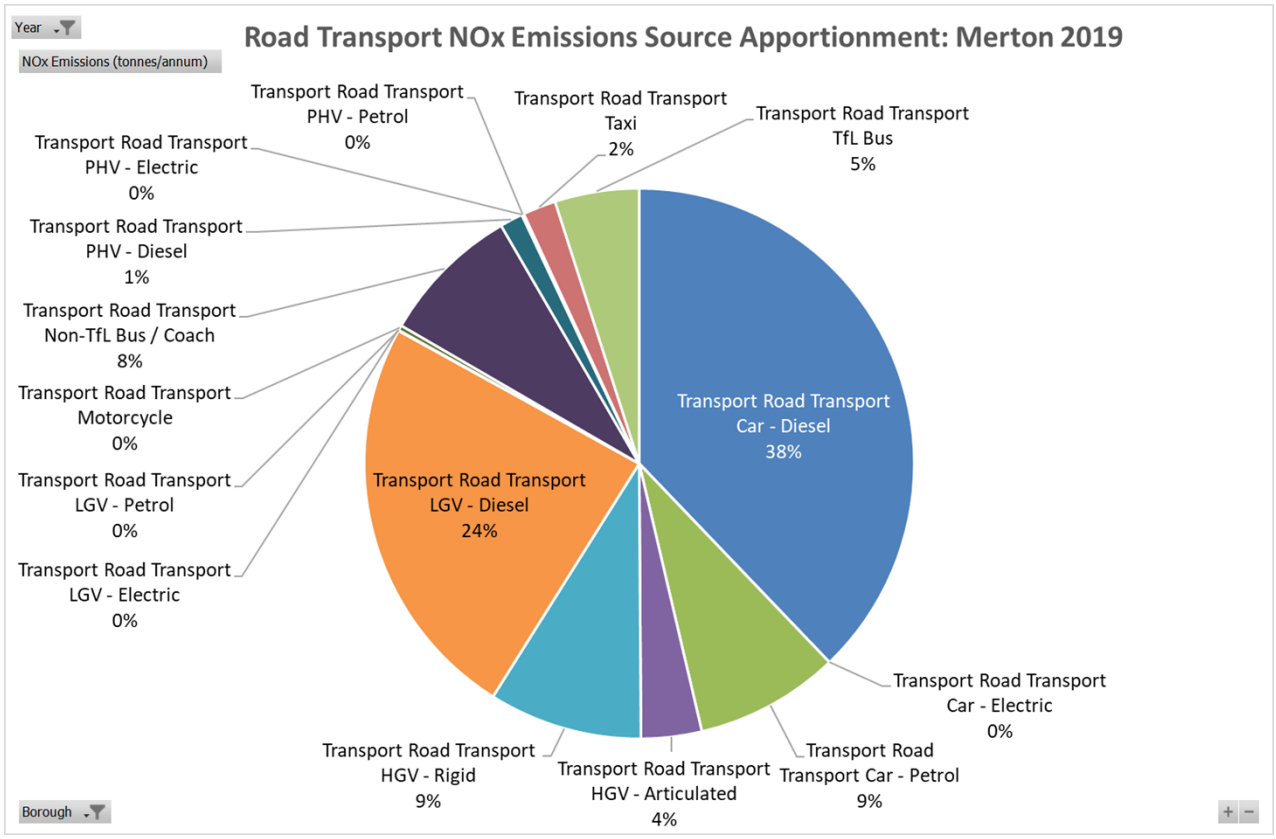

Year
NOx Emissions (tonnes/annum)
Road Transport NOx Emissions Source Apportionment: Merton 2019
Transport Road Transport PHV - Petrol 0%
Transport Road Transport Taxi 2%
Transport Road Transport TfL Bus 5%
Transport Road Transport PHV - Electric 0%
Transport Road Transport PHV - Diesel 1%
Transport Road Transport Non-TfL Bus / Coach 8%
Transport Road Transport Motorcycle 0%
Transport Road Transport LGV - Petrol 0%
Transport Road Transport LGV - Electric 0%
Transport Road Transport Car - Diesel 38%
Transport Road Transport LGV - Diesel 24%
Transport Road Transport Car - Electric 0%
Transport Road Transport Car - Petrol 9%
Transport Road Transport HGV - Articulated 4%
Transport Road Transport HGV - Rigid 9%
Borough

Figure 6: This outlines the contribution of $PM_{2.5}$ (fine particulate matter) by vehicle type in the Borough.

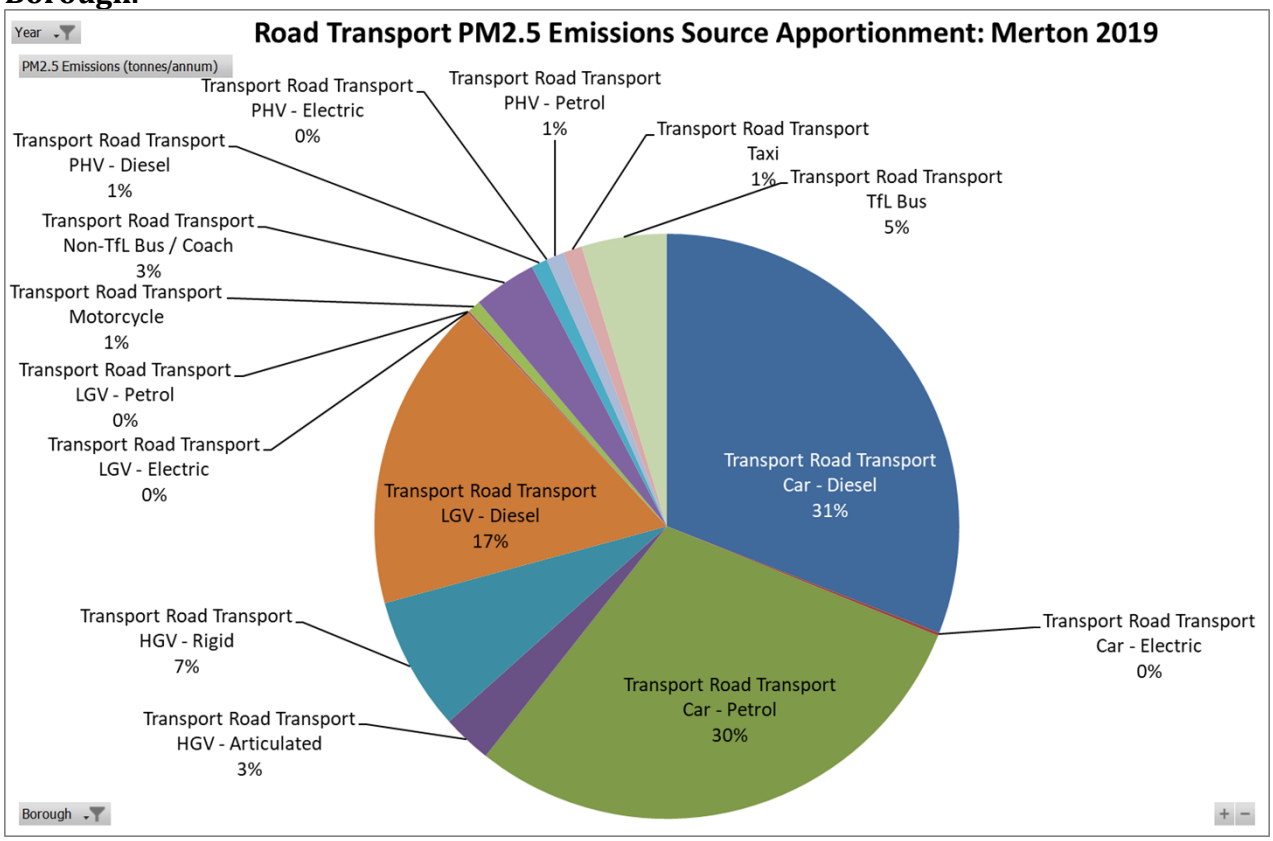


Figure 7: This outlines the contribution of PM_{10} (course particulate matter) by vehicle type in the Borough.

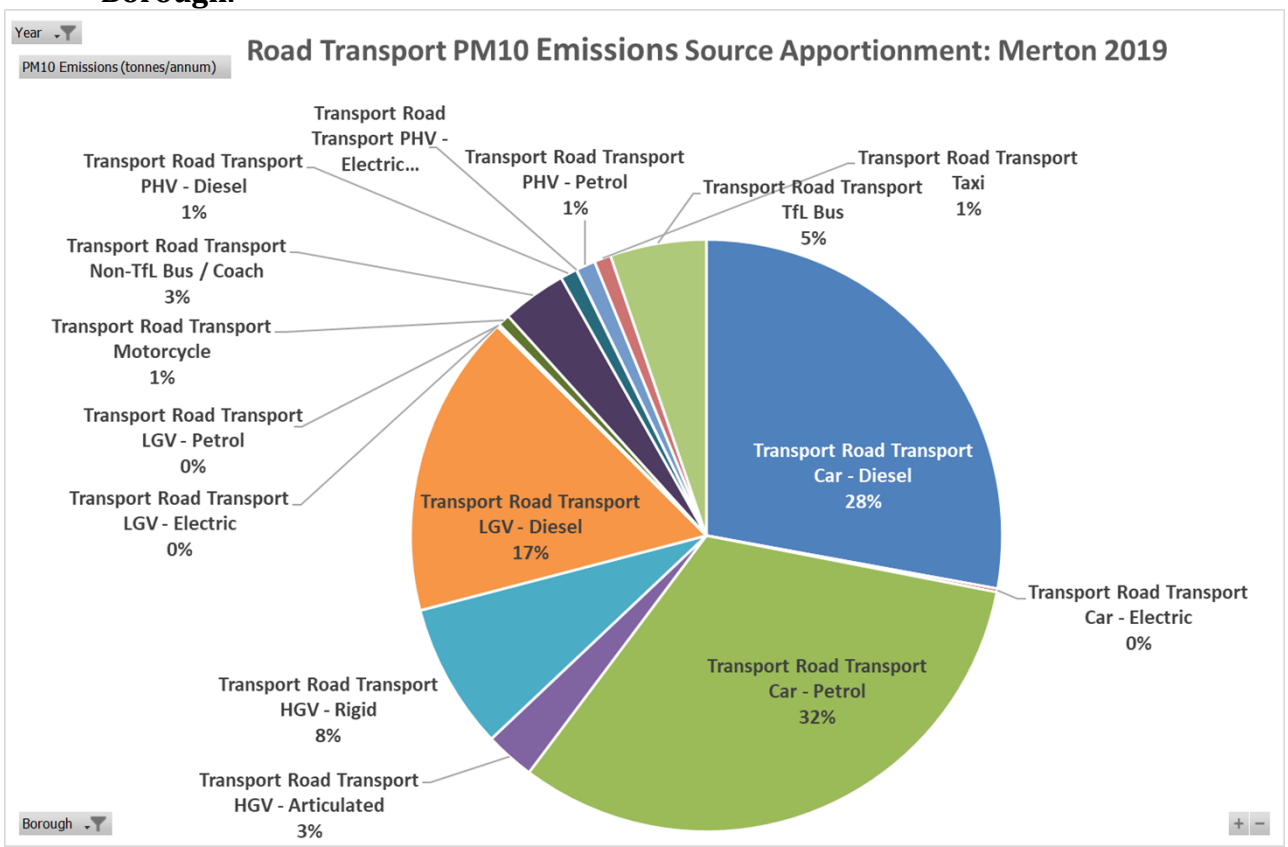
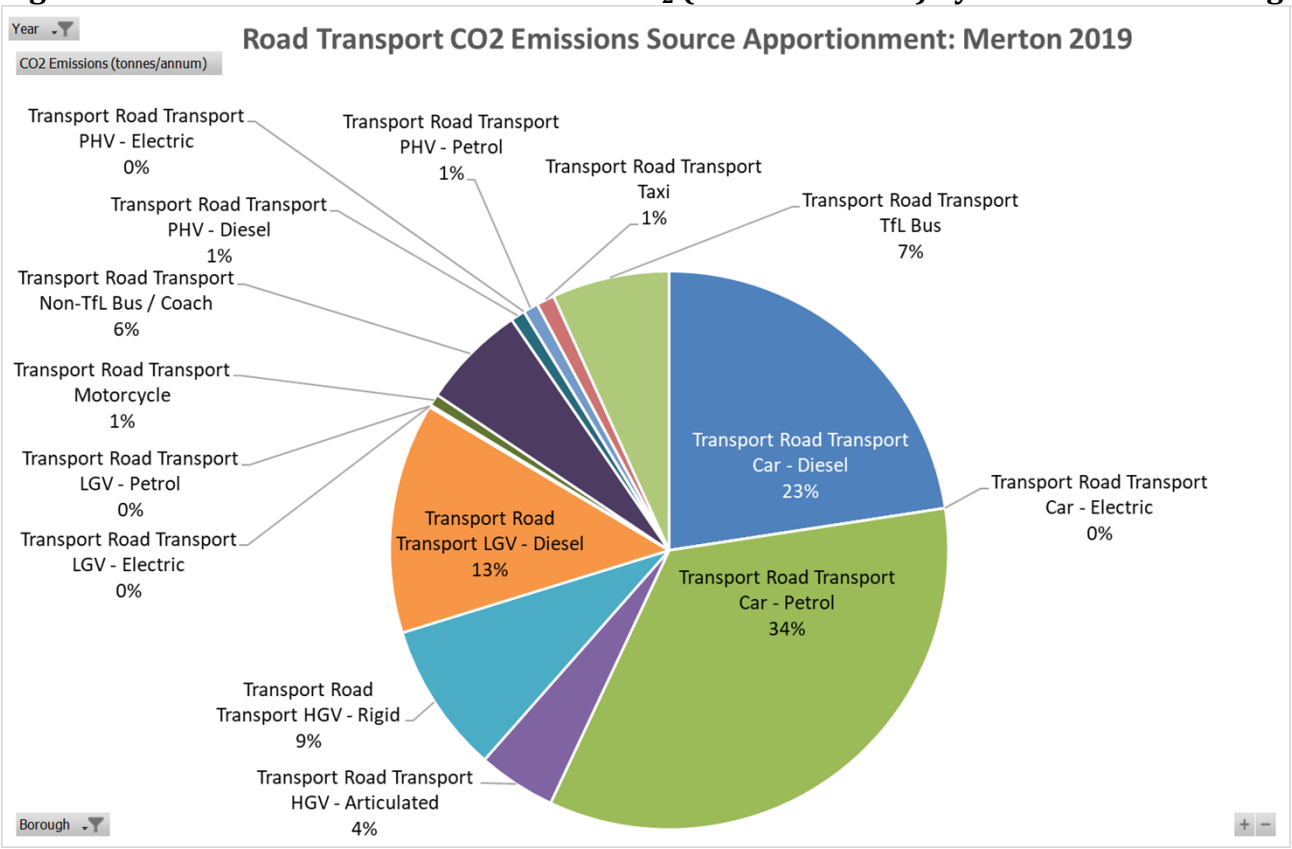


Figure 8: This outlines the contribution of CO_2 (carbon dioxide) by source in the Borough.



Appendix D

Road heirarchy

There is a road hierarchy which means that throughout the borough there is a network of London Distributor Roads, Local Distributor Roads and local access roads that allow movement of freight (HGVs) and service vehicles to move freely both within and across borough boundaries.

There appears to be an increase in demand from some residents that HGVs should be prevented from using residential roads. However, it is important to note that almost all roads in Merton are residential i.e. there are residential properties adjacent to the highway and there is a need to facilitate movement of commercial vehicles, including construction, waste and delivery vehicles.

LONDON LORRY BAN (LONDON LORRY CONTROL SCHEME LLCS)

In response to persistent complaints from Londoners about the disturbance caused by larger Heavy Goods Vehicles (HGVs) at night times and weekends, in 1986, the Greater London Council (GLC) introduced the LLCS in order to control freight movement. This was reviewed in 2017. The scheme aims to reduce unnecessary through traffic, while ensuring that London's economic activity continues. This scheme only applies to 18T vehicles and is controlled and managed by London Councils.

The hours of operation for LLCS controls are:
- Monday – Friday 9pm to 7am (including 9pm Friday night to 7am Saturday morning)
- Saturday – 1pm to 7am Monday morning
- Normal restrictions apply during public and bank holidays

Complaints regarding 18T vehicles are reported to London Councils who do undertake enforcement. However, it is not normal practice to receive feedback regarding the outcome of any enforcement that may have been carried out. Although some generalised pan London feedback is provided via London Council's annual reporting structure.

Local Lorry Ban

Over the years, each London borough including Merton has introduced local 7.5T HGV bans. This was introduced area wide as well as localised restrictions. Many of these schemes were aimed at inappropriate freight traffic seeking to cut through a specific area. This involved the appropriate statutory consultation and erection of signage. The 7.5T HGV ban applies to through traffic but it does permit access which makes enforcement challenging. Currently Merton does not enforce local 7.5T HGV ban.

Historically, where there was evidence of safety associated with rat running by HGVs, the Council introduced width restrictions. Width restrictions are effective but they do have an adverse impact on Emergency services, service vehicles and legitimate deliveries, which is an increasingly issue and concern. They can also restrict access for large transits, buses, community/mobility vehicles and box sized delivery vehicles. The few width restrictions in the borough are often subject to vandalism resulting in an increase in the Council's revenue budget for repairs. Such features also displace the problem on to neighbouring roads.

Freight deliveries are essential in ensuring that the demand for goods and services in London can be met. In an ideal world this should be undertaken with minimum disruption to all parties; this, however, would require coordinated effective and efficient management maximising delivery windows and taking advantage of out of hour deliveries where possible, to free up space during peak times on a congested network. This is not something that Merton can do in isolation.

Additional info on HGVS

The Fleet Operator Recognition Scheme (FORS) which is a voluntary accreditation scheme for fleet operators which aims to raise the level of quality within fleet operations, and to demonstrate which operators are achieving exemplary levels of best practice in safety, efficiency, and environmental protection. The scheme is managed by TfL but includes many operators from outside the Capital.

At the basic FORS Bronze accreditation level, it confirms that an operator employs good practices. This includes demonstrating dedication to driver and vehicle safety, combined with improving operating practices through effective monitoring of fuel and tyre usage, vehicle maintenance and performance management.

There are currently over 5000 accredited members across the transport and haulage industry. Adopting these practices can reduce accidents and improve fuel efficiency. For companies to sign up to any scheme there needs to be tangible benefits to membership. FORS can demonstrate a proven track record to prospective members.

The Council cannot force anyone organisation to sign up to this but as far as the businesses in the town centres are concerned perhaps this can be promoted through the business partners such as Love Wimbledon and other partners and stakeholders. This, however, will not address the other HGV activities, particularly skip lorries that are commissioned by individuals.

Development Sites

As part of all planning stage, developers are required to develop a construction management plan which must be agreed by the Council. Construction management plans are about reducing the impact of vehicles used in construction. As this is a planning condition, not complying to say a prescribed access route would be a planning enforcement matter.

Appendix E

Key to OGV's (Vivacity sensors)

OGV 1 (Ordinary Goods Vehicle 1)

All larger rigid vehicles with two or three axles including larger ambulances with double rear wheels, tractors (without trailers), road rollers for tarmac pressing, box vans, similar large vans and middle-sized trucks which have double rear wheels (if the rear wheels are single, the vehicle should be classified as LGV).

OGV 2 (Ordinary Goods Vehicle 2)

Includes all rigid vehicles with four or more axles and all articulated vehicles. Also included in this class are OGV1 goods vehicles towing a caravan or trailer.

Appendix F

Emission from OGV's v Cars

Since 1992, the EU has introduced increasingly stricter limits on heavy-duty vehicle emissions through a series of 'Euro' standards for the approval of the engine emissions. Euro I, II and III led to improvements in engine emissions, but catalytic emission control technologies were only effectively required with the introduction of Euro IV and V in 2005 and 2008. The latest and most stringent standard currently in place is Euro VI. Since the introduction of the Euro standards, nitrogen oxides (NOx) limits for heavy-duty engines have been reduced by 95%, and those for particulates (PM) by 97%.

The Euro VI-D legislation for heavy-duty engines approvals entered into force on 1 September 2018 for new types and has applied to all new engines from 1 September 2019. The Euro VI-E entered into force on 1 September 2020 for new types and will apply to all new engines from 1 September 2021. This stage includes consideration of cold-start emissions in data evaluation of the PEMS testing, as well as the measurement and evaluation of PN during the on-road test.

Euro 6 is the current standard for new registrations, and for diesel trucks, the permitted emissions of NOx were reduced to 0.08g/km. The move was made after studies linked NOx to respiratory problems.

The heavy-duty Euro VI standards address high real-world NOX and PM emissions from diesel trucks with changes to the heavy-duty vehicle test procedure in favour of the World Harmonized Transient Cycle, a new particle number limit, and stronger OBD requirements. These changes with the Euro 6/VI standards will lead to further advances in the full suite of vehicle engine and aftertreatment design.

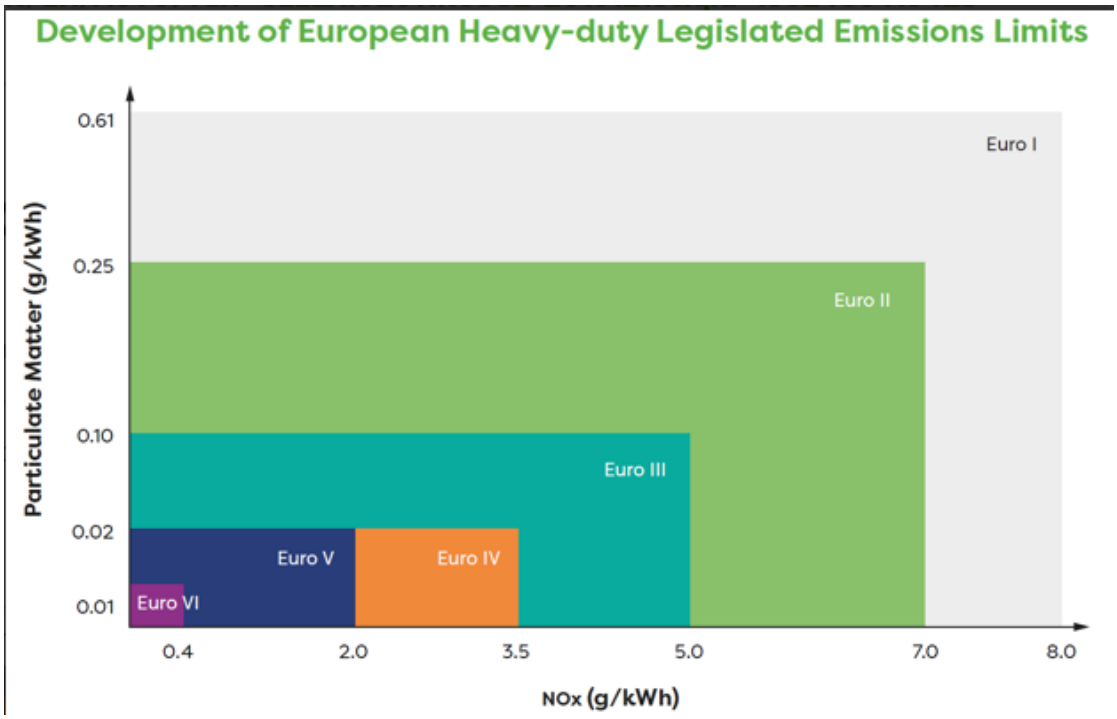


Table 1. EU Emission Standards for HDV Diesel Engines

Tier	Date	Test	CO (g/kWh)	HC (g/kWh)	NOx (g/kWh)	PN (#/kWh)	PM (mg/kWh)	Smoke (m^{-1})
Euro I	1992 (< 85 kW)	R-49	4.5	1.1	8.0	–	612	–
	1992 (> 85 kW)		4.5	1.1	8.0	–	360	–
Euro II	October 1996		4.0	1.1	7.0	–	250	–
	October 1998		4.0	1.1	7.0	–	150	–
Euro III	*Voluntary EEV (October 1999 to January 2013)*	*ESC & ELR*	*1.5*	*0.25*	*2.0*	–	*20*	*0.15*
	October 2000	ESC & ELR	2.1	0.66	5.0	–	100	0.8
Euro IV	October 2005		1.5	0.46	3.5	–	20	0.5
Euro V	October 2008		1.5	0.46	2.0	–	20	0.5
Euro VI	January 2013	WHSC	1.5	0.13	0.4	8.0×10^{11}	10	–

Note: EEV – enhanced environmentally-friendly vehicles

Euro 6 Emissions standards by Vehicle:

Limits are different for petrol and diesel engines

- Euro 6 Diesel Emissions Standards (grams per kilometer): 0.080 NOx, 0.005 PM.
- Euro 6 Petrol Emissions Standards (grams per kilometer): 0.060 NOx, 0.005 PM.

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