

Report on a community-led survey of nitrogen dioxide (NO₂) in north Marylebone

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For The North Marylebone Traffic Group
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Summary

People who live or work in Marylebone are exposed to unacceptably high levels of NO₂, a toxic atmospheric pollutant (pages 2-5). Full results are mapped in Figure 5 on page 6. Most of the survey samples exceeded the EU limit; the “cleanest” was close to it, the worst was 3.6 times higher.

This survey is the first time real measurements have been taken on a street-by-street basis in north Marylebone. It gives a remarkably clear picture of how individual streets, crossing points and public facilities like schools and pavement cafes are affected (see pages 6-8). The impacts of Marylebone Station and of buses routed unnecessarily into this residential area are very evident.

Key conclusions are: 1) Westminster Council and Transport for London must demonstrate that their Baker Street two-way traffic scheme will not increase peoples' exposure, but hopefully reduce it. 2) London needs more drastic ways of reducing NO₂ than the current gradualist approach being taken. The run-up to London's Mayoral and Assembly elections in May 2016 offers an opportunity for voters to demand extension of the ULEZ to include all of Marylebone and stronger measures to deter high polluting vehicles. 3) Occupational exposure to NO₂ of staff working in open premises in high pollution areas like Oxford Street and Marylebone Road warrants closer examination.

Ways for people to reduce their exposure to NO₂ as they move around north Marylebone are suggested on page 10.

“London is a cesspool....” of polluted air

With apologies to Arthur Conan Doyle for borrowing from *A Study in Scarlet*

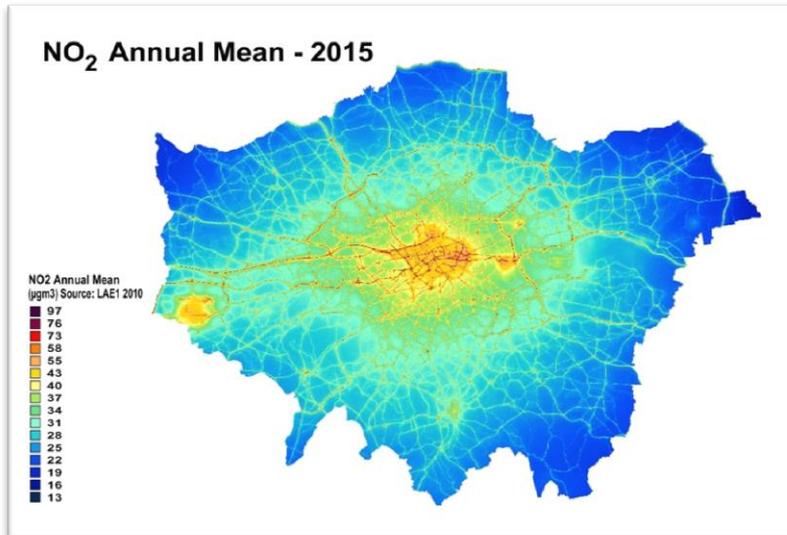


Fig 1: Map showing NO₂ levels across Greater London [from www.londonair.org]

with Marylebone at its epicentre.....

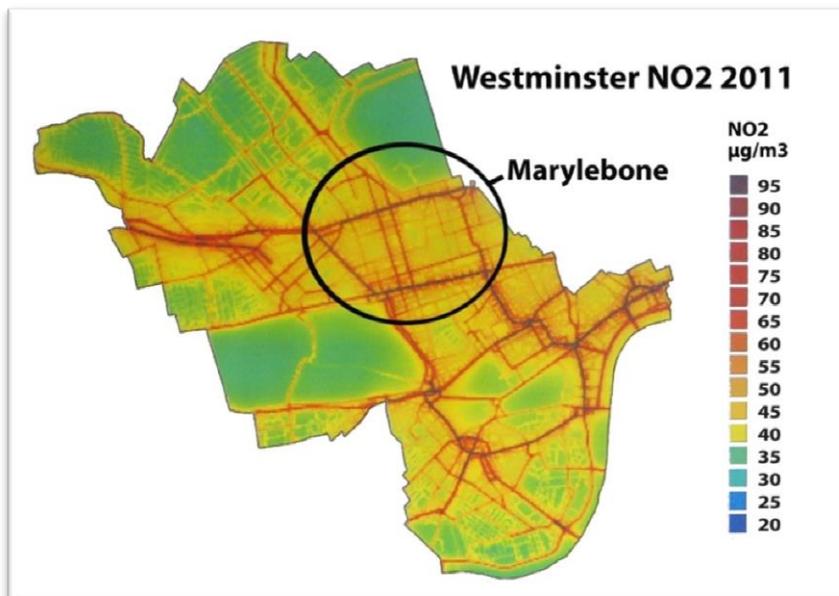


Fig 2: NO₂ levels in Westminster in 2011 [from *Air Quality in Westminster: A Guide for Public Health Professionals* published by the GLA in November 2012]

Air quality maps are based on data collected from a relatively small number of automated pollution monitoring stations across London. Using sophisticated models which factor in traffic volumes and weather conditions, they depict likely concentrations of pollutants in different locations. Figures 1 and 2 above are based on such modelling.

Marylebone is bounded by Oxford Street and Edgware Road; Marylebone Road, Baker Street and Gloucester Place run through it. There are Air Quality Monitoring Stations on Marylebone Road, Oxford Street and Horseferry Road. The annual mean NO₂ levels recorded at them since 2004 are shown in Figure 3. NO₂ concentrations on Marylebone Road have declined steadily since 2008. However Oxford Street is intensely polluted. In 2014 there were 1503 episodes when hourly mean NO₂ exceeded 200mcg/m³ on Oxford Street. The EU limit for this measure is 18 episodes in a year. Most of the NO₂ on Oxford Street comes from buses, which suggests that the new London buses have not improved matters.

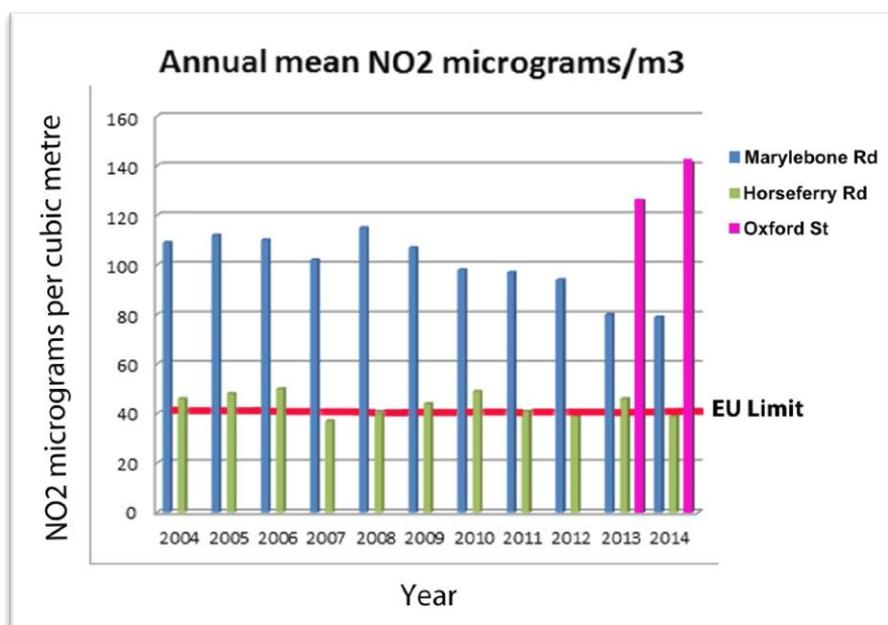


Fig 3: Annual Mean NO₂ levels in Westminister (2004-2014) [from Westminister 2015 Air Quality Report, published April 2015]

Figure 4 suggests only a gradual downward trend in monthly means of NO₂ on Marylebone Road over the last 17 months. This is the proposed boundary for an Ultra-Low Emissions Zone (ULEZ) which will come into effect in 2020. Recent media reports state that nine out of ten diesel cars on Europe’s roads are breaking the EU’s emissions limits, with the average vehicle emitting seven times more NO_x than European law permits. In this context, it remains to be seen how much better “zero-emission capable” taxis prove to be under real driving conditions and how non-compliance will be enforced. So despite the ULEZ and other emission reduction measures proposed by London’s Mayor, several areas of central and inner London are likely to exceed EU limits beyond 2025.

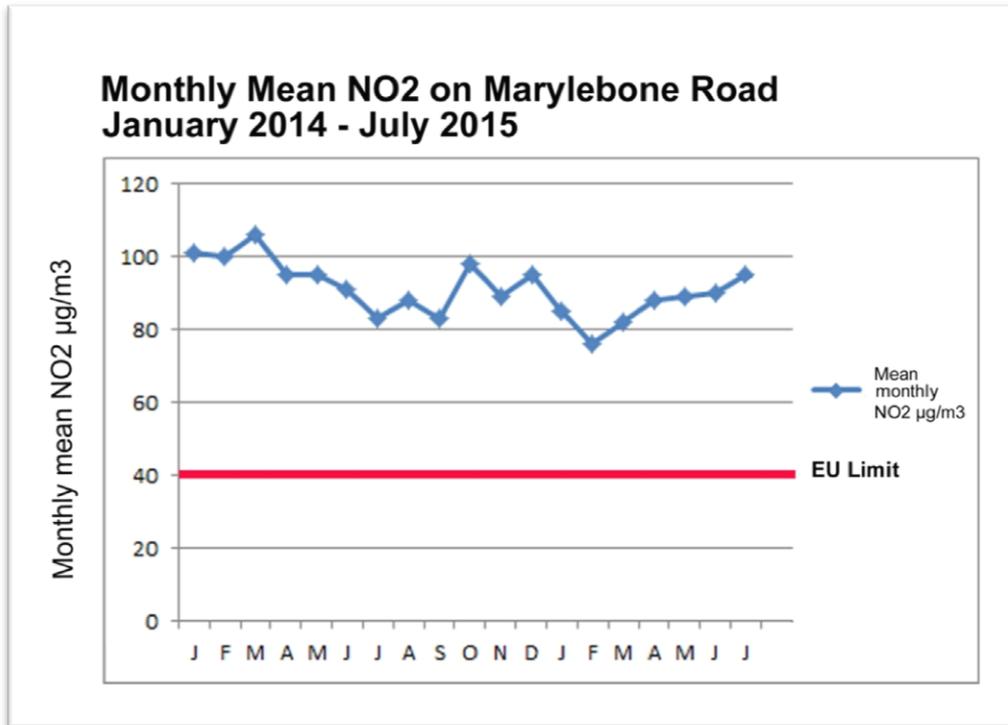


Fig 4: Monthly Mean NO2 on Marylebone Road up to July 2015 [based on data excerpted from DEFRA website in August 2015]

What NO2 is and why it matters

Oxides of nitrogen (NO_x) are produced by all combustion processes. In London, road transport and heating systems are the main sources of these emissions. NO_x is primarily made up of two pollutants - nitric oxide (NO) and nitrogen dioxide (NO₂) – and can convert to NO₂ in the air. NO₂ is of most concern due to its impact on health. You cannot smell or see NO₂ around you; in which respect it differs from the visible plumes and smell of diesel which emanate from some engines.

Inhaling high levels of NO₂ inflames the airways and long-term exposure can cause problems with breathing and affect lung function. Those most vulnerable include the young and elderly and people with existing lung conditions like asthma and chronic obstructive pulmonary disease (COPD). Traffic-related air pollution worsens these illnesses. A study commissioned by TfL estimated that NO₂ and particulates in polluted air contributed to 9,416 premature deaths in London in 2010. This is far greater than deaths from road traffic accidents.

The BMA presented evidence in 2012 that exposure to air pollution during pregnancy is associated with adverse outcomes like slower foetal growth, low birth weight, and a higher risk of chronic diseases in later life. Recent evidence suggests exposure of children to NO₂ is related to development of childhood asthma and impaired lung development and function (from *Air Quality in Westminster: A Guide for Public Health Professionals*, Nov 2012).

Individuals who live or work near busy roads are at particularly high risk of exposure to the health harms of air pollution. The same is true for those who spend long periods in traffic i.e. drivers of buses, taxis, delivery vans and HGVs. People travelling in cars are typically exposed to higher levels of air pollution than cyclists or pedestrians.

“Out of a total of 68 Public Health Outcome Framework measures of the health of the local population certain transport related measures could contribute to a **third** of them. No other area of intervention could impact on so many key aspects of population health.”

[from *Air Quality in Westminster: A Guide for Public Health Professionals* published by the GLA in November 2012, p16]

A community-led survey of NO₂ in north Marylebone

Concerns about potential adverse impacts of the Baker Street two-way scheme on their air quality led a group of local residents to collect baseline data on NO₂ in north Marylebone. They were supported to do this by Mapping for Change, a social enterprise wholly owned by and based at University College London, which provided materials, technical advice and invaluable assistance. A grant from the Dorset Square Trust enabled the group to expand the coverage of sampling points.

Fifty NO₂ diffusion tubes were placed at various locations at a standard height of 2-2.5m from the ground on posts and railings across north Marylebone. The locations were carefully selected to reflect places people would pass in their daily lives – while walking on busy or quiet side streets, waiting at bus stops, using crossings over main roads, near schools and pavement cafes - and in areas of housing near the railway tracks of Marylebone Station. The tubes were exposed to the air for a month (30th June to 29th July 2015); 2 were lost, 48 were returned to Mapping for Change and analysed by Gradko International Ltd.

This relatively simple method yielded a detailed picture of how NO₂ levels vary across our neighbourhood. Gratifyingly, this picture corresponds with the one developed by King’s College London from the detailed data gathered by the London-wide Air Quality Monitoring Network (Figure 2 and www.londonair.org). Most importantly, the NO₂ reading from the diffusion tube placed at the Marylebone Road monitoring station (97.59mcg/m³) was close to the monthly mean reported from that station for July 2015 (95mcg/m³) on the DEFRA website (see Figure 4). This validates the survey results.

MAIN FINDINGS

A map showing the locations and lab results (monthly mean NO₂ levels) from 48 tubes are shown in Figure 5. Full details of each site sampled can be accessed at:

<https://communitymaps.org.uk/#/project/26?center=51.5153:-0.1457:11>

Marylebone Road. NO₂ levels are high (55-67mcg/m³) along much of this route and very high (90mcg/m³) at the corner of Gloucester Place/Dorset Square and in front of Marylebone Station. Turning or stationary buses and taxis are likely contributors. This situation contrasts markedly with York Street, also one block away from Marylebone Road but to the south, which has no buses. There NO₂ levels are much lower at 40-46mcg/m³.

Strategic Roads

As well as being strategic routes, these are also residential roads lined with mansion blocks of flats as well as Georgian terrace houses with basement flats.

Kerbside NO₂ levels are very high on Park Road (56-59mcg/m³), Baker Street (59-83mcg/m³) and Gloucester Place (66-117mcg/m³). The highest readings on Gloucester Place were on corners where northbound buses, coaches and taxis turn left into Marylebone Road (117mcg/m³) and Dorset Square (90mcg/m³).

As could be predicted, NO₂ concentrations are extremely high on Marylebone Road: kerbside levels vary from 97 to 117mcg/m³ and soar to 134-145mcg/m³ on the central reservation. Around Baker Street station, levels are 97 at kerbside, 82 near the Metropolitan Bar on the side road, 145 on the central island of the ground-level crossing and 74 in the pedestrian subway crossing.

Impact of Marylebone Station

Marylebone Station is a significant transport hub with intercity train services to Birmingham (and soon to Oxford), commuter trains, a tube station, three bus routes and numerous taxis. Its retail/bar/café outlets and the hotel opposite require servicing for deliveries and waste management. NO₂ at the front of the station was 90mcg/m³. The reading on Harewood Avenue, near the overspill taxi rank on the west side of the station, was 47mcg/m³.

Boston Place on the east side of the station was the only quiet residential street in the heart of the DSCA which gave readings above 45mcg/m³; being 48mcg/m³ alongside the enclosed train shed and 51mcg/m³ alongside the open railway tracks. A tube on the Blandford Estate 30m from the station boundary wall on the west side of the open tracks gave a reading of 38mcg/m³. A possible explanation for this set of results may be that prevailing wind flows from west to east carry train engine NO₂ emissions away from the Blandford Estate towards Boston Place. A reading of 45mcg/m³ was obtained from kerbside on the Rossmore Road bridge over the railway tracks.

Impact of bus routes through residential streets

Three bus routes (#2, #205 and #453) loop into the DSCA to get to the front of Marylebone Station, while many other routes serve the station from stops on Marylebone Road and Gloucester Place. The extra contribution of buses to NO₂ levels is evident from the higher concentrations at corners where buses and coaches make turns e.g from Gloucester Place northbound onto Marylebone Road (117mcg/m³); Marylebone Road into Balcombe Street (103mcg/m³); Gloucester Place into Dorset Square (90mcg/m³).

Exposure of school children to NO2

Six schools are located in the survey area and sampling tubes were placed outside four of them. Francis Holland School (Park Road) gave readings of 57mcg/m³ in front of the main gate on Park Road, a strategic route, and 44mcg/m³ on Ivor Place, the side where coaches and cars pick up and drop off pupils. At St Edward's RC Primary School (Lisson Grove), readings were 40mcg/m³ on the front railings and 49mcg/m³ on Hayes Place where the #2 bus terminates next to its nursery wing. St Mary's CoE Primary School (Enford Street) had a reading of 56mcg/m³, perhaps because of its proximity to Marylebone Road. Parents with children at this school have long complained that short pedestrian crossing times allowed by TfL on Marylebone Road leaves them trapped on the central reservation (NO2 135mcg/m³) when walking their children to and from school. Christ Church Bentinck CofE Primary School (Cosway Street), also near Marylebone Road, had a reading of 44mcg/m³.

The tube on Rossmore Road nearest Abingdon House School went missing, but the reading from the junction of Broadley Terrace with Harewood Avenue (40mcg/m³) is perhaps indicative. Abercorn School, being on Marylebone Road, is likely to have very high NO2.

Pavement cafes, pubs and restaurants

Such establishments are used by residents because of the lack of gardens. Tubes were placed near them when a street was sampled specifically in order to assess the likely exposure of their customers and employees to NO2. Readings were as follows: Sports Bar and V&A pub, Marylebone Station (89mcg/m³); Costa Coffee, Baker Street (83mcg/m³); Metropolitan Bar, next to Baker Street station (82mcg/m³); Dorset Café, Melcombe Street (58mcg/m³); Duke of Wellington, Crawford Street (54mcg/m³).

CONCLUSIONS AND RECOMMENDATIONS

The survey findings above provide greater clarity of residents' exposure to NO2 in north Marylebone. A key finding is that monthly mean NO2 levels on several residential streets in the Dorset Square Conservation Area are just below or above the EU annual mean limit. It is vitally important that WCC and TfL make certain that the Baker Street two-way proposals do not open up rat-runs so that non-resident traffic diverting into these streets create new exceedances of that limit. Restricting turns for southbound traffic on Gloucester Place into Ivor Place and Taunton Place would achieve this. The Council's revised proposals for the two-way and its Air Quality Impact Assessment have yet to be issued at the time of writing.

The survey revealed higher than expected NO2 along Melcombe Street/Dorset Square south side/Melcombe Place. This is probably due to bus routes and the existing rat-run from Baker Street to Marylebone Station and the right-turn from Harewood Avenue onto Marylebone Road. Residents seek assurances that the two-way proposals will increase right-turning capacity from Baker Street into Marylebone Road sufficiently so that traffic and NO2 are reduced markedly along this pedestrian route and shopping parade.

The extra contribution of three bus routes to NO₂ in residential streets of the DSCA is notable. There is no compelling reason for them to loop into the area around Marylebone Station which is congested with pedestrians, cyclists and taxis. TfL is urged to re-route the #205 and #453 so they stay on the Marylebone Road. Its proposal to re-route the #2 to turn from Gloucester Place into Marylebone Road, and via lower Balcombe Street into Melcombe Place is welcomed. This route should terminate in Great Central Street instead of Hayes Place, where it currently raises NO₂ levels near the nursery wing of a primary school.

This survey and London-wide air quality models indicate that many thousands of people who live or work in Marylebone are exposed to excessive amounts of NO₂ which harm health and contribute to premature deaths. Westminster's intention to set up a Low Emission Neighbourhood encompassing all of Marylebone is therefore welcome. Everyone is encouraged to contribute actively to the development of policies and measures both individually and through Amenity Societies and the Marylebone Forum.

We urgently need the equivalent of The Clean Air Act (1956) to dramatically reduce atmospheric pollution in central and inner London. Residents are urged to join active campaigns in the run up to London's Mayoral and Assembly elections in 2016 to achieve big differences quickly, for example by demanding extension of the proposed ULEZ so it includes all of Marylebone and sets pollution charges which reflect each vehicle's actual emission level, not some spurious figure simplistically based on the year in which it was manufactured. As proposed, the £12.50 ULEZ charge will permit a "dirty" car to pollute central London without limit for a day. Another campaign is to ban certain diesel vehicles from entering city centres. Yet another option is to institute road pricing. With GPS technology, charges can be calculated for each vehicle's actual emission level and the actual distances it is driven on different types of road so that higher polluters pay accordingly.

In the same way that anti-tobacco laws protect employees in their workplaces and children in cars from passive exposure to smoke for health reasons, perhaps the time has come to regulate against excessive NO₂ exposure. Health & safety, licensing and planning regulations may need to be revised to take into account the public health implications of insidious exposure to NO₂ for staff and customers of businesses which operate in high pollution areas like Oxford Street and Marylebone Road. Sheffield City Council is in the vanguard with plans to relocate two schools, which lie near Junction 34 of the M1, because of the children's high exposure to vehicle emissions.



REDUCING PERSONAL EXPOSURE TO NO₂ AND HEALTH RISK

The findings of this survey are being disseminated and publicised via email distribution lists of residents' groups and the newsletters of Amenity Societies. All those recipients will be encouraged to cascade the information on to friends, neighbours and work colleagues.

There are a number of ways to reduce daily exposure to polluted air

- Make sure you and your family know about the pattern of air pollution in your local neighbourhood (Figures 2 and 5) and build that knowledge into how you move around the area.
- Avoid walking or cycling on strategic roads whenever possible. The air is usually cleaner in the side streets, and they are also much quieter and generally far more pleasant.
- When crossing the Marylebone Road, wait as far away from the kerbside as you can and try to avoid getting caught on the central reservation. Make it a rule not to wait close to corners where buses turn. At Baker Street, using the pedestrian subway (currently being upgraded by Baker Street Quarter) will expose you to the least amount of NO₂ and could save you time.
- Every journey in a non-electric private car contributes to the high NO₂ levels around us, especially if it has a diesel engine. So think twice before driving in central London and re-assess whether it's sensible to drive your children to school. Exposure to NO₂ inside the car is greater than if they were walking or cycling or on public transport!
- When considering an al fresco drink or meal in Marylebone, remember to factor in the venue's location. The pavement café, bar or restaurant could be more noxious and less fresco than you bargained for.
- If you work for a business whose premises are open to a highly polluted road, ask your employer if they will monitor NO₂ levels and staff exposure.