

Love Lambeth Air Monitoring Air Quality in Lambeth



Final Project Report

This final report has been produced by Mapping for Change for Lambeth Council. It has been developed as part of a six month project led by Mapping for Change to engage local residents in Lambeth with the view to increase public understanding about air pollution, its causes and effects, and how concentrations vary both spatially and from day to day. It has been written by Claire Baldock. Copies of this report can be obtained from the Mapping for Change website (Mappingforchange.org.uk). Text copyright Mapping for Change. This material is made available for public use subject to acknowledgement being made of the source and its availability on the Mapping for Change website.

Acknowledgements

We would like to thank all of the community members who participated in this project, and whose work is used as examples here to help others learn how they can use a citizen science approach to monitor and map local air quality in their own community. We would like to acknowledge, in particular, participants at St John's Church whose support as a local Lambeth resident went above and beyond the cause.



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Summary

Love Lambeth Air was initiated with the aim to increase public understanding about air pollution, its causes and effects amongst local residents, and how concentrations of different pollutants vary over space and time.

The project focused on one of the major ambient air pollutants, nitrogen dioxide (NO₂), which is considered harmful to health. This report describes the process with which residents in Lambeth carried out an in-depth air quality monitoring survey using diffusion tubes and then goes on to outline the preliminary findings.

In summary, the results found that there were higher levels of pollution in the north of the borough. Also a number of locations, such as Waterloo Bridge Road and Stockwell Road, were found to have concentration levels exceeding the EU annual targets. The average monthly results show that only 3 out of 34 sites were within the EU annual targets.

During the monitoring of NO₂, the UK was subject to very high air pollution levels in January 2017 and residents were able to directly see the impact of this on local air quality conditions. Results show that 85% of the sites display their highest reading in January 2017, see figure 10.

A number of areas that are seen as key in trying to combat Lambeth's air pollution problem were discussed at the project feedback event. Some of these were put forward to Lambeth Council for consideration and other actions were noted that can be taken at an individual or community level.

Introduction

Air pollution is a concern for everyone and is something that affects us all. We are all contributors to the problem and can all take steps to improve the air we breathe and to reduce our personal exposure to poor air quality. The London Borough of Lambeth has some of the highest levels of pollution in the country due to its central London location.



A number of studies have been carried out into the health effects of air pollution across all stages of life – from conception to old age; on specific pollutants; and on different health endpoints, such as mortality and cardiovascular disease. Mounting evidence suggests that air pollution contributes to the global burden of respiratory and allergic diseases, including asthma, chronic obstructive pulmonary disease, pneumonia, and possibly tuberculosis (Laumbach and Kipen, 2012). Various long and short-term studies also conclude that there is a positive association between poor air quality and mortality rates (Rückerl et al., 2011).

NO₂ is one of the major air pollutants found in our cities and is largely attributed to the burning of fossil fuels (coal, natural gas and oil) and vehicle emissions. Industry and road transport are primary sources of these emissions across the UK. As an irritant gas, NO₂ can damage cell membranes and proteins. High concentrations can produce airway inflammation (experienced as a cough, chest tightness and difficulty breathing) and may lead to narrowing of lung airways, particularly among people with pre-existing asthma.

In response to the negative effects that air pollution has on human health, vegetation and ecosystems, the European Commission has set reduction targets for key pollutants for all its Member States. The current EU legislative framework governing air quality has its origins in the Air Quality Framework Directive of September 1996 (96/62/EC) (the Framework Directive). This includes an annual mean limit value for NO₂ of 40µg/m³ which was to be met by 2010.

Local authorities around the UK regularly monitor air quality to assess compliance with air quality objectives and to measure the effectiveness of plans and programmes to reduce levels of air pollution. However, the collection and analysis of data is a costly process. As such, the majority of monitoring undertaken by local authorities is limited to collecting data from a few static sites within their jurisdiction. These data are then extrapolated using complex models to infer what pollution levels are in areas where there is no data. Whilst this offers an indication of local air quality, it is unable to create an accurate picture at a scale which the public may relate to or find useful on a day-to-day basis, particularly if they are seeking to reduce their exposure to poor air quality. Models produced during 2013 showing the annual mean NO₂ air pollution for Lambeth can be seen in Appendix 1.



The aim of this project is to increase community awareness about air quality issues and the health impacts of air pollution, and how they can take steps to reduce their personal exposure to airborne pollutants. Moving forward it is hoped that they will also benefit from the opportunity to voice support for increased local action.

To establish the variability of air quality at a smaller scale the London Borough of Lambeth commissioned *Love Lambeth Air*, a six month project running from November 2016 to April 2017, led by Mapping for Change.

The main aims of the project were to:

- Develop an understanding of hyper-local air quality conditions around the borough
- Raise awareness of local and wider air quality issues among Lambeth residents

Objectives included:

- Carry out diffusion tube monitoring with local residents
- Educate local residents on how to reduce their exposure to pollutants
- Collate data to provide community air quality maps

A citizen science approach has been adopted which enables local residents, many of whom have not been involved in a project of this kind before, to carry out grassroots data collection. Participating residents and businesses were given diffusion tubes to measure nitrogen dioxide outside their home or office over the course of six months. Every month participants changed the diffusion tube and sent the old tube to Mapping for Change who sent them for analysis. The results were then made available on the [Community Air Quality Map](#).



The images below in figure 1 show snapshots from Community Maps, Mapping for Change’s platform for participatory mapping. The maps posted here show air quality monitoring across London. Data from the monitoring sites across Lambeth was entered each month onto the Community Air Quality Map for participants of the project to see; the results can then be shared with the wider community.

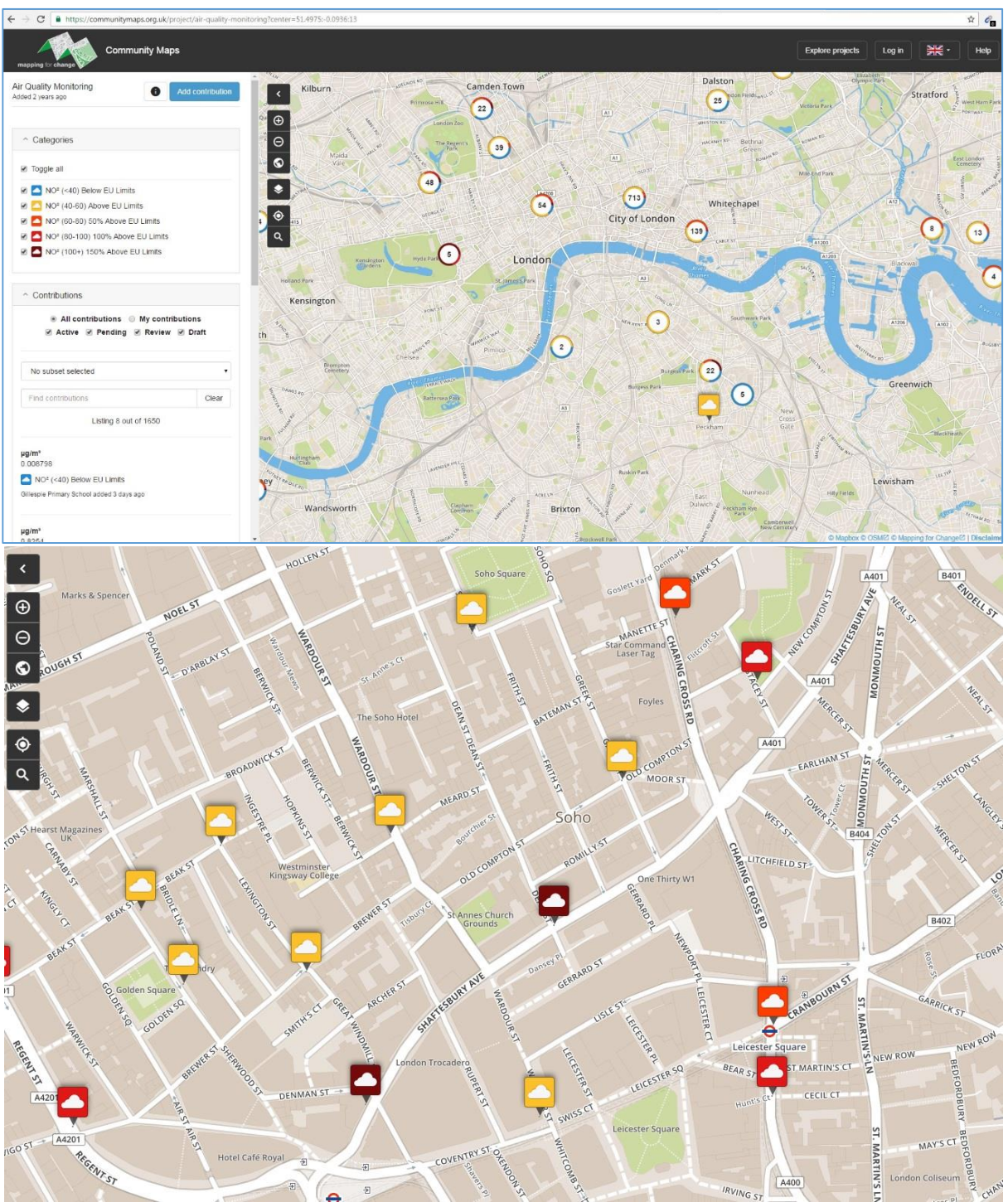


Figure 1. (a) Community Air Quality Map with (b) individual measurements depicted by coloured icons.

Methodology

Qualitative Approach

The project commenced in September 2016 with Lambeth residents being invited to register their interest in the project through various channels including emails, word of mouth, posters, social media and help from members of Waterloo Business Improvement District (BID). The project was also published in the Lambeth Talk magazine and on the Love Lambeth website.

Two training workshops (figure 2) were provided at the onset of the project, during which participants were shown how to carry out the monitoring using diffusion tubes and were given their first months monitoring equipment. In total 22 participants attended the training sessions, those who were unable to attend were provided with the materials and information via email, post and face-to-face meetings.



Figure 2. Mapping for Change running training workshops with Lambeth residents



The meeting consisted of an introduction to the problem of air pollution in Lambeth, the current monitoring systems in place, the effects poor air quality may have on health, and measures currently in place to reduce air pollution.

To gain an insight into what residents felt about Lambeth's air quality two surveys were conducted; one at the start of the project and one at the end. These were in the form of semi-structured questionnaires so that both qualitative and quantitative data could be collected. The residents were asked about their perceptions of air quality and the sources of pollution around the borough, their understanding of the health impacts of poor air quality and whether taking part in the project had changed their opinions or their behaviour. The overall responses were collated and compared.

Quantitative Approach

To gain an overall insight into air quality across the area, NO₂ monitoring was undertaken at 34 sites across the borough using diffusion tubes. Volunteers were recruited through online and offline engagement methods to take part in this activity and training was provided. The initial drive for participants was very successful and the project was oversubscribed with over 50 volunteers. To give as many people as possible the chance to participate in the project several participants were encouraged to share the responsibility of managing one diffusion tube. Participants were matched-up based on the proximity of their preferred monitoring locations and were asked to share the responsibility of changing the diffusion tubes. By the end of the six months of monitoring, 30 residents had hosted diffusion tubes outside their properties, offices or strategically monitored 'hotspots' at street level to maximise coverage. One participant ended up monitoring a total of five sites.

Lambeth Sites

Maps were produced to show the location of the sites chosen by participants in this project across the borough of Lambeth, shown in Appendix 3 with a description of the site locations shown in Appendix 4.



Diffusion Tubes

Diffusion tubes were used to passively monitor airborne Nitrogen Dioxide (NO_2). The diffusion tubes are made from clear plastic, with a rubber stopper at each end. A steel mesh coated with a chemical called Triethanolamine is located at one end of the tube. This absorbs nitrogen from the air when the stopper at the other end of the tube is removed, allowing air in. Laboratory analysis provides the average concentration of the pollutant in the air over the period that the tube was exposed.

Once a suitable site had been selected, a tube was positioned vertically, using a bracket and tie to fix it in place, with the open end facing down (see figure 3). The start time and date were recorded along with the location and any details about the site that might provide additional context. The tube was left exposed for 4 weeks before being removed, re-capped and replaced with a new tube. The end time and date were recorded so that the exposure time, in hours, could be calculated. The tubes were collected and sent to the laboratory for analysis. All the data from the survey sheets was collated and recorded. This was repeated each month between November 2016 and April 2017. Each tube had a unique number identifier and barcode so data could be attributed to the individual site. All results for nitrogen dioxide monitoring were digitised using an interactive community map, plotted on easy to interpret graphs and shared via email with the residents involved.

Diffusion tubes are one of the most common, simplest and well-proven methods for measuring NO_2 . They are very useful for identifying areas of high NO_2 concentration, particularly when dealing with sources such as traffic and vehicle emissions. The measurements collected using this method are also comparable with local council data and can be used for indicative comparison with the Air Quality Strategy Objectives based on the annual mean.



Figure 3. Monitoring sites hosting diffusion tubes to monitor nitrogen dioxide

Results

Residents' perceptions

Each participant was asked to complete an initial questionnaire at the start of the project, which was followed-up with a similar questionnaire at the end of the project for evaluation purposes. The questionnaire benchmarked participant's knowledge of air pollution in Lambeth at the onset of the project and also gathered demographic information about each participant.

The residents' perceptions of both air quality and the main sources of local pollution are shown in the figures below along with their most frequently used modes of transport. For both questionnaires 29 residents responded respectively.

Figure 4 shows that the most frequently used mode of transport was walking at 28% followed by the tube at 24% and bus at 22%. Very few residents travelled by car or other modes of transport including riverboat.

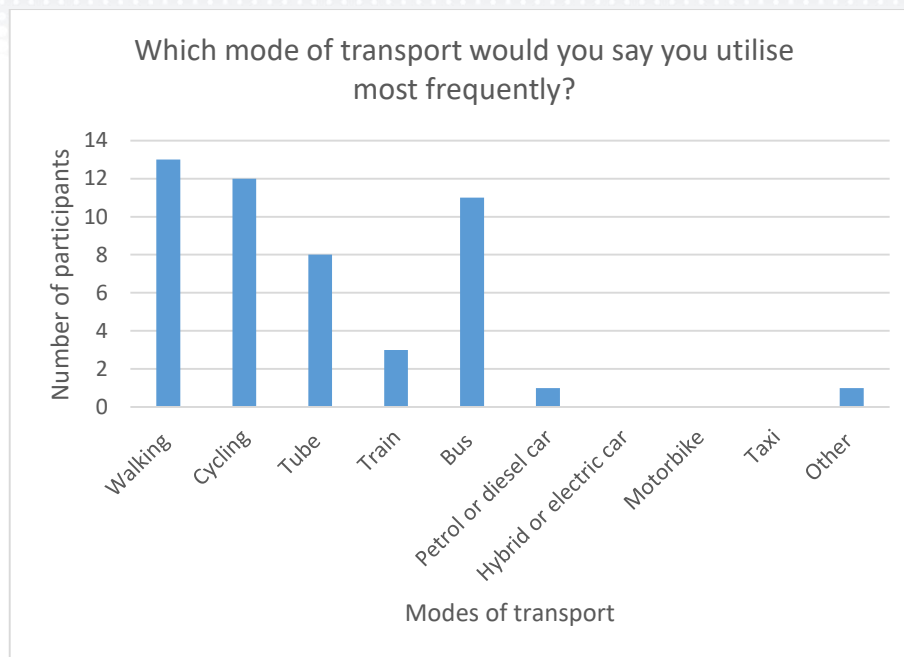


Figure 4. Lambeth participants' response when asked which mode of transport you would say you utilise most frequently.

Residents were asked how they felt about air quality around Lambeth and the responses, outlined in figure 5 show that at the start of the project 50% of residents felt it was *often very poor* and 32.1% *always very poor*, whereas 43.8% and 43.8%, respectively, felt this way at the end of the project.

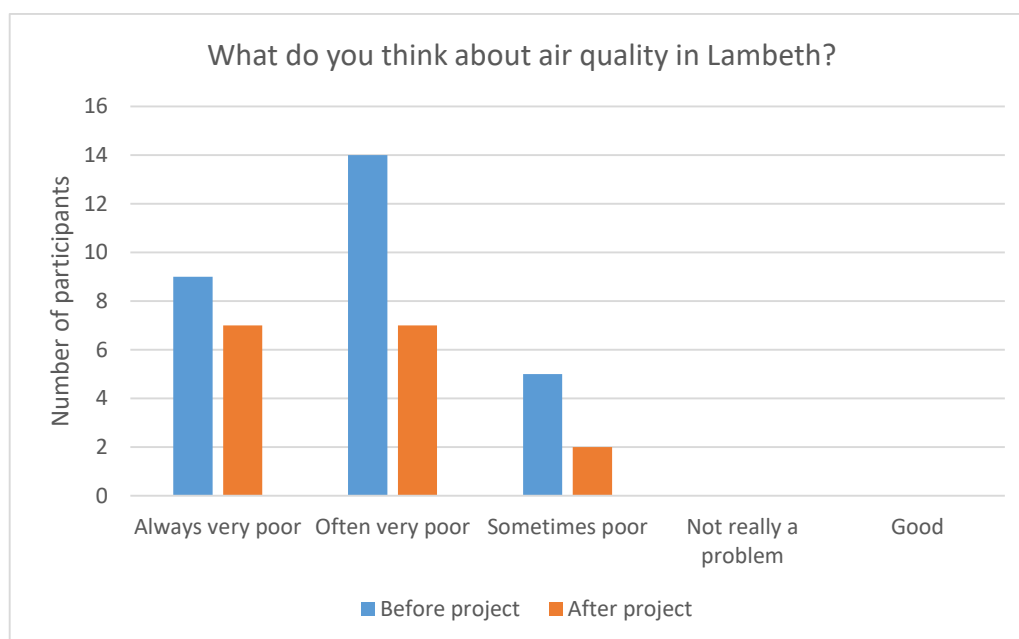


Figure 5. Shows the comparison of participant's views about air quality in Lambeth before and after the project.



One of the primary ‘hotspots’ identified by the local residents was in Waterloo. This area is busy with public transport including buses, taxis and delivery vehicles.

Participants were asked to select three of the main sources of local pollution from a predefined list. Respondents initially cited lorries as being the main sources of pollution and this remained the main perceived source at the end of the project.

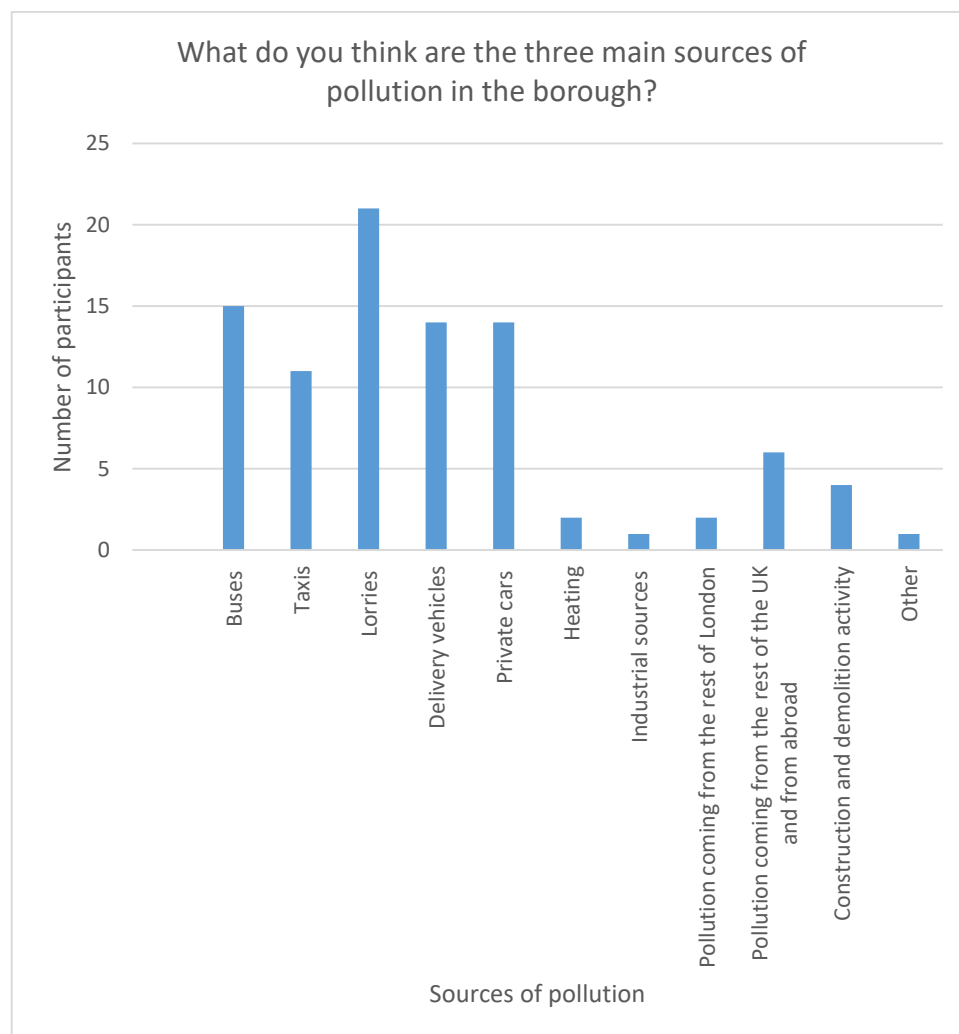


Figure 6. Lambeth participants’ response when asked what they think are the main sources of pollution in the borough at the start of the project.

When asked what impact poor air quality in London has on health several key themes appeared. The majority of respondents were aware that poor air quality could cause health problems and damage to lungs. Along with heart problems, respondents felt that poor air quality lowered people’s quality of life. Children were identified as being affected by poor air quality in London, with it causing problems with lung and brain development.



Figure 7 shows that 81.3% of respondents agreed that their understanding of the health impacts of air pollution had improved as a result of participating in the project, 18.7% of respondents said that they were already aware of the impacts poor air quality has on health before engaging in the project.

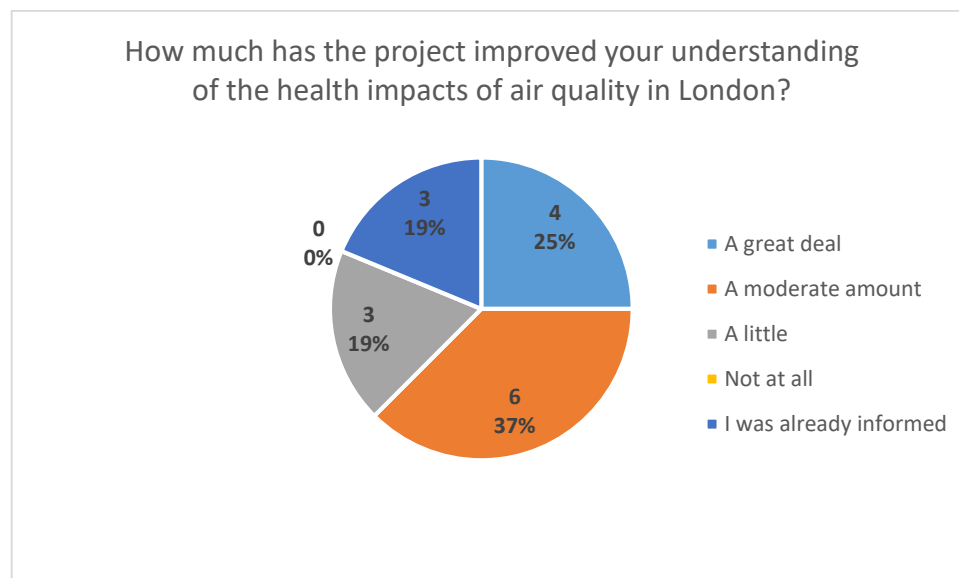


Figure 7. Lambeth participants' responses when asked whether the project had improved their understanding of the health impacts of air quality in London.

At the start of the project when asked whether they felt sufficiently informed about the Borough's work on air pollution 60.7% of respondents stated that they didn't feel sufficiently informed, whereas 21.4% felt that they were sufficiently informed. Those that were aware of measures taken noted the promotion of 20mph speed limits, cycling and walking to work schemes and the anti-idling campaign. However, after the project 73.3% of respondents felt that they were more informed about the local authority's work on air pollution reduction, figure 8.

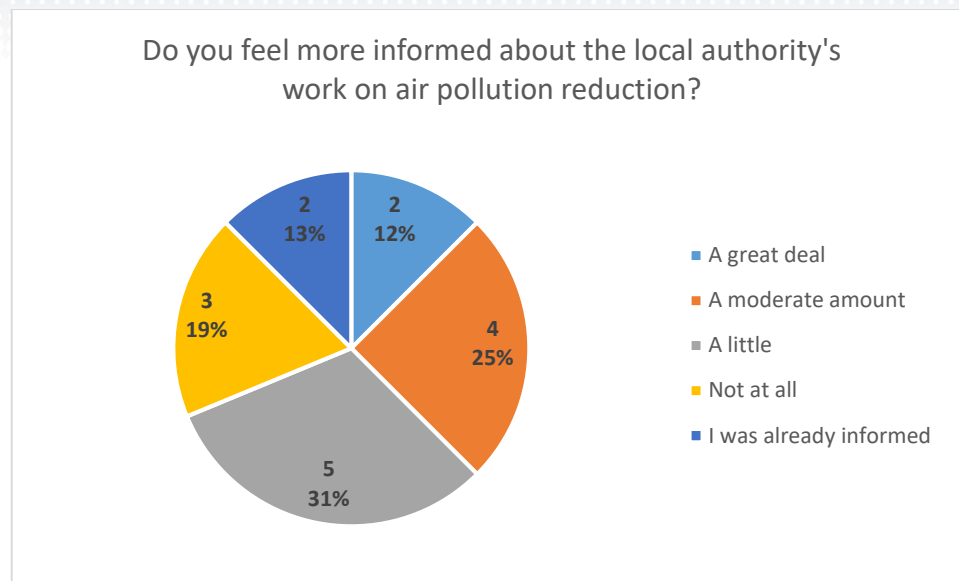


Figure 8. Lambeth participants' response when asked whether they feel sufficiently informed about the borough's work on air pollution reduction.

Over 65% percent of respondents suggested changes they could make to reduce their personal exposure to air pollution as a result of the project. Some of the measures participants suggested to improve air quality within their borough can be seen in appendix 5.

There were hopes that the project provides evidence and information to support moves to clean up air quality. This information could then be used to apply pressure to central government, the Mayor of London and Transport for London. Respondents would like the project to raise awareness of the issue around home and work environments including local businesses and schools.

In the questionnaire at the end of the project, participants were asked if they were happy with the way the project was delivered and carried out; 100% of respondents said yes. Participants were asked if they would participate in this type of project again and results show that 87.5% of respondents said yes (figure 9).

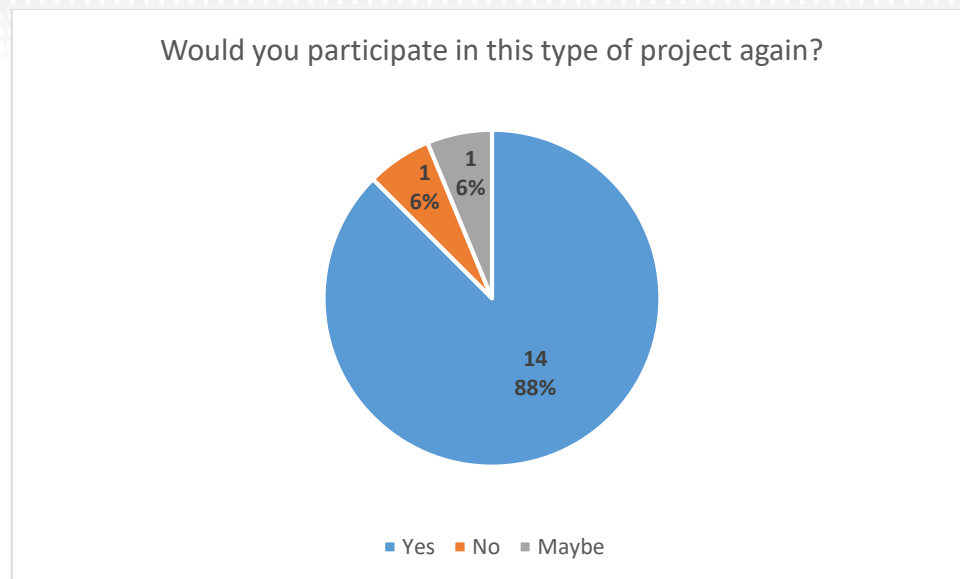


Figure 9. Lambeth participants' response when asked whether they feel sufficiently informed about the borough's work on air pollution reduction.

Nitrogen Dioxide

Of the initial 35 NO₂ monitoring sites originally set up, sufficient data was only received from 34 sites due to tubes being removed and residents no longer being available to take part in the project. Figure 10 below shows the results of NO₂ monitoring across all sites over the six months for comparison. The black line represents the EU limit of NO₂ (annual mean). Results show that most of the months breach the legal limits of air pollution with the highest readings across 85% of sites recorded in January.

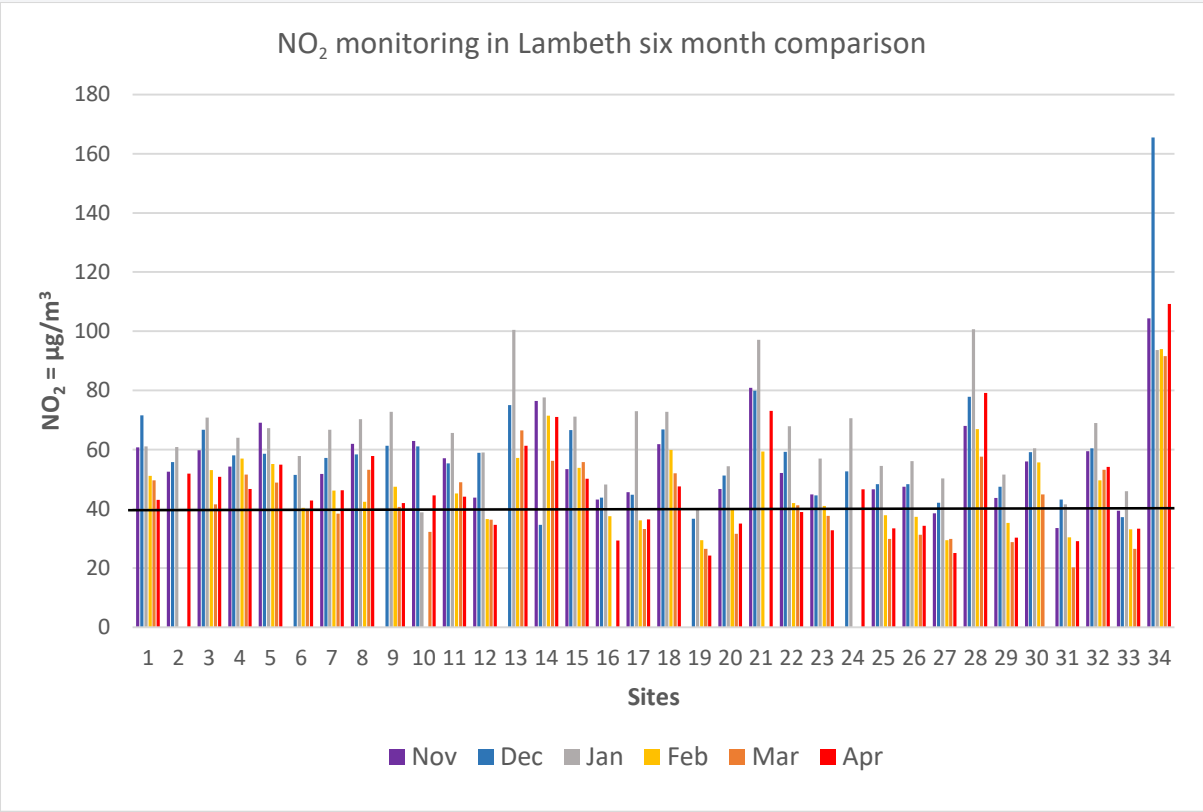


Figure 10. Graph showing the NO₂ monitoring in Lambeth across all 34 sites over six months from November 2016 – April 2017, the black line represents EU limit of NO₂ (annual average).

Figure 11 below shows the average level of NO₂ for the six months at each site. From this data you can see that only 4 out of the total 34 sites were on average within legal limits.

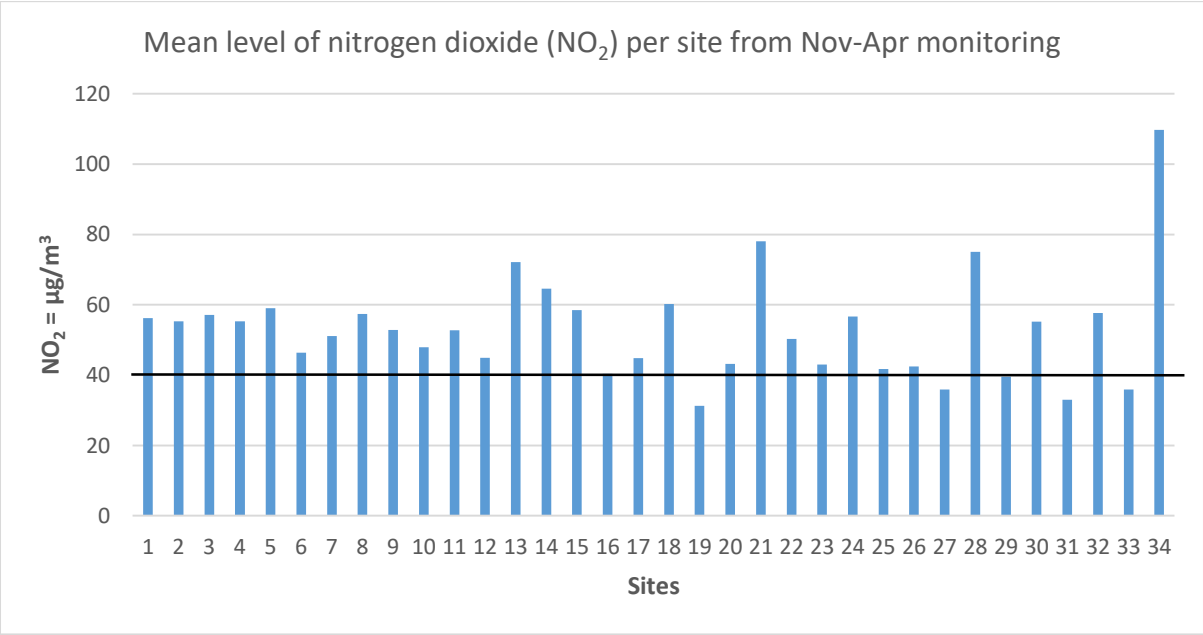




Figure 11. Graph showing the average level of NO₂ per site from November 2016 – April 2017, the black line represents EU limit of NO₂ (annual mean).

Due to the large spread of monitoring sites across the borough it was interesting to look specifically at the north south divide in air quality results. Figures 12 and 13 show that the mean level of nitrogen dioxide varies, with higher readings predominately appearing in the north of the borough. The average monthly readings from the sites in the north all breach the annual mean (40µg/m³), whereas 61.5% of sites across the south of the borough breach this limit. A map showing the location of all 34 monitoring sites with their average monthly NO₂ reading can be seen in appendix 3.

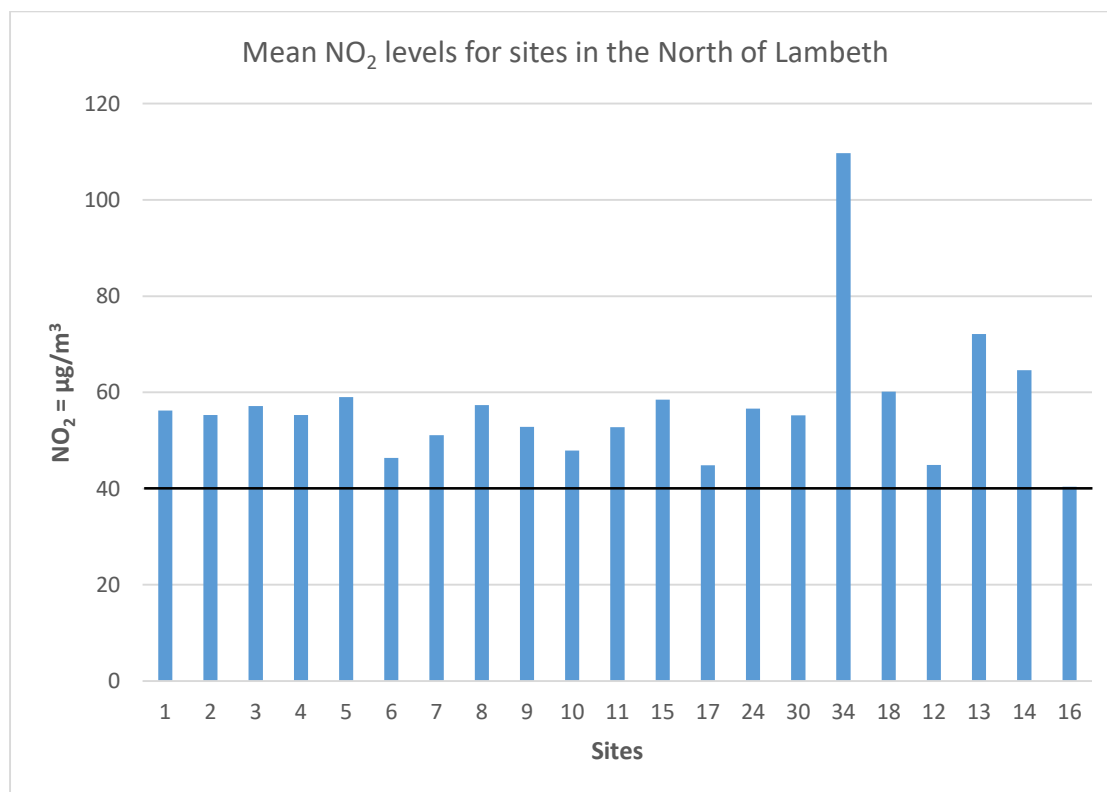


Figure 12. Graph showing the average level of NO₂ per site in the north of Lambeth borough from November 2016 – April 2017.

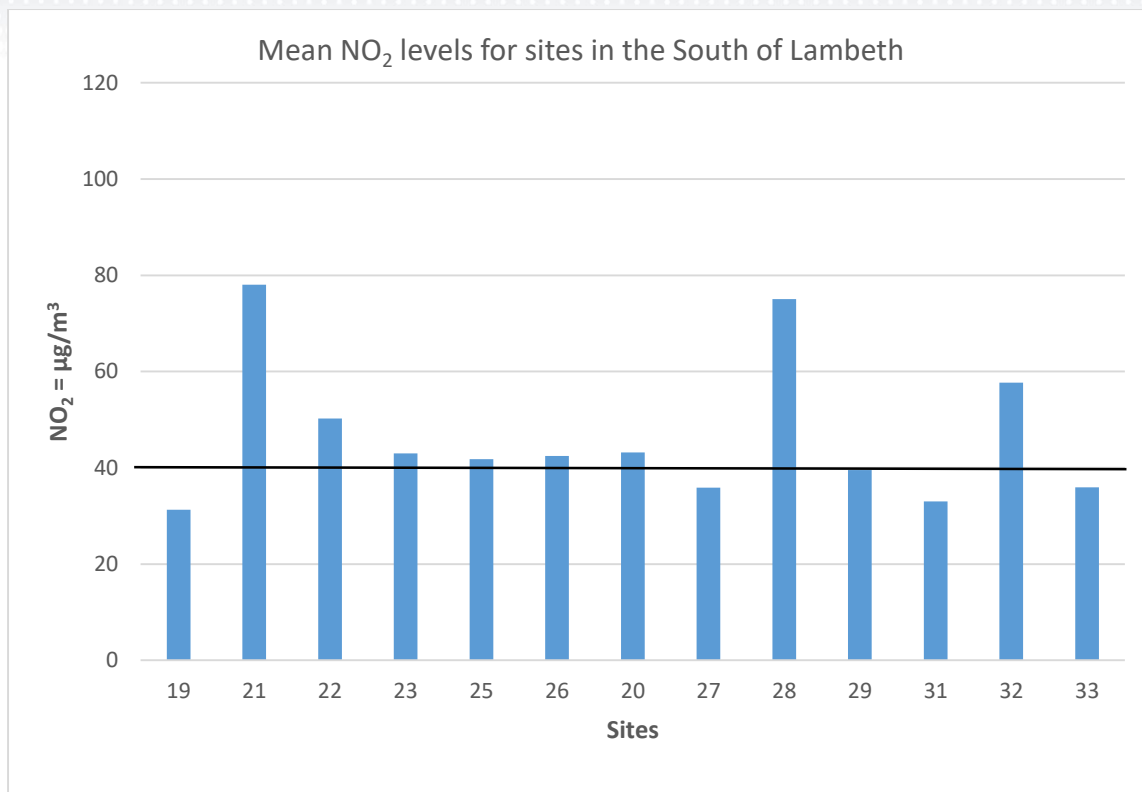


Figure 13. Graph showing the average level of NO₂ per site in the south of Lambeth borough from November 2016 – April 2017.

Height differences between the locations of the diffusion tubes at each monitoring site could also have an impact of the results. NO₂ is usually measured at breathing height where it can be most harmful. NO₂ emissions from vehicles are higher close to the source and can disperse the further away from the source or higher away from the vehicle. Figure 14 below shows the average monthly NO₂ readings for each site compared to the height of the diffusion tube in metres. The height varied as some participants placed their diffusion tubes on balconies or outside their windows whereas the majority placed their diffusion tubes at street level. The data doesn't show a strong correlation between the height and NO₂ readings.

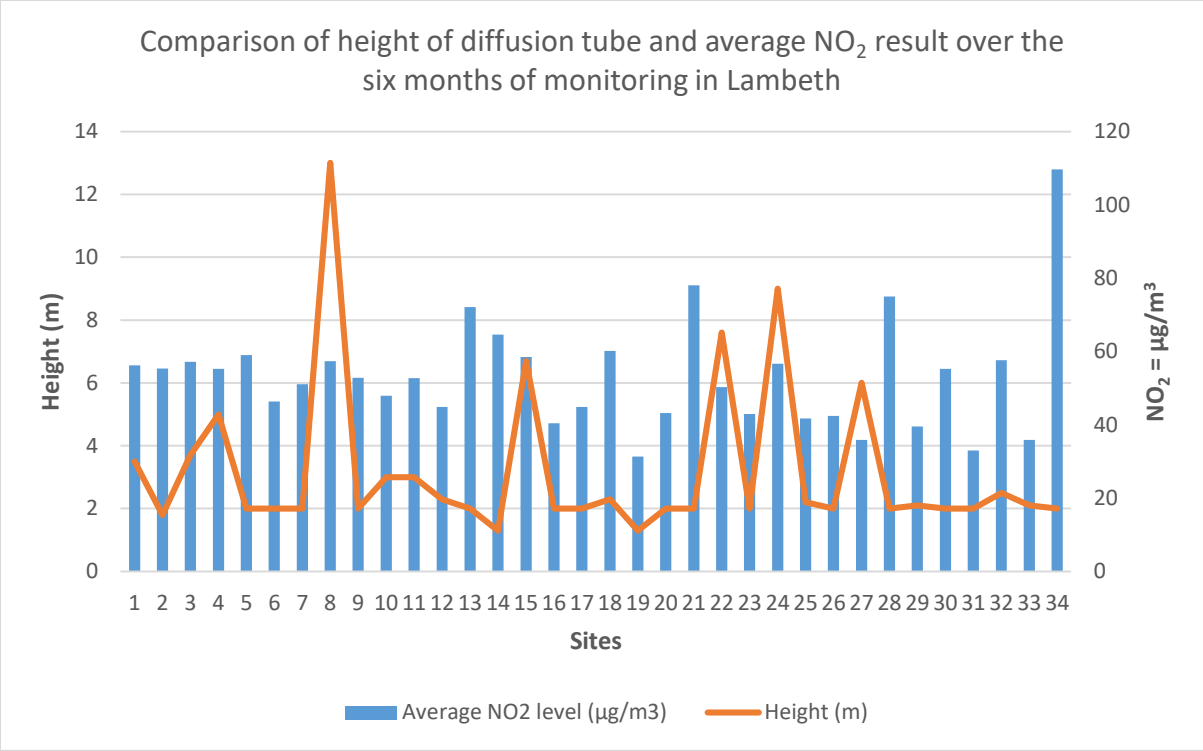


Figure 14. Graph showing the average level of NO₂ per site for November 2016 – April 2017 against the height of the diffusion tubes in metres.

Some external factors which effect NO₂ levels include meteorological conditions and traffic. Figures 15-18 shows the monthly meteorological conditions during the project’s monitoring period taken from a monitoring station at Heathrow Airport in London.

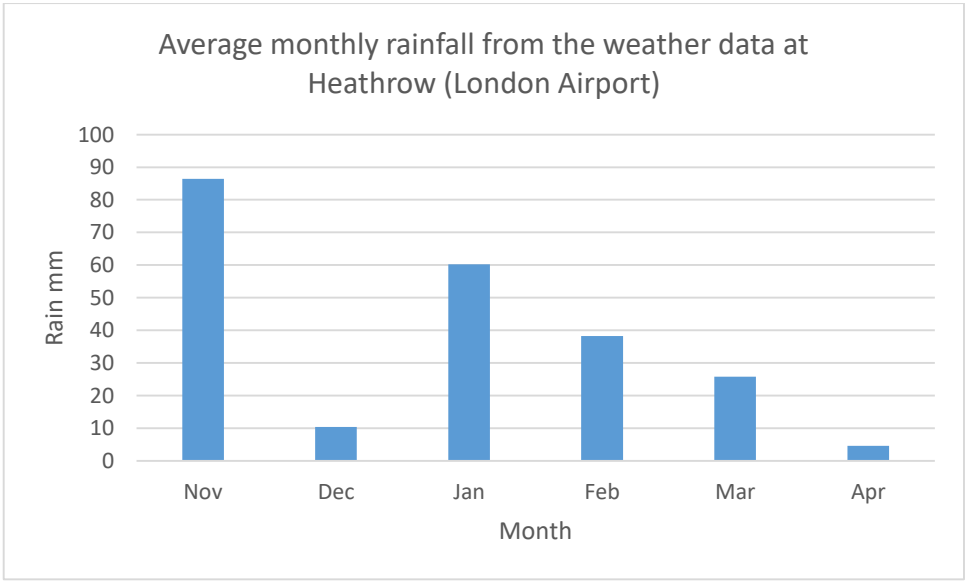


Figure 15. Shows the average monthly rainfall from the weather station at Heathrow Airport from November 2016 – April 2017.

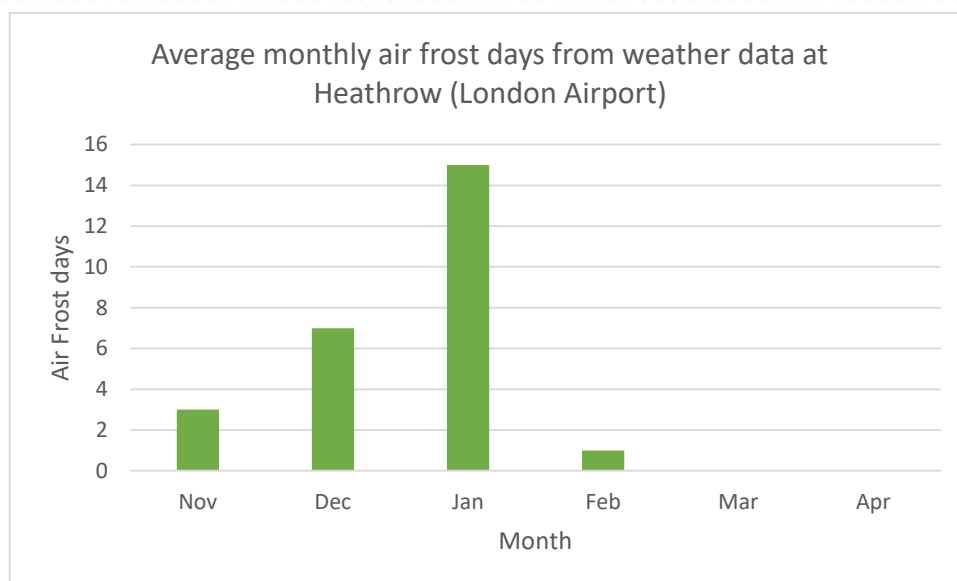


Figure 16. Shows the average monthly air frost days from the weather station at Heathrow Airport from November 2016 – April 2017.

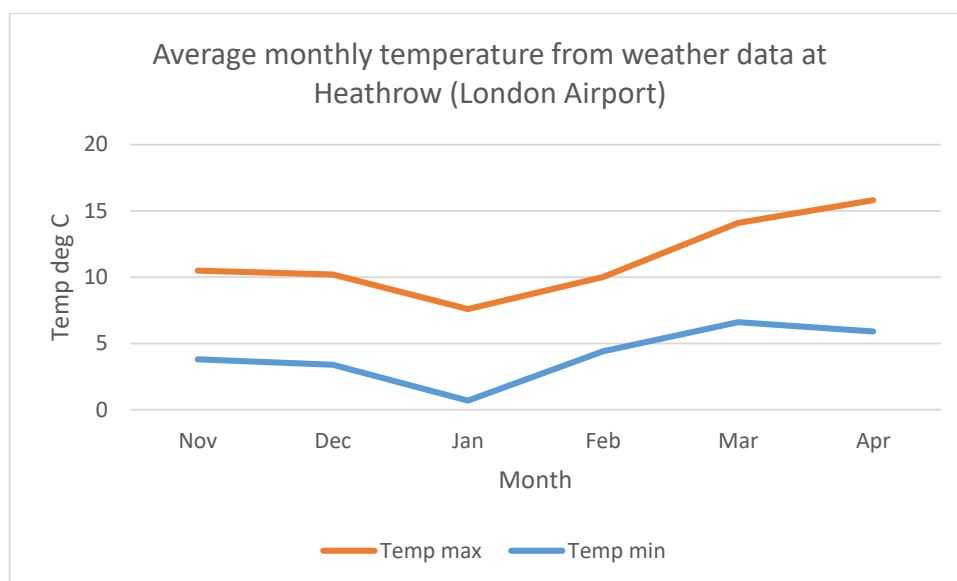


Figure 17. Shows the average monthly temperature from the weather station at Heathrow Airport from November 2016 – April 2017.

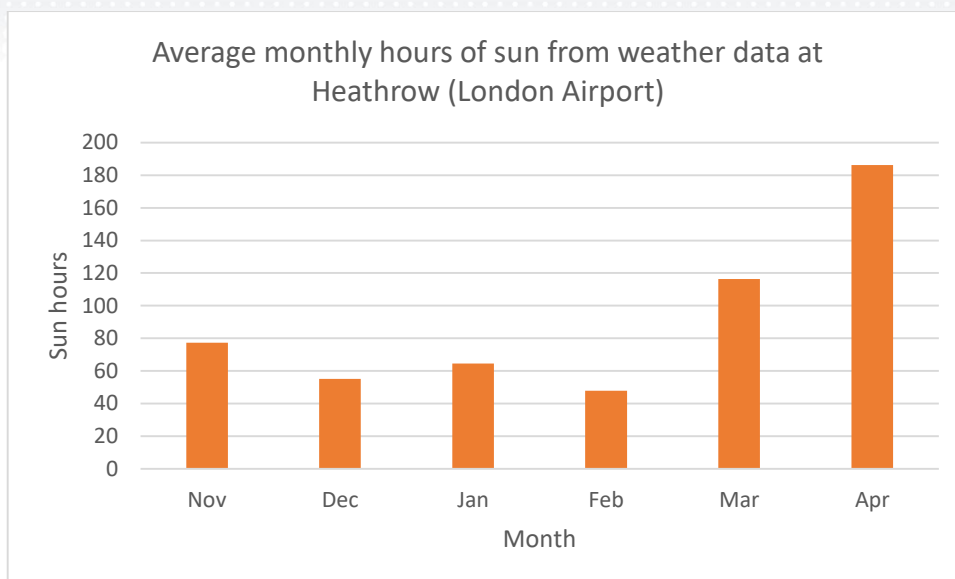


Figure 18. Shows the average monthly hours of sun from the weather station at Heathrow Airport from November 2016 – April 2017.

During the monitoring of nitrogen dioxide in Lambeth, the UK was subject to very high air pollution levels in January 2017 and residents were able to directly see the impact of this on local air quality conditions with 85% of the sites showing their highest reading in January 2017.

Scientists at King’s College London explained that the high levels of air pollution have been caused by cold, calm and settled weather suggesting that the lack of winds are keeping car emissions close to the ground in London (BBC, 2017). Scientists went on to propose that the current weather conditions and an “unusually high amount of domestic wood burning” has resulted in the highest pollution alert being issued. The data from the Heathrow weather station in figures 15-18 suggest cold and damp weather throughout January which may have increased resident car use.

Feedback Event

On Wednesday 14th June 2017, over 45 local residents and stakeholders gathered in St John's Church, Waterloo, to discuss the results of air quality monitoring in Lambeth and share ideas on ways to help improve local air quality and reduce personal exposure.

The event highlighted the results of the Love Lambeth Air project and included guest speakers from other London based air quality monitoring projects. Speakers included Sarah Hudson from the Barbican Estate and Sheila D'Souza from Marylebone who presented along with Cllr Jennifer Brathwaite from Lambeth, May Van Schalkwyk from Public Health and Ben Stephenson from South Bank and Waterloo Neighbourhood Forum. A one-page document summarising the results of the project was distributed to event attendees.

Following the presentations, all speakers participated in a Q&A panel discussion session followed by an action building session to share ideas on how to improve local air quality going forward. Event attendees established a number of ideas for individual and collective action, action for Lambeth and action for the Mayor. These included ideas from planting up outside spaces, to car free days and restricting use of HGVs at construction sites.



Figure 19. Shows the panel of speakers taking questions during the Q&A session.



Below is a table summarising actions that can be taken to improve local air quality.

Individual Action	Collection Action	Action for Lambeth	Action for Mayor
Planting	Community market	Schools involvement	Denser concentration of cycle hire
Community garden (edible bus stop)	Car free days	Scrapping green waste fees	Extend the cycle hire scheme
Balconies and windowsill planting	Cycle to work day in a team	Creative use of planning	Rigorous licensing – taxis
AQ filter planting – window box	Two main parks – need volunteers	Restrict use of HGVs in new developments	Measure impact of Waterloo station
Low Emission Zone (contribute)	Housing policy (new developments)	Refuse collection contractors for businesses	
Meeting to discuss ULEZ	Encourage living close to work	Involve/train traffic wardens to ask drivers parked with their engines on to turn them off	
Promote walking to schools	Join the organisation – Lambeth Cycling	Use electric vehicles for garbage/recycling and delivery	
Cycle to work day	Working more with schools		
Ask for a bicycle hanger near my house	Raise awareness among the youth mediums & other demographics		
Shop locally	Hedges planting – community garden		
Delivery batches and collection points	Participate in consultations		
Respond to consultation	Last km delivery only by electric vehicle		

Event attendees, a number of whom were not directly involved in the project, were asked how much the event raised their awareness of any measures Lambeth Council have taken to improve air quality in Lambeth. 93.3% of respondents suggest that the event raised their awareness levels with 53.3% of respondents stating their awareness was raised a great deal through the event.



One output from the event was to inform local residents and stakeholders of the local authority's work on air pollution reduction. Results show that 93.3% of respondents do feel more informed with 46.7% of respondents stating by a moderate amount. 6.6% of respondents felt that they were already informed.

Conclusion

Community Participation and Awareness

One of the primary aims of the Love Lambeth Air project was to increase public understanding about air pollution, its causes and effects, and how concentrations vary both spatially and from day to day. This was done by adopting a bottom-up citizen science approach to monitoring air quality, using simple methods and tools, to enable local residents to participate.

The level of participation and commitment of residents to conduct this study over six months is testament to their genuine concern about air quality within Lambeth and willingness to engage in the wider discourse. Most of the residents involved (88.8%) had not previously taken part in any kind of environmental monitoring project and the majority (87.5%) said that they would be happy to participate in future projects of this kind.

The data gathered by the community provides a valuable insight into the temporal and spatial variability of air quality across the area. Where many residents initially felt the local air quality was either always very bad or often poor, the data gathered demonstrated that this is not always the case and the situation is not uniform across the area.

Monitoring results

Monitoring nitrogen dioxide over the course of the six months shows that the EU target of $40\mu\text{g}/\text{m}^3$ is not currently being met. Although there were variations between months and across monitoring sites, the combined annual average for the area as a whole ($53.10\mu\text{g}/\text{m}^3$) is still above the levels aimed for. Some of the key findings from the Love Lambeth Air project highlighted the fact that only 4 out of 34 locations monitored for nitrogen dioxide fell within the EU legal limits (annual mean). The north of the borough was also found to have poorer air quality in general over the six month period.



Nitrogen dioxide levels at some monitoring sites were more than twice the EU target, including under Waterloo Bridge Road, site 34, where the diffusion tube was placed near to a bus stop and an average measurement of $109\mu\text{g}/\text{m}^3$ was recorded. Residents using this bus stop on a regular basis, may wait several minutes for a bus and are therefore potentially exposed to very high levels of NO_2 which could be harmful to their health.

The NO_2 monitoring shows that pollution levels are high around the main roads and lower by the green areas like site 19 next to Myatt's Field Park. This could support the idea of using plants as an air filter and that pedestrianisation or traffic control would reduce air pollution. Some of the ideas put forward might warrant further research or setting up trials but many ideas go beyond the scope and control of the local authority so would need wider public consultation.

As a direct result of the NO_2 monitoring some residents have decided to use less gas for water heating in their homes and to get rid of their cars. This clearly demonstrates an increased awareness amongst residents and suggests that similar programmes would be worthwhile implementing across the borough and beyond.

Final remarks

The project's success was made possible by combining residents' local knowledge and their commitment, with the technical knowledge and experience provided by Mapping for Change, and the genuine willingness on the part of Lambeth Council. Local insights gave context to the monitoring programme making the data collected more relevant to those involved, adding scientific evidence to the residents' opinions giving strength to the voice of the community. The results of this project offer a valuable resource which can be used as a foundation to effect change and tackle the problem of poor air quality in Lambeth.

Lambeth Council has and continues to take steps to improve air quality across the borough. On 12th-16th June Lambeth Council ran the borough's first Clean Air Week and hosted a number of different air quality events to raise awareness across the borough. Lambeth Council have recently published their [Lambeth Air Quality Action Plan 2017-2022](#) which identifies the actions they will be taking to improve air quality in the borough over the next five years.



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City Air App: <http://cityairapp.com/>

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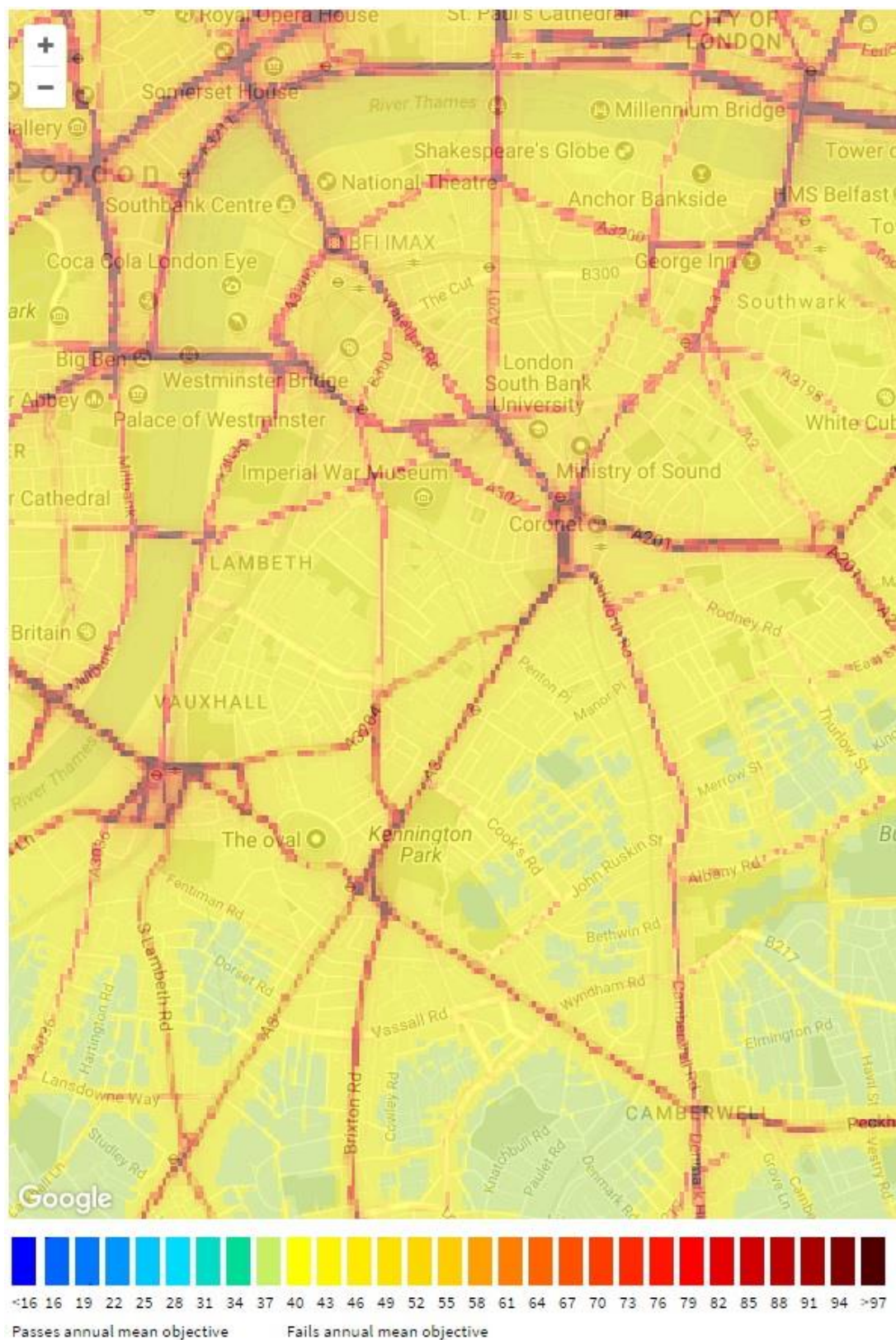
London Air, 2013, Annual Pollution Maps:

<http://www.londonair.org.uk/london/asp/annualmaps.asp?species=NO2&LayerStrength=95&lat=51.5008010864&lon=-0.124632000923&zoom=14>

Appendices

Appendices	Item description
Appendix 1	Map showing modelled annual mean NO ₂ air pollution, based on measurements made during 2013. Showing North of Lambeth borough.
Appendix 2	Map showing modelled annual mean NO ₂ air pollution, based on measurements made during 2013. Showing South of Lambeth borough.
Appendix 3	Map showing locations of 34 monitoring sites across Lambeth borough.
Appendix 4	The table provides a more detailed explanation of the site locations.
Appendix 5	Table showing some of the measures participants have suggested to improve air quality within their borough, to improve local air quality and their own exposure to poor local air quality.
Appendix 6	Map showing the location of all 34 monitoring sites with their average monthly NO ₂ reading.

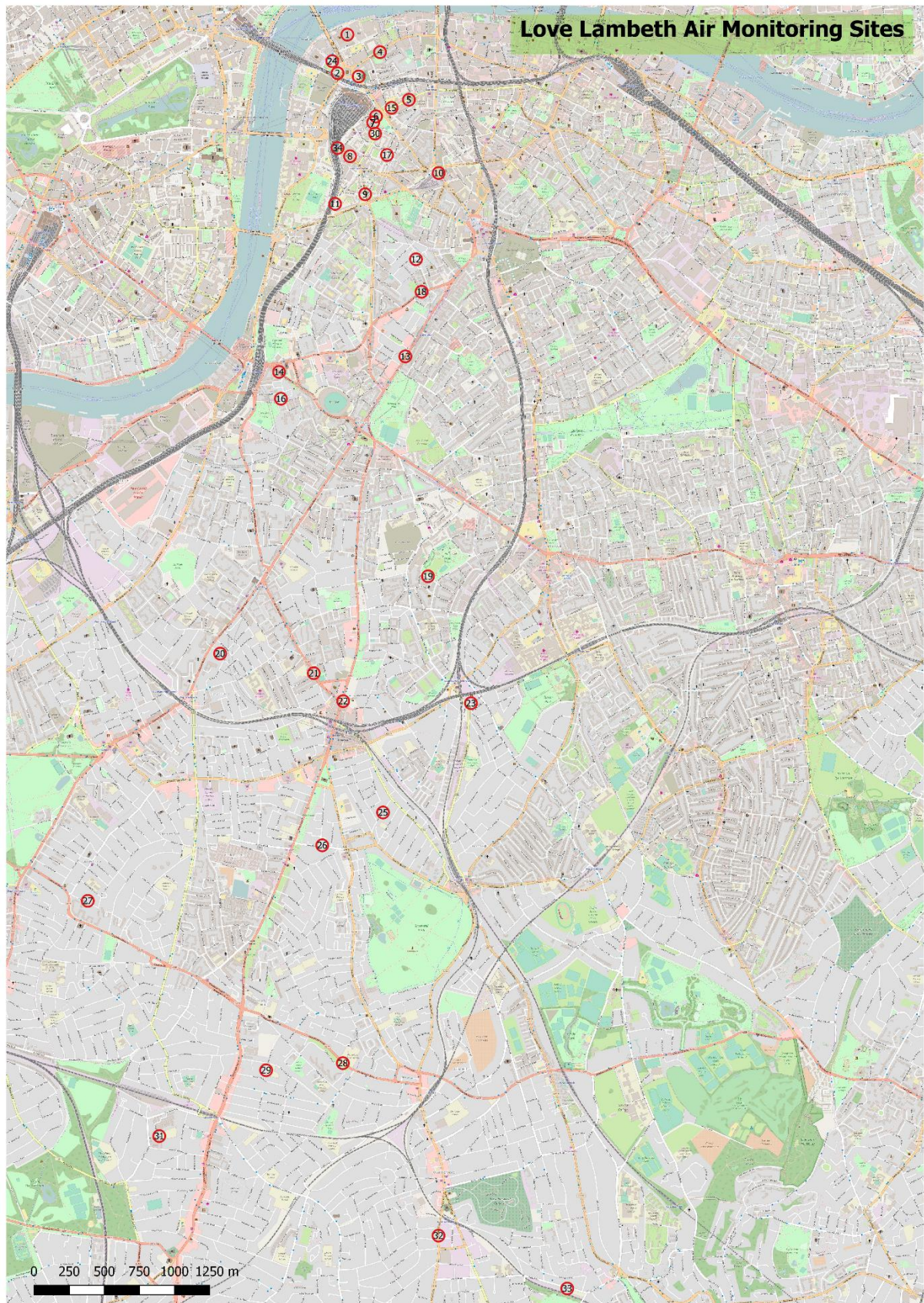
Appendix 1: Modelled annual mean NO₂ air pollution, based on measurements made during 2013. Showing North of Lambeth borough.



Appendix 2: Modelled annual mean NO₂ air pollution, based on measurements made during 2013. Showing South of Lambeth borough. Data and map from London Air:



Appendix 3: Map showing the monitoring site locations across Lambeth borough.





Appendix 4: The table below provides a more detailed explanation of the site locations:

Site number	Location in Lambeth
1	National Theatre, Stage Door Avenue off Upper Ground, London SE1 9PX
2	Corner of concert hall approach opposite the Imax, Waterloo
3	St John's Church, 73 Waterloo Rd, London SE1 8TY
4	Stamford Street, London, SE1 9NH
5	Young Vic, 66 The Cut, London SE1 8LZ
6	14 Baylis Road, London SE1 7AA
7	Outside Cubana, Lower Marsh, London SE1 7RG
8	69 Walpole House, 126 Westminster Bridge Road, SE1 7UN
9	52 Kennington Rd, London SE1 7BL
10	The Clarence Centre, 6 St George's Circus, London, SE1 6FE
11	Near Eden Caterers, 199 Hercules Road, London SE1 7LD
12	Corner of Renfrew Road and Gilbert Road, SE11 4NL
13	142 Kennington Park Road, SE11 4DJ
14	19 Harleyford Road, SE11
15	108 The Cut, London, SE1 8LN
16	82 Bonnington Square, SW8 1TG
17	40 Pearman Street, SE1 7RB
18	52 Kennington Ln, Lambeth, London SE11 4HP
19	The Greenhouse, Myatt's Fields Park, Cormont Road, London, SE5 9RA
20	13 Mayflower Road, SW9 9JY
21	176 Stockwell Road, SW9 9TG
22	Alleyway by Canterbury Court junction with Brixton Road, SW9
23	2 Wanless Road, Herne Hill, SE24 0HW
24	Third floor roof garden, The Whitehouse Apartments, 9 Belvedere Road, SE1 8YS
25	53 Barnwell Road, SW2 1PN
26	Brixton Water Lane/St Matthews Rd, Brixton, SW2
27	44 Trouville Road, SW4 8QW
28	66 Christchurch Rd, SW2 3EY
29	Daysbrook road, Streatham Hill, London, SW2 3TH
30	Oasis School Playground fence, Baylis Road, SE7 7AY
31	Dingley Lane, SW16, leading to primary school
32	43 Knights Hill, London SE27 0HS
33	180 Gipsy Road, SE27 9RE
34	Westminster Bridge Road (under railway bridge), SE1



Appendix 5: Some of the measures participants have suggested after the project to improve air quality within their borough, to improve local air quality and improve their own exposure to poor local air quality.

Measures to improve air quality within the borough	Measures you feel you could personally take to improve local air quality	Measures you feel you could take to reduce your exposure to poor local air quality
Bring pressure via Sadiq Khan and Government to get motor industry to meet achievable reduction deadlines and targets on NO ₂ emissions. Campaign to get people with buggies to get them back from crossings	More plants, more cycling but this isn't answer to pollution for those of us who live against the 2 car lanes in a 3-lane road, 1 of which is CS5	Wear a mask! I can't go out my front door without meeting 2 lanes of stationary traffic
Yes planting - maybe the church offering window boxes to the local community	Planting	Take side streets
Encourage window boxes, walking and use of public transport	I already take all the measures that I think will help	Yes, walk on the back streets
More cycling infrastructure, particularly segregated from traffic. Stricter limits on emissions. Ban diesel vehicles. Enforce idling and speeding fines.	Using less gas for water heating	Campaigning, breathing filters for cycling
Stop cars idling. Plant more trees and greenery to absorb the fumes	Better and less use of heating	Yes and covered in aspects of neighbourhood plan, which Lambeth could support a little more
Extend ULEZ, more cycling infrastructure, transport plans for schools, more car free days	Get involved in the stop idling campaign but it happens in work time, so I'm not available. Do they run in the evening?	I now walk on side roads (not major transit routes) whenever possible.
More action within schools and workplaces. Less	To walk more when I can, instead of using busses. (I	For the past few years I have suffered from a range



tolerance of removing or concreting front gardens. Increased planting - moss pits around trees (moss absorbs NO ₂)	do not drive, there is no vehicle in our household, I rarely take taxis or travel in private vehicles, and I do not bike).	of lung problems. Other than moving house I am not aware of other measures I might take.
Provide incentives to get people to use private transport less frequently. Introduce a Congestion Zone or other way to reduce car use. Set a London-wide deadline for making all bus fleets (including their old training busses) non-polluting. London-based coach companies too.	Get rid of my car which I have done	Sometimes use an app to see when is the best time to go out.
Identify hot spots and causes. I was monitoring a main road almost entirely residential which on one occasion at least had the highest pollution in North Lambeth. A main cause of this has to be road traffic. Other hot spots in North Lambeth were probably caused by traffic delays as a result of construction and road works. I was not aware of any action taken by Lambeth to mitigate this. I look forward to reading the report which might address this.	Try to remove neighbours who have barbecues.	Buy air purifier when price comes down
More space/priority for electric vehicles, more space/priority for electric vehicles, promoting walking & having more seating in walking routes		Move out of London
Plant more trees. Ban private cars. Reduce light pollution	No. I don't drive	

Appendix 6: Map showing the location of all 34 monitoring sites with their average monthly NO₂ reading.

