Breathe Clean

School air quality education and monitoring

Full programme report

MP Smarter Travel

109 The Print Rooms
180 Union Street
London SE1 0LH

November 2020

Report prepared by:

MP Smarter Travel
109 The Print Rooms
164-180 Union Street
London SE1 0LH

0207 960 2553

www.mpsmartertravel.co.uk

Company number: 5100886
VAT registration number: 843 6739 96

Review and sign off	
Project title: Breathe Clean: School air quality education and monitoring	
Project Numbers: 1066-02, 03, 04, 05	**Version number:** 2.0
Written by: Oli Ivens	
Reviewed by: Arun Khagram	
Signed 	**Date:** 24 November 2020

CONTENTS

MP Smarter Travel consultant Oli Ivens delivering an air quality assembly at John Keble Church of England Primary School

Introduction

Breathe Clean is the LB Brent school air quality education and monitoring programme which serves to measure NO_2 concentrations; educate children about air quality; and engage with schools about what they can do to limit their exposure to air pollution and minimise their air pollution impact. The programme provides an excellent baseline of air quality data and engagement with schools in order to support the implementation of measures such as Healthy School Streets, green screens and various School Travel Plan measures.

The *Breathe Clean* programme comes after the Mayor's School Air Quality Audit Programme (MSAQAP), which delivered air quality audits at 50 London schools in order to reduce school emissions and children's exposure to polluted air. This included audits at two Brent schools: Ark Franklin Primary Academy and John Keble Church of England Primary School.

The MSAQAP and *Breathe Clean* are compared in Table 1.

Table 1 – Comparison of MSAQAP and *Breathe Clean*

Feature	MSAQAP	*Breathe Clean*
Cost per school	Very high (£10,000+ per school)	Very low (£600-£700 per school)
NO_2 data	Estimated, based on data from London Atmospheric Emissions Inventory (LAEI)	Actual, based on NO_2 diffusion tube monitoring at an average eight locations per school for a two-four week period.
Engagement / education	Engagement with school administration	Engagement and education with teachers and pupils via school assemblies
Identification of measures	Detailed and comprehensive identification of measures based on site visit, engagement and a detailed list of potential measures	Discussion about some potential measures as part of assemblies

About this report

This report provides a summary of the *Breathe Clean* programme, focusing on our methodology and key outputs. We discuss the key tasks in detail:

- School engagement
- Anti-idling
- Air quality assemblies and monitoring

In the final section we discuss observations about air quality concentration patterns, including suitable actions that can be taken at the school level to reduce exposure to air pollution.

School engagement

Engagement refers to the process of making contact with schools, explaining the *Breathe Clean* programme to them, and booking in school assemblies. Schools receive high volumes of phone calls from external organisations, and receptionists often serve to filter out unsolicited calls. Schools also need to consider child protection when inviting visitors into schools. MP Smarter Travel staff are experienced in making arrangements with schools and other target organisations, and our staff all have DBS certifications which we present to schools on our first visit.

School ranking

At the beginning of the programme there was not enough budget to deliver the *Breathe Clean* programme to all schools in Brent, so we needed a clear and fair decision-making process for inclusion in the programme. We prioritised schools based on the factors shown in Table 2.

Table 2 – School ranking factors

Factor	Data	Effect on ranking	Data source
Local air quality	Whether school is in an Air Quality Focus Area (AQFA)	In AQFA → increase rank	LB Brent Air Quality Action Plan 2017-2021 (p.4-5)
	NO_2 concentrations: Above 40 µg/m^3	Above 40 µg/m3 → increase rank	Kings College London NO2 map
Building refurbishment / redevelopment	Condition of windows, insulation and heating system	Poorer condition → increase rank	School rebuilding programme
	Plans for future major refurbishment	No plans → increase rank	School rebuilding programme
School engagement	STARS accreditation / engagement	Higher accreditation / engagement → increase rank	TfL Stars Brent School Travel Planning team
	Children and Young People – level of engagement	Higher engagement → increase rank	Brent Children and Young People team
	Public Health – level of engagement	Higher engagement → increase rank	Brent Public Health team
	Number of active projects (School Travel Planning, Children and Young People, Public Health)	More active projects → increase rank	Brent School Travel Planning team Brent Children and Young People team Brent Public Health team
School population	Number of pupils in schools	Higher population → increase rank	Edubase Ofsted LB Brent
	Number of students on free school meals	Higher number → increase rank	Edubase Ofsted LB Brent

Engagement process

Following the school ranking exercise, we contacted schools to book in assemblies. Table 3 provides a summary of challenges and solutions to engaging with schools and booking in assemblies.

Table 3 – Challenges and solutions to engaging with schools

Challenge	Solutions
The key school contact is currently teaching	Organise a time to call back or speak with an administrative member of staff
The school's gatekeeper may not pass a call onto the desired person	Encourage the gatekeeper to champion the programme and pass a message/contact details to the school's key contact
Head teachers may be too busy to respond	Aim to speak with deputy heads, class teachers and business managers
Schools may be unresponsive to e-mails sent to an admin address	Call the school instead to encourage their involvement. Once staff are interested in the concept, ask for direct contact details
Assembly timetable is full	Book assemblies in advance or deliver the content to a smaller audience, for example a single year group/class
School contact requires sign-off to participate from a more senior member of staff	Send more junior member information about the programme, encourage them to champion the programme and follow up to ensure the information is passed on.

Number of schools participating in the programme

We delivered the *Breathe Clean* programme in two phases. Phase 1 involved delivering the programme at the 66 primary and secondary schools in most need of air quality monitoring. In Phase 2, with additional funding, we aimed to deliver the programme at a further 28 primary and secondary schools.

Table 4 – Summary of the number of schools participating

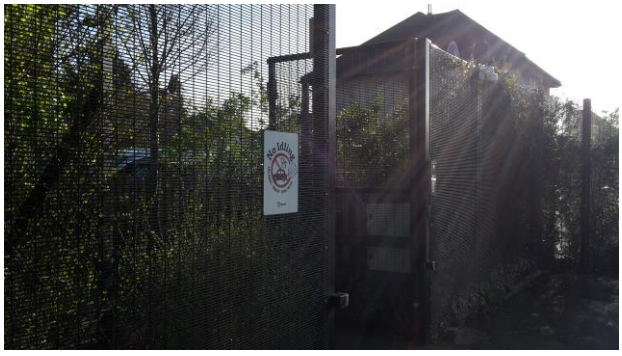
Participation in the programme	Schools		
	Primary and secondary	Infant	Total
Schools participating	75	5	80
Schools that did not respond	7	1	8
Schools that declined to participate	3	2	5
Schools that were closed	1	0	1
TOTAL	**86**	**8**	**94**

Anti-idling

‘No idling’ sign installation

MP Smarter Travel were tasked with installing ‘No Idling’ signs outside 93 schools in Brent. The signs are A3 size, 3mm thick, and made of weatherproof material. The design of the sign and two examples of sign installation are shown below.

Figure 2 – No idling sign images



A total of 157 signs were installed across 93 schools, an average of 1.7 per school. The full list of each school and the number of signs installed at each school are shown in Appendices A and B.

Idling Action volunteer work

As part of the *Breathe Clean* programme, Brent Council officers and MP Smarter Travel took part in *idling action* volunteer work, which was supported by The Idling Action Project. Staff worked in pairs, asking members of the public who were idling to switch off their engines. A Brent Council civil enforcement officer was present to give tickets to any drivers who refused to switch off.

Idling Action volunteer work was paired with pre-arranged *Breathe Clean* assemblies in nearby schools. While engaging with members of the public, staff gave out leaflets to increase awareness of idling and its damaging impact on public health. In addition to idling engagement, Idling Action work included events with large outdoor games and ‘smoothie bikes.’ All of these activities were designed to educate students through active engagement. Table 5 identifies the schools that took part in idling action events.

Table 5 – Schools engaged through The Idling Action Project

School	Date of Idling Action volunteer work
John Keble Church of England Primary School	30 January 2019
Kilburn Grange School	5 March 2019
Uxendon Manor Primary School	9 December 2019
Malorees Infant School	13 December 2019
Elsley Primary School	16 December 2019
Roe Green Infant School	16 January 2020
Newman Catholic College	24 January 2020
Convent of Jesus and Mary RC Infant School	28 February 2020

The key leaflet for the Idling Action work is shown in Figure 2.

Figure 2 – Idling Action leaflet

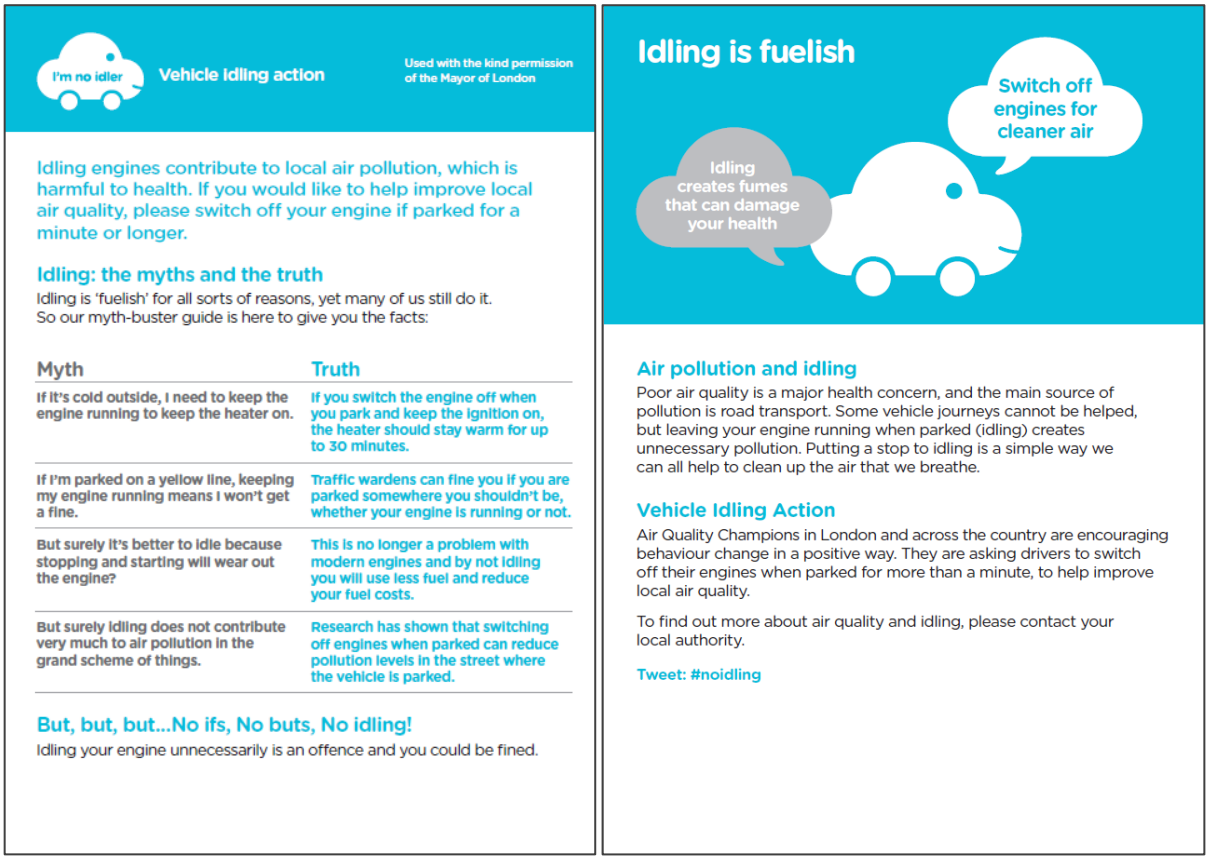


Figure 3 – Idling Action volunteers

Figure 4 – Students playing an Idling Action game

Air quality assemblies and monitoring

At each of the 80 participating schools, we aimed to deliver two air quality assemblies. In the weeks between assemblies, we monitored air quality across each school, using an average of eight nitrogen dioxide diffusion tubes per campus. The assembly's content covered London's current air quality, methodologies for measuring air quality and ways of combatting pollution. Assemblies were differentiated for secondary, primary, infant and SEN pupils. Audience size varied from a small group of ten students to whole-school assemblies of 500 students.

Due to COVID-19 restrictions, we completed six second assemblies as webinars. It was agreed that infant school students would not fully engage with a webinar, so three infant schools did not receive assemblies. These infant schools are identified in Appendix B.

Assembly 1

The first educational assembly gave a broad introduction to air pollution and its effects on the environment and all living things. Key elements of the presentation were defining air pollution, explaining how it is measured, and demonstrating that nitrogen dioxide levels vary across London. Student engagement was key to a successful presentation, so in each *Breathe Clean* assembly we included formative assessments to determine student comprehension of the presentation concepts.

For assemblies we used Prezi software to deliver dynamic presentations. An image from the home screen of our presentation is shown in Figure 5.

Figure 5 – Prezi presentation home screen

As part of the assembly we showed King College London's *London Air Annual NO_2 Map.* The map was zoomed in on Brent to give students a local context. Students were able to identify high and low concentrations of NO_2. In particular, students were able to identify the North Circular, seen clearly in red on the map in Figure 6.

Figure 6 – London Air Annual NO_2 Map, showing the Brent area

The second half of the presentation introduces community-level solutions to London's air quality crisis. Solutions include walking and cycling, reducing engine idling, installing green screens, and building community awareness of air quality issues. We emphasise to students that they have the ability (and responsibility) to improve their local air quality. The image below shows MP Smarter Travel's consultant, Oli Ivens locating Ark Franklin Primary Academy on London's Air Annual NO_2 Map.

Figure 7 – Delivering an assembly at Ark Franklin Primary Academy

Examples of high quality questions asked by students and our consultant's responses:

- *Why don't we all just buy electric cars?*

Although electric cars produce no NO_2 while in use, they do produce tiny pollutants while braking that are created as the brakes get worn away. These pollutants are very bad for our lungs. Cars, no matter how they are powered still take up lots of space. If everyone bought cars instead of walking or cycling, we'd have huge traffic jams. Electric cars are also still generally more expensive than diesel/petrol cars and therefore are not affordable for lots of families. It's also important to be active while travelling, if we all sat in cars we wouldn't be getting the vital and enjoyable exercise we get from walking, scooting and cycling.

- *Does smoking create pollution?*

Yes, smoking does create pollution, in particular it produces the same tiny particles that we get from the exhaust fumes and brake dust of cars. Some studies show cigarettes can produce 10 times more of these tiny particles than car exhausts. Pollution from smoking is made worse by the fact that people suck it directly into their lungs.

- *How do the tubes measure air pollution?*

At the top of each of our tubes is a piece of fabric, or gauze, this is soaked in a solution that captures Nitrogen Dioxide; the pollutant we want to measure. Over two to four weeks, air naturally blows in and out of the tube, allowing it to soak up pollution. We send the tubes to a lab where the amount of Nitrogen Dioxide is measured, we then divide this amount by how long the tube was in place, giving us an average reading for how much pollution was in the air around the tube.

- *What will happen if air pollution gets worse?*

If air pollution gets worse, then so do all of its negative effects on our bodies and environment. I mentioned the Great Smog earlier in the presentation, during this five day period of very high levels of air pollution, up to 12,000 people lost their lives from struggling to breathe. Higher levels of pollution particularly effect people's lungs, giving people asthma and other breathing symptoms.

- *What is the relationship between air pollution and global climate change?*

Poor air pollution in a city is nearly always a sign that lots of fossil fuels are being burnt. Burning fossil fuels has a negative effect on our planet's climate. There are many different types of air pollutants and each can have very different impacts on our climate, there are some that help to cool the planet by reflecting sunlight, while others trap heat and lead to global warming. It is important that we focus particularly on reducing the amount of insulating pollutants in our air.

The final section of the first assembly explains how the students will be part of a Brent-wide air quality study. We provide a map showing where that school's NO_2 diffusion tubes will be placed, remind students not to tamper with the tubes, and identify a small group of students to assist with the installation of tubes.

Air quality monitoring

Immediately after the first assembly, a small group of students, usually Junior Travel Ambassadors, members of an eco-group or school council installed an average of eight nitrogen dioxide diffusion tubes per school under the supervision of an MP Smarter Travel consultant. At each site, two tubes were placed side-by-side to act as control tubes, helping us calculate the accuracy of our results.

Tube macro-location characteristics

Table 6 summarises diffusion tube 'macro-location characteristics' – the types of locations where tubes should be placed on school campuses.

Table 6 – Diffusion tube macro-location characteristics

Macro-location characteristic	Justification
Where children spend time on school grounds	To measure children's exposure to air pollution
Near potential sources of air pollution, such as car parks, roads and junctions	To potentially provide evidence of relationship between sources of air pollution and NO_2 concentrations
Away from potential sources of pollution	To potentially provide a counter example to the above
Indoor and outdoor (directly adjacent locations)	To calculate ratio of indoor to outdoor air quality, and the impact of windows as a barrier to air pollution.
Spread around school grounds	Relatively even distribution of monitoring in order to map air quality throughout school grounds

Figure 8 provides an example of tube macro-locations (across school grounds) at Sudbury Primary School.

Figure 8 – An example of diffusion tube macro locations on a school campus

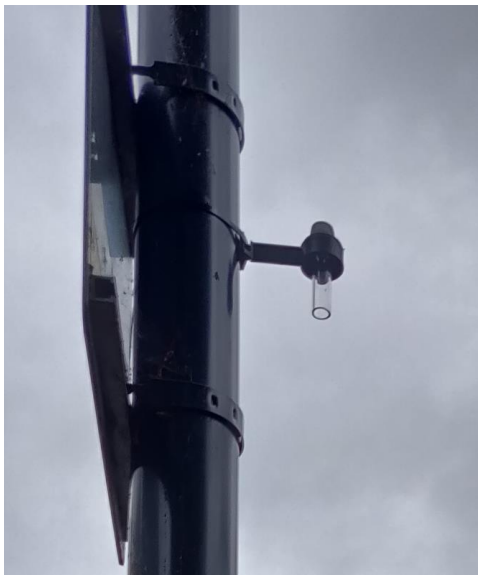
Tube micro-location characteristics

Table 7 summarises diffusion tube 'micro-location characteristics' – where tubes should be placed at a detailed level.

Table 7 – Diffusion tube micro-location characteristics

Micro-location characteristic	Justification
At ground floor level	Where air quality is worst
2m to 3m from the ground	As close as possible to head height, whilst minimising risk that tubes will be removed or disturbed
At locations where tubes can be securely attached	As per Gradko instructions for mounting tubes
Away from locations that experience air turbulence	Turbulence distorts results (either up or down)
In well-ventilated areas	Locations with poor air ventilation can exaggerate NO_2 concentrations

Figure 9 – A diffusion tube installed using a spacer and placed in freely-circulating air



Tube installation

Tube installation was led by an MP Smarter Travel consultant, with help from a small group of pupils who prepared tubes and recorded their reference numbers and locations, an example of which can be seen in Figure 10. While installing diffusion tubes students would often ask additional questions about air pollution. Participation in tube installation helped students build a sense of ownership over the programme.

Figure 10 – An example of students at St Mary's C of E Primary School noting tube reference numbers and locations

Tube	Tube Ref (On tube's label)	Location (Indoor/Outdoor/Room number)
A	1285888	Outdoor carpark
B	1285835	Outdoor Carpark
C	1285863	~~bathroom~~ outdoor - lunch club garden.
D	1285848	Indoor hallway
E	1285871	Outdoor KS1 playground
F	1285854	Outdoor mugs
G	1285879	~~Outdoor~~ Outdoor mugs
H	1285890	Dep. Office
I	1285842	Headteachers office
J		
Date of installation:	8/1/19	
Time of installation:	11:30 - 12:00	
White cap location:	Reception desk draw.	

As per the manufacturer's instructions, we left the diffusion tubes in place for two to four weeks. During the two-week long collection window, we returned to the school, gathered the tubes and sent them to the lab for the nitrogen dioxide concentration on each tube to be calculated. If two or more tubes were missing from a school, we replaced them and collected them two to four weeks later. If on return to the school, the tubes were missing again, they were not replaced.

Figure 11 – MP Smarter Travel consultants installing tubes with pupils

Throughout the *Breathe Clean* programme we collected results from 572 diffusion tubes. In total, there were 27 tubes missing.

Assembly 2

The second assembly begins with a brief recap of the first assembly to reinforce student learning. The next and most important section of the assembly is the presentation of the school's air quality results. Staff take an interest in how their school has fared and are keen to find out where on campus they had the highest levels of air pollution.

An example of an NO_2 results map for Sudbury Primary School is shown in Figure 12 below.

Figure 12 – An example of an NO_2 results map

We lead a discussion with students regarding observations about air pollution concentration patterns, possible explanations for these patterns, and corresponding actions that schools can take.

A screenshot from the second assembly presentation is shown in Figure 13.

Figure 13 – Screenshot from second assembly presentation

At the end of the second assembly, students have the opportunity to ask questions. Below we have listed some notable questions. Answering these questions gives our educators time to clarify and expand on topics covered in the assembly. Our educators were often surprised by the quality of students' questions, which demonstrated students' engagement with the subject matter.

Examples of high-quality questions asked by students:

- *If we should take public transport rather than drive a car, don't buses also pollute?*

Yes, buses do create pollution, even electric ones. However, buses and other forms of public transport can hold many more people at a time than say a single car. Therefore, any pollution that a bus creates needs to be divided by the number of people it carries. This means that per person, public transport creates far less pollution.

- *Isn't it dangerous to bike in London?*

Cycling in London is getting safer. More cycle lanes and quiet streets across the city mean that cyclists spend far less time close to fast-moving traffic. Stricter speed limits are helping to slow drivers down and Bikeabilty is preparing young people for riding on the roads. Most importantly, the health benefits we get from cycling far outweigh the dangers. Being active when we travel is one of the best things we can do for our bodies.

- *If the car park in the school creates the most pollution, why don't we not allow teachers to drive and turn it into bike parking?*

There are some cases where cycling, walking or public transport are not a practical way for teachers to travel to work. For example, people may need to drive if they have a disability or if they travel a long way to work from a rural area, so it's unlikely we can completely remove parking. However, reducing car parking, introducing a Cycle to Work Scheme and installing secure cycle parking can all help to reduce the number of teachers driving to work. It's just as important for staff to be active when traveling to work as it is for students.

- *A few years ago my parents were advised to buy a diesel car. Now we have found out that diesel cars can be very damaging to our health. Why did the government's advice change?*

Scientific research regularly offers new insights that can greatly impact government advice. In this case, diesel vehicles were shown to produce fewer greenhouse gases, so they were promoted. More recent research has shown that burning diesel creates more fine particles than burning petrol, these small particles have a very strong negative effect on our health. As always, the best solution is to walk or cycle as many journeys as possible, especially while in built up cities.

Air quality results & analysis

Appendix A presents the full set of results for the *Breathe Clean* project. In this section we present our key findings and an analysis of the collected results. Table 8 presents our initial descriptive statistics. Our results are also presented cartographically. Each school's map can be accessed by clicking on the corresponding school name in Appendix A.

Table 8 – Air quality results, descriptive statistics

Description	Result
Total # of schools with AQ monitoring	78
Total # of tubes analysed	572
Total # missing tubes*	27 or 5%
Total # readings above 40µg/m³**	62 or 8%
Total # schools with at least 1 tube above 40µg/m³	29 or 37%
Total # of schools with playground readings above 40µg/m³	17 or 22%
Highest NO_2 reading	50.1 µg/m³
Highest Indoor NO_2 reading	50.1 µg/m³
Highest Outdoor NO_2 reading***	49.4 µg/m³
Lowest NO_2 reading	1.9 µg/m³
Lowest Indoor NO_2 reading	1.9 µg/m³
Lowest Outdoor NO_2 reading***	6.0 µg/m³
Average NO_2 reading	29.2 µg/m³
Average Outdoor NO_2 reading***	32.1 µg/m³
Average Indoor NO_2 reading	21.7 µg/m³
Average Playground NO_2 reading	32.0 µg/m³
Average Roadside NO_2 reading	34.6 µg/m³
Average margin of error in control tubes	±1.3 µg/m³

* While monitoring schools' air quality, if two or more tubes went missing, tubes were replaced. If any replaced tubes went missing again, they were not replaced a second time.

** 40µg/m³ is the EU and UK annual mean concentration limit for NO_2 levels. Tubes were in place for up to four weeks as per manufacturer's instructions. While the data gathered do not demonstrate exceedance of the UK annual NO_2 concentration limit, they do provide an indication of which locations require attention and resources focussed.

*** 'Outdoor' includes all tubes labelled as 'Playground', 'Roadside and 'Unspecified Outdoor'.

We installed each diffusion tube in the *Breathe Clean* project for a period of two to four weeks. Laboratory analysis reports state that the results provided in Appendix A are not blank subtracted. Results have been corrected to a temperature of 20°C and have an overall measurement uncertainty of ±9.7%. The results do not account for the margin of error found in our control tubes, although this margin is noted in Table 8. As monitoring did not span a full year, we cannot assure exceedance of the UK and EU annual concentration limit, but we can provide an indication of which schools require extra attention.

We labelled each diffusion tube in the project as either: 'Indoor', 'Playground', 'Roadside' or 'Unspecified Outdoor'. This categorisation has allowed for more detailed analysis into population exposure. If a tube was both at the roadside and in the playground, we have labelled it as 'Playground'.

Key findings

As expected, NO_2 levels tend to be lower indoors compared to outdoors. Across the 78 schools, we found the average outdoor NO_2 reading to be 10.4 µg/m³ higher than the average indoor reading. The most likely explanation for this difference is that the buildings block some nitrogen dioxide in the air, preventing it from reaching the indoor tubes.

Breathe London estimate that 48.9% of NO_x emissions come from Road Transport. A further 13.0% comes from other forms of transport. The *Breathe Clean* results tend to support these findings, showing a gradient of NO_2 across campuses. From cartographic observations, higher concentrations tend to be found near to roads and railways, while reduced concentrations are nearer to green spaces, far from roads.

Figure 14 shows how NO_2 concentrations vary, using St Nicholas School as an example. Concentrations are highest in tube C, near to Salmon Street and decrease while moving away from passing traffic. Diffusion tube A measured a 12.6 µg/m³ lower concentration inside the school's building compared to tube C, on the roadside. These results show a decreasing NO_2 reading with distance from the road, and how indoor tubes tend to measure lower levels of NO_2.

Figure 14 – St Nicholas School's air quality map

Our *Breathe Clean* results show an average school playground reading of 32.0 µg/m³, 2.6 µg/m³ below the average roadside reading. It must be noted that many school playgrounds are also at the roadside, therefore reducing the difference between readings classed as 'Playground' and those classed as 'Roadside'. In total, 17 schools were found to have readings in their playground, above 40 µg/m³. This finding creates a cause for concern as children are generally more active and often breathing heavily in the playground. Breathing heavily while in polluted air increases students' risk of developing respiratory symptoms. We would recommend further analysis at these schools, all of which are highlighted in bold in table 9.

Tube consistency check

To check that tubes measure NO_2 consistently, students placed two control tubes about 5cm apart. These control tubes are identifiable on the air quality maps as overlapping circles, for example tubes D and E in figure 14. The control results are also identifiable in Appendix A as bold tube letters. By placing tubes side by side, they are exposed to similar atmospheric conditions, one would therefore assume that the tubes would produce similar results. Any variation in results between these two tubes will be a result of; micro-level variations in air flow, the effectiveness of the tubes' ability to absorb NO_2 and any margin of error occurring in the laboratory. The average difference between control tubes was ± 1.3 µg/m³, equivalent to 4.5% of the experiment's average NO_2 reading of 29.2 µg/m³. This small margin of error gives us confidence that the *Breathe Clean* data is accurate enough to draw conclusions about the variation in NO_2 readings across school campuses.

Cases of anomalies

Ark Academy – Tube G

In Ark Academy's school gym, tube G was placed indoors and it is the project's highest NO_2 reading at 50.1 µg/m³. This reading sits 28.4 µg/m³ above the average indoor reading of 21.7 µg/m³ and 14.0 µg/m³ above the next highest indoor reading. Tube G was positioned near Bridge Road (a major road, busy bus route and large source of NO_2). However, the tube was indoors and further from the road than tubes H and I, which both recorded around 10 µg/m³ lower readings than G. There are two likely explanation for this anomaly. The first is that the tube was installed near to a boiler flue, which would produce very large amounts of NO_2. The second is that the air surrounding the tube was stagnant and not sufficiently ventilated. Polluted air from the busy major road may be accumulating in the gym, unable to escape. This reading produces a cause for concern and should be investigated further.

St Robert Southwell RC Primary School – Tube D

The average NO_2 reading across St Robert Southwell RC Primary School is the second lowest in the borough, surpassed only by Mount Stewart Junior School. However, tube D inside the main reception of St Robert Southwell RC Primary School recorded the lowest NO_2 concentration in the project, at 1.9 µg/m³. This reading is 4.1 µg/m³ lower than the second lowest reading in the project. It's most likely that this tube was placed in an area of stagnant air with very low levels of NO_2. The school is also around 250m from Kingsbury Road, a large major road. NO_2 diffusing from vehicles on this road will likely be highly dispersed by the time it reaches the school. Additionally, the school backs on to Fryent Country Park, a sink for air pollution with almost zero NO_2 sources. With the school's location in mind, it is not impossible that this tube would measure such a low reading.

Our Lady of Grace Catholic Junior School – Tube F

At Our Lady of Grace Catholic Junior School, tube F recorded an average NO_2 reading of 9.6 µg/m³, a very low reading given its proximity to Dollis Hill Lane. This reading is 23.1 µg/m³ below the average of the school's five other tubes and 14.9 µg/m³ below the school's other indoor tube. This anomaly is likely explained by the fact that tube F was installed inside a more modern extension to the school. This building has well insulated windows, walls and doors. Better insulation significantly reduces the infiltration of NO_2 into buildings.

UK and EU air quality standards

The EU and UK determine an annual average NO_2 concentration of 40 µg/m³ to be the legal limit. Concentrations exceeding this level are considered to have an unacceptably negative impact on

health and on the environment. Tubes were in place for up to four weeks as per manufacturer's instructions. While the data gathered do not demonstrate exceedance of the UK annual NO_2 concentration limit, they do provide an indication of which locations require attention and resources focussed. NO_2 is known to irritate the airways of the lungs, exacerbating lung diseases. Therefore, reducing NO_2 levels is even more crucial during the outbreak of a pandemic disease such as COVID-19.

Through the *Breathe Clean* programme, we found that 37% of schools have at least one diffusion tube showing an average reading above the UK and EU air quality standard for NO_2. Each of these results is a cause for concern and requires action to reduce student's exposure. Table 9 shows the schools that require improvements to their air quality.

Table 9 – Schools with at least one diffusion tube showing an average reading above 40 µg/m³. Schools with at least one 'Playground' tube above 40 µg/m³ are shown in bold.

School name	
Alperton Community School	**Leopold Primary School (Hawkshead Rd)**
Al-sadiq and Al-Zahra Schools	**Manor School**
Anson Primary School	Newman Catholic College
Ark Academy	**Northview Junior and Infant School**
Avigdor Hirsch Torah Temimah Primary School	**Oliver Goldsmith Primary School**
Braintcroft Primary School	**Roe Green Infant School**
Buxlow Preparatory School	Roe Green Junior School
Christ Church CofE Primary School	**Salusbury Primary School**
Convent of Jesus and Mary RC Infant School	**St Joseph's Roman Catholic Primary School**
Donnington Primary School	**St Mary's CofE Primary School**
Elsley Primary School	**St Mary's RC Primary School**
Gladstone Park Primary School	Wembley Primary School
Harlesden Primary School	**Woodfield School**
Kilburn Grange School	Wykeham Primary School
Leopold Primary School (Gwenneth Rickus)	

In order to determine the best course of action for improving air quality at each of these schools it would be crucial to complete a more extensive audit of each site. Audits would include more detailed spatial air quality monitoring, whilst also examining temporal variation using live monitoring. Audits would also consider the characteristics of the local area, the school's site and buildings to determine suitable measures for improving air quality. We have included a full list of potential measures in Appendix C.

Recommendations for future projects

The current levels of air quality in Brent pose a health risk to schools. As a result, MP Smarter Travel would recommend and would be happy to support the delivery of the following future projects.

Table 10 – Proposed future projects

Project	Scale	Outcomes
School air quality audits	All schools in Table 9	• Better understand sources of air pollution • Show temporal variations in pollution concentration • Investigate other pollutants • Complete a cost/benefit analysis of potential measures for improving air quality • Implement measures and monitor their impact

School air quality walking maps	Primarily schools with timed road closures	• Maps that identify routes which avoid air pollution, road traffic and crowds of people (for social distancing) • Heightened student and parent awareness of where air pollution comes from • Mode shift towards walking, scooting and cycling
STARS support	All Brent schools	• Increased school engagement in the STARS programme • Increased accreditation levels • Mode shift towards more sustainable travel
LTN public Consultation support	Proposed Brent LTNs	• Direct engagement with businesses, schools and residents to gather their views • Independent analysis and reporting on collected data • Suggestions on alterations to LTNs based on consultation results

Appendix A – School air quality results

The following table includes a complete set of results for each school that received air quality monitoring through the *Breathe Clean* programme. Each school name is hyperlinked to the school's corresponding air quality results map. Missing results are highlighted in grey. Bold tube letters indicate the two tubes per school installed as a control.

School		Air Quality Results					School Contact details			No-idling signs
School Name	**School Type**	**Tube**	**Location**	**µg/m³**	**Average Indoor AQ**	**Average Outdoor AQ**	**Lead Contact**	**E-mail**	**Telephone**	**# of no-idling signs**
Alperton Community School	Secondary and 16-18	A	Indoor	29.6	28.6	38.1	Naomi Ranasinghe	n.ranasinghe@alperton.brent.sch.uk	020 8902 2038	1
		B	Roadside	34.0						
		C	Unspecified Outdoor	38.5						
		D	Indoor	27.7						
		E	Playground	36.8						
		F	Playground	38.9						
		G	Playground	42.5						
Al-sadiq and Al-Zahra Schools	Primary and Secondary	A	Indoor	26.5	27.5	38.9	Aliya Azam	AliyaAzam@hotmail.com	020 7372 7706	2
		B	Roadside	39.7						
		C	Indoor	28.5						
		D	Roadside	40.5						
		E	Roadside	38.5						
		F	Roadside	36.9						
Anson Primary School	Primary	A	Indoor	17.3	18.2	36.5	Adrian Clargo	aclargo@anson.brent.sch.uk	020 8452 8552	1
		B	Roadside	33.6						
		C	Indoor	19.1						
		D	Playground	35.2						
		E	Playground	41.2						
		F	Playground	36.1						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
Ark Academy	Primary, Secondary and 16-18	A	Indoor	27.7	39.1	35.1	Peter Watkins	p.watkins@arkacademy.org	020 8385 4390	2
		B	Unspecified Outdoor	34.6						
		C	Playground	34.5						
		D	Playground	34.2						
		E	Playground	30.4						
		F	Playground							
		G	Indoor	50.1						
		H	Roadside	41.7						
		I	Indoor	39.4						
Ark Elvin Academy	Secondary and 16-18	A	Roadside	28.1	11.0	24.8	Sophie Flanagan	s.flanagan@arkelvinacademy.org	020 8902 6362	2
		B	Unspecified Outdoor	24.3						
		C	Indoor	11.0						
		D	Playground	23.7						
		E	Playground	23.8						
		F	Playground	22.4						
		G	Unspecified Outdoor	25.4						
		H	Unspecified Outdoor	25.8						
Avigdor Hirsch Torah Temimah Primary School	Primary	A	Indoor	13.9	19.0	38.9	Natalie Seshold	natalie.seshold@torahtemimah.brent.sch.uk	020 8450 4377	2
		B	Playground	39.1						
		C	Playground	37.1						
		D	Playground	38.5						
		E	Roadside	40.9						
		F	Indoor	24.1						
Barham Primary School	Primary	A	Unspecified Outdoor	30.6	23.4	30.0	Karen Giles	admin@barham.brent.sch.uk	020 8902 3706	2
		B	Roadside	31.8						
		C	Playground	29.1						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		D	Playground	28.9						
		E	Playground	29.6						
		F	Indoor	23.4						
Braintcroft Primary School	Primary	**A**	Roadside	38.6	21.5	37.1	Laura Biggs	Laura.Biggs@E-ACT.org.uk	020 8452 2413	2
		B	Roadside	41.0						
		C	Playground	37.9						
		D	Indoor	23.6						
		E	Unspecified Outdoor	37.7						
		F	Playground	30.4						
		G	Indoor	19.3						
Brentfield Primary School	Primary	A	Roadside	36.6	16.5	35.0	Ms Meyerowitz	omeyerowitz.304@lgflmail.org	020 8965 5326	1
		B	Indoor							
		C	Playground	32.6						
		D	Playground	33.9						
		E	Playground	37.4						
		F	Indoor	16.5						
		G	Unspecified Outdoor	34.6						
Buxlow Preparatory School	Primary	A	Playground	29.5	13.6	35.3	Darren May	head@buxlowschool.org.uk	020 89043615	2
		B	Roadside	44.7						
		C	Roadside	45.3						
		D	Roadside	26.6						
		E	Roadside	30.3						
		F	Indoor	15.1						
		G	Indoor	12.1						
Byron Court Primary School	Primary	A	Unspecified Outdoor	33.9	20.8	30.5	Hugh Bastion	hbastion.304@byroncrt.brent.sch.uk	020 8904 2785	1
		B	Indoor	25.5						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		C	Playground	31.1						
		D	Unspecified Outdoor	33.6						
		E	Unspecified Outdoor	32.1						
		F	Unspecified Outdoor	23.0						
		G	Indoor	16.2						
		H	Roadside	29.1						
Capital City Academy	Secondary and 16-18	A	Unspecified Outdoor		19.6	27.8	Joanne Hunt	Jhunt@capitalcityacademy.org	020 8838 8700	2
		B	Indoor	21.9						
		C	Playground	28.2						
		D	Playground	28.2						
		E	Indoor	17.5						
		F	Unspecified Outdoor	27.1						
		G	Indoor	19.3						
		H	Unspecified Outdoor							
Carlton Vale Infant School	Primary	A	Indoor	12.1	14.2	36.6	Mary Desmond	mdesmond@carlton.brent.sch.uk	020 7624 0348	2
		B	Unspecified Outdoor	28.3						
		C	Unspecified Outdoor	39.5						
		D	Indoor	18.3						
		E	Playground	38.1						
		F	Indoor	12.2						
		G	Playground	37.6						
		H	Playground	39.5						
Chalkhill Primary School	Primary	**A**	Playground	27.4	20.4	26.1	Tasnim Ali	alit@chalkhill.brent.sch.uk	020 8904 4508	2
		B	PLayground	28.3						
		C	Unspecified Outdoor	23.1						
		D	Indoor	20.4						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		E	Roadside	23.5						
		F	Indoor	20.4						
		G	Unspecified Outdoor	27.9						
Christ Church CofE Primary School	Primary	A	Indoor	29.9	29.9	35.6	James Kelly	jkelly@cchurch.brent.sch.uk	020 7624 4967	1
		B	Playground	34.9						
		C	Playground	39.3						
		D	Playground	25.2						
		E	Roadside	39.7						
		F	Roadside	32.5						
		G	Indoor							
		H	Roadside	42.1						
		I	Indoor	24.9						
		J	Indoor	20.0						
Claremont High School	Secondary and 16-18	A	Playground	18.5	17.2	17.4	George Burns	George.Burns@claremont-high.org.uk	020 8204 4442	2
		B	Indoor	18.5						
		C	Unspecified Outdoor	15.7						
		D	Indoor	15.3						
		E	Roadside	17.5						
		F	Indoor	17.7						
		G	Playground	17.6						
		H	Playground	17.6						
Convent of Jesus and Mary Language College	Secondary and 16-18	A	Roadside	35.8	16.9	25.7	Himakshi Patel	hpatel@cjmlc.co.uk	020 8965 2986	1
		B	Unspecified Outdoor	27.3						
		C	Unspecified Outdoor	25.9						
		D	Playground	22.6						
		E	Indoor	13.8						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		F	Indoor	17.5						
		G	Playground	19.2						
		H	Unspecified Outdoor	26.6						
		I	Indoor	19.5						
		J	Unspecified Outdoor	22.3						
Convent of Jesus and Mary RC Infant School	Primary	A	Indoor	23.6	24.4	40.6	Geraldine Byrne	admin@conventinf.brent.sch.uk	020 8459 5890	1
		B	Playground	40.4						
		C	Playground	42.1						
		D	Playground	33.8						
		E	Playground	39.9						
		F	Indoor	25.1						
		G	Playground	43						
		H	Playground	44.1						
Donnington Primary School	Primary	A	Indoor	23.3	23.6	36.4	Cheryl Haynes	chaynes@donnington.brent.sch.uk	020 8451 0761	2
		B	Unspecified Outdoor	33.3						
		C	Unspecified Outdoor	32.7						
		D	Playground	35.6						
		E	Playground	39.4						
		F	Indoor	23.9						
		G	Playground	41.2						
East Lane Primary	Primary	A	Playground	21.5	15.5	25.1	Emma Duong	reception@elps.co.uk	020 8289 4600	2
		B	Playground	22.5						
		C	Unspecified Outdoor	26.0						
		D	Unspecified Outdoor	24.2						
		E	Unspecified Outdoor	24.3						
		F	Indoor	15.5						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		G	Roadside	27.2						
		H	Roadside	29.8						
Elsley Primary School	Primary	A	Indoor	24.7	26.2	39.2	Raphael Moss	raphael.moss@elsley.brent.sch.uk	020 8902 8003	2
		B	Unspecified Outdoor	37.0						
		C	Indoor	27.7						
		D	Playground	41.7						
		E	Playground	35.4						
		F	Unspecified Outdoor	45.5						
		G	Roadside	41.9						
		H	Playground	33.9						
Fryent Primary School	Primary	A	Indoor	27.6	18.7	25.2	Alison Gross	alison.gross@fryent.brent.sch.uk	020 8205 4047	1
		B	Playground	18.8						
		C	Playground	15.8						
		D	Playground	16.8						
		E	Roadside	39.8						
		F	Indoor	15.0						
		G	Indoor	13.5						
		H	Unspecified Outdoor	35.1						
Furness Primary School	Primary	A	Playground	23.0	22.0	27.5	David Ansong	admin@furness.brent.sch.uk	020 8965 5977	2
		B	Playground	27.0						
		D	Playground	27.6						
		E	Playground	28.2						
		F	Playground	28.6						
		G	Indoor	20.6						
		H	Indoor	23.4						
		I	Unspecified Outdoor	30.2						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
Gladstone Park Primary School	Primary	A	Indoor	30.5	23.3	41.3	Liza Silvanian	lsilvanian@gladpark.brent.sch.uk	0208 4521350	2
		B	Roadside	39.6						
		C	Indoor	16.1						
		D	Playground	42.5						
		E	Playground	39.5						
		F	Playground	43.8						
Harlesden Primary School	Primary	A	Unspecified Outdoor	43.9	32.3	41.2	Rosa Walker	rwalker@harlesden.brent.sch.uk	020 8965 5977	2
		B	Playground	41.6						
		C	Playground	46.5						
		D	Playground							
		E	Indoor	36.1						
		F	Roadside							
		G	Playground	38.0						
		H	Playground	40.5						
		I	Playground	35.9						
		J	Unspecified Outdoor	42.2						
		K	Indoor	28.4						
JFS	Secondary and 16-18	A	Indoor	23.2	26.1	20.7	Charlotte Rigby	charlotte.rigby@jfs.brent.sch.uk	020 8206 3100	2
		B	Unspecified Outdoor	22.6						
		C	Indoor	18.1						
		D	Unspecified Outdoor	22.0						
		E	Playground	29.6						
		F	Unspecified Outdoor	27.1						
		G	Unspecified Outdoor	26.0						
		H	Roadside	29.3						
Kilburn Grange School	Primary	**A**	Indoor	33.8	32.8	40.0	Sonia Mallick			2

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		B	Indoor	33.7				Head@kilburngrangeschool.org.uk	0207 504 0547	
		C	Indoor	30.9						
		D	Playground	39.3						
		E	Roadside	44.1						
		F	Roadside	36.7						
Kingsbury Green Primary School	Primary	A	Indoor	17.8	16.9	17.5	Jennie Chesney	jchesney@kgreen.brent.sch.uk	020 8204 6423	1
		B	Unspecified Outdoor	17.0						
		C	Indoor	16.0						
		D	Playground	17.6						
		E	Unspecified Outdoor	17.4						
		F	Unspecified Outdoor	18.0						
Kingsbury High School	Secondary and 16-18	A	Unspecified Outdoor	31.3	23.8	30.7	Sarah Purtill	sarah.purtill@kingsburyhigh.org.uk	020 8206 3000	3
		B	Unspecified Outdoor	31.8						
		C	Unspecified Outdoor	26.3						
		D	Unspecified Outdoor	31.0						
		E	Playground	32.0						
		F	Unspecified Outdoor	25.7						
		G	Unspecified Outdoor							
		H	Indoor	24.3						
		I	Indoor	23.2						
		J	Unspecified Outdoor	36.6						
Leopold Primary School (Gwenneth Rickus Campus)	Primary	A	Indoor	20.2	20.6	37.6	Kafui Gbesemete	kgbesemete@leopold.brent.sch.uk	020 8961 5336	1
		B	Unspecified Outdoor	43.6						
		C	Playground							
		D	Playground	34.8						
		E	Playground	34.4						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		F	Unspecified Outdoor	30.9						
		G	Roadside	44.1						
		H	Roadside	43.8						
		I	Playground	31.6						
		J	Indoor	21.1						
Leopold Primary School (Hawkshead Rd)	Primary	A	Indoor	17.2	24.4	38.6	Anil Albana	admin@leopold.brent.sch.uk	020 8459 5654	2
		B	Playground	39.9						
		C	Playground	41.0						
		D	Playground	23.5						
		E	Playground	37.5						
		F	Unspecified Outdoor	43.0						
		G	Indoor	31.1						
		H	Indoor	23.6						
		I	Roadside	46.9						
		J	Indoor	25.6						
Lycee International De Londres	Primary, Secondary and 16-18	A	Indoor	32.1	28.5	32.5	João Barros	info@lyceeinternational.london	020 3824 4900	2
		B	Unspecified Outdoor	30.9						
		C	Roadside	33.8						
		D	Playground							
		E	Playground							
		F	Playground	37.6						
		G	Playground	27.8						
		H	Indoor	24.9						
Lyon Park Primary School	Primary	A	Indoor	13.6	19.2	32.3	Sean Moran	smoran@lyonpark.brent.sch.uk	020 8902 5454	2
		B	Playground	30.9						
		C	Playground	34.3						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		D	Playground	31.1						
		E	Roadside	32.1						
		F	Playground	32.2						
		G	Indoor	24.8						
		H	Roadside	33.3						
Malorees Infant School (same results as Junior School)	Primary	N/A	N/A	N/A	N/A	N/A	Clare Wood	admin@malorees-inf.brent.sch.uk	020 8459 3038	1
Malorees Junior School	Primary	A	Indoor		18.9	32.2	Sarah Harris	admin@maloreesjnr.brent.sch.uk	020 8459 5452	1
		B	Playground	30.9						
		C	Indoor	18.9						
		D	Playground	31.0						
		E	Playground	32.2						
		F	Unspecified Outdoor	31.3						
		G	Roadside	34.5						
		H	Playground	31.1						
		I	Playground	35.5						
		J	Playground	30.8						
Manor School	Primary	A	Indoor	26.4	24.3	37.9	Steve Thompson	steven.thompson@manor.brent.sch.uk	0208 968 3160	1
		B	Roadside	40.4						
		C	Indoor	26.8						
		D	Playground	35.1						
		E	Playground	40.9						
		F	Playground	30.1						
		G	Playground	40.2						
		H	Indoor	26.3						
		I	Roadside	41.0						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		J	Indoor	17.6						
Maple Walk School	Primary	A	Indoor	17.6	15.1	29.4	Mabel May	mabel.may@maplewalkschool.co.uk	020 8963 3890	1
		B	Playground	29.1						
		C	Roadside	27.2						
		D	Roadside	32.9						
		E	Unspecified Outdoor	28.6						
		F	Indoor	12.5						
Mitchell Brook Primary School	Primary	**A**	Playground	20.7	15.5	21.7	Adam Russell	arussell@mbrook.brent.sch.uk	020 8459 1392	1
		B	Playground	24.8						
		C	Indoor							
		D	Playground	20.6						
		E	Playground	19.6						
		F	Indoor	15.5						
		G	Roadside	22.7						
Mora Primary School	Primary	A	Playground	29.8	24.9	32.0	Minnie Tejan-Cole	mtejancole@mora.brent.sch.uk	020 8452 2634	2
		B	Indoor	24.8						
		C	Playground	29.2						
		D	Indoor	25.0						
		E	Playground	35.1						
		F	Playground	33.7						
Mount Stewart Junior School	Primary	A	Roadside	14.7	12.2	13.3	Carrie Huvers	c.huvers@tmss.org.uk	020 8907 1977	2
		B	Indoor	8.6						
		C	Playground	14.5						
		D	Playground	14.0						
		E	Unspecified Outdoor							
		F	Unspecified Outdoor							

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		G	Unspecified Outdoor	6.5						
		H	Playground	15.1						
		I	Indoor	15.8						
		J	Unspecified Outdoor	15.0						
Newfield Primary School	Primary	A	Indoor	19.9	18.1	31.5	Oweda Harrison	oharrison@newfield.brent.sch.uk	020 8961 1566	2
		B	Playground	30.2						
		C	Indoor	13.9						
		D	Unspecified Outdoor	33.0						
		E	Playground							
		F	Playground	33.6						
		G	Playground	28						
		H	Unspecified Outdoor	32.8						
		I	Indoor	20.5						
Newman Catholic College	Secondary and 16-18	**A**	Playground		28.3	40.4	Andrew Dunne	adunne@ncc.brent.sch.uk	020 8965 3947	2
		B	Playground	36.4						
		C	Roadside	42.8						
		D	Unspecified Outdoor	40.9						
		E	Indoor							
		F	Indoor	28.3						
		G	Roadside	40.0						
		H	Roadside	41.8						
Northview Junior and Infant School	Priamary	**A**	Playground	38.1	24.4	40.4	David Syed	admin@northview.brent.sch.uk	020 8450 7982	2
		B	Playground	41.3						
		C	Unspecified Outdoor	42.6						
		D	Indoor	28.2						
		E	Indoor	20.6						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		F	Unspecified Outdoor	38.0						
		G	Roadside	42.7						
		H	Unspecified Outdoor	39.5						
Oakington Manor Primary School	Primary	A	Unspecified Outdoor	22.3	20.1	24.7	William Lowry	williaml@oakmanor.brent.sch.uk	020 8902 2871	2
		B	Unspecified Outdoor	25.8						
		C	Indoor	22.0						
		D	Playground	27.0						
		E	Indoor	18.2						
		F	Playground	27.7						
		G	Playground	27.5						
		H	Indoor							
		I	Playground	18.2						
Oliver Goldsmith Primary School	Primary	A	Roadside	34.3	23.5	35.1	Aleksandra Polewczyk	apolewczyk@olivergoldsmith.brent.sch.uk	020 8205 6038	2
		B	Unspecified Outdoor	30.5						
		C	Indoor	20.3						
		D	Indoor	25.9						
		E	Playground	35.0						
		F	Unspecified Outdoor	32.0						
		G	Indoor	24.3						
		H	Playground	41.0						
		I	Playground	39.8						
		J	Roadside	33.2						
Our Lady of Grace Catholic Junior School	Primary	A	Roadside	31.9	17.0	34.8	Leonie Jones	ljones@ologjuniors.brent.sch.uk	020 8450 6002	2
		B	Indoor	24.5						
		C	Playground	34.7						
		D	Playground	33.5						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		E	Playground	39.0						
		F	Indoor	9.6						
Our Lady of Lourdes RC Primary School	Primary	**A**	Roadside	36.9	21.1	35.9	Mary Bickerstaff	mbickerstaff@lourdes.brent.sch.uk	020 8961 5037	2
		B	Roadside	36.3						
		C	Playground	36.3						
		D	Playground	32.9						
		E	Playground	35.4						
		F	Indoor	21.1						
		G	Unspecified Outdoor	37.6						
Park Lane Primary School	Primary	A	Playground	33.8	28.3	33.8	Amanda Rahnama	arahnama@parklane.brent.sch.uk	020 8902 5006	3
		B	Roadside	33.2						
		C	Playground	36.8						
		D	Playground	39.7						
		E	Playground	35.2						
		F	Indoor	28.6						
		G	Indoor	27.9						
		H	Unspecified Outdoor	23.9						
Phoenix Arch School	Primary	A	Indoor	18.0	20.2	29.3	Jude Towell	admin@phoenixarch.brent.sch.uk	020 8451 6961	1
		B	Unspecified Outdoor	34.3						
		C	Playground	35.8						
		D	Playground	38.7						
		E	Playground	6.0						
		F	Indoor							
		G	Indoor	22.5						
		H	Unspecified Outdoor	31.6						
		A	Indoor	21.5	21.0	32.7				1

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
Preston Manor Lower School	Primary, Secondary and 16-18	B	Playground	28.9			Kevin Atkinson	k.atkinson@preston-manor.com	020 8385 4089	
		C	Unspecified Outdoor	33.9						
		D	Playground	34.4						
		E	Playground	33.9						
		F	Playground	30.9						
		G	Unspecified Outdoor	32.2						
		H	Indoor							
		I	Unspecified Outdoor	34.5						
		J	Indoor	20.5						
Preston Park Primary School	Primary	A	Playground	30.2	19.8	30.3	Joanna Haine	jhaine@prestpk.brent.sch.uk	020 8904 3602	1
		B	Playground	31.1						
		C	Playground	31.8						
		D	Indoor	14.8						
		E	Roadside	30.6						
		F	Indoor	22.9						
		G	Indoor	21.6						
		H	Unspecified Outdoor	27.6						
Queens Park Community School	Secondary and 16-18	A	Unspecified Outdoor	17.2		19.7	Steve Cripps	scripps@qpcs.brent.sch.uk	020 8438 1700	2
		B	Playground	21.9						
		C	Playground	22.5						
		D	Unspecified Outdoor	20.7						
		E	Unspecified Outdoor	18.1						
		F	Playground							
		G	Indoor							
		H	Roadside	18.1						
	Priamry	A	Unspecified Outdoor	37.7	33.3	38.6	Andrew Miller			2

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
Roe Green Infant School		B	Unspecified Outdoor	39.6				amiller@rgreeninf.brent.sch.uk	020 8204 5221	
		C	Roadside	37.1						
		D	Indoor	34.5						
		E	Playground	40.1						
		F	Playground	38.7						
		G	Indoor	32.1						
Roe Green Junior School	Primary	**A**	Playground	30.0	30.1	30.4	Yvonne D'Souza	ydsouza@rgjs.brent.sch.uk	020 8204 5221	1
		B	Playground	29.6						
		C	Roadside	31.3						
		D	Playground	30.5						
		E	Indoor	40.3						
		F	Playground	29.7						
		G	Indoor	26.0						
		H	Indoor	24.0						
		I	Playground	33.5						
		J	Playground	28.1						
Roe Green Strathcona School	Primary	A	Indoor	26.1	27.8	35.3	Liz McLaren	emclaren@rgreeninf.brent.sch.uk	020 8904 5597	1
		B	Unspecified Outdoor	38.1						
		C	Roadside	38.7						
		D	Roadside	36.0						
		E	Indoor	29.5						
		F	Unspecified Outdoor	36.8						
		G	Playground	25.5						
		H	Playground	36.6						
Salusbury Primary School	Primary	A	Indoor		28.7	41.9	Stephanie Armstrong	sarmstrong@salusbury.brent.sch.uk	0207 624 0311	2
		B	Playground	39.2						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		C	Playground	41.4						
		D	Playground	46.4						
		E	Playground	40.5						
		F	Indoor	28.7						
Sinai Jewish Primary School	Primary	A	Roadside	30.2	15.8	27.1	Claire Gough	cgough@sinai.brent.sch.uk	020 8204 1550	2
		B	Unspecified Outdoor	11.4						
		C	Indoor	15.8						
		D	Unspecified Outdoor	31.8						
		E	Playground	31.7						
		F	Playground	30.6						
Southover Partnership School	Primary, Secondary and 16-18	A	Playground	27.4	14.5	30.7	Fola Oluwole	fola.oluwole@southoverpartnership.com	020 8446 0300	2
		B	Playground	28.1						
		C	Playground	38.9						
		D	Unspecified Outdoor	30.8						
		E	Unspecified Outdoor	29.7						
		F	Unspecified Outdoor	29.1						
		G	Indoor	14.5						
St Andrew and St Francis CofE Primary School	Primary	A	Indoor	22.8	17.1	27.1	Fiona Maclean	fmaclean@sasf.brent.sch.uk	020 84591636	2
		B	Unspecified Outdoor	23.7						
		C	Roadside	27.2						
		D	Indoor	11.5						
		E	Playground	31.7						
		F	Playground	25.0						
		G	Playground	28.1						
St Christopher's Preparatory School	Primary	A	Playground	30.0	12.9	30.7	Jean Robertson	jean.robertson@stchristophersschool.org.uk	020 8902 5069	2
		B	Playground	28.1						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		C	Playground	28.0						
		D	Indoor	9.9						
		E	Indoor	16.0						
		F	Roadside	36.8						
St Gregory's Catholic Science College	Secondary and 16-18	A	Indoor	23.2	23.2	31.7	Gail Hovey	ghovey@stgregorys.harrow.sch.uk	020 8907 8828	2
		B	Unspecified Outdoor	33.2						
		C	Unspecified Outdoor	29.1						
		D	Unspecified Outdoor	32.0						
		E	Playground	32.5						
		F	Indoor	23.3						
St Joseph's RC Junior School	Primary	A	Indoor	23.0	21.6	36.2	Mark Betts	mbetts@sjjnr.brent.sch.uk	020 8902 3438	1
		B	Unspecified Outdoor	34.7						
		C	Unspecified Outdoor	37.4						
		D	Indoor	20.2						
		E	Unspecified Outdoor	32.9						
		F	Unspecified Outdoor	38.7						
		G	Playground	37.5						
St Joseph's Roman Catholic Primary School	Primary	A	Indoor	26.9	26.8	41.7	Brenda Kirby	bkirby@stjo.brent.sch.uk	020 8965 5651	2
		B	Playground	45.3						
		C	Roadside	39.2						
		D	Roadside	39.2						
		E	Indoor	26.7						
		F	Playground	45.5						
		G	Playground	39.2						
		H	Indoor	18.2						
	Primary	**A**	Unspecified Outdoor	21.9	12.5	23.5				2

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
St Margaret Clitherow RC Primary School		**B**	Unspecified Outdoor	25.9			Ewa McSperrin	head@clitherow.brent.sch.uk	020 8450 3631	
		C	Playground	22.9						
		D	Indoor	9.0						
		E	Indoor	16.0						
		F	Playground	23.3						
St Mary's CofE Primary School	Primary	A	Unspecified Outdoor	37.6	19.7	39.0	Susan Lawrence	slawrence@stmarysce.brent.sch.uk	020 8451 0363	2
		B	Unspecified Outdoor	36.2						
		C	Unspecified Outdoor	41.6						
		D	Indoor	30.1						
		E	Playground	40.8						
		F	Playground	38.9						
		G	Playground	38.6						
		H	Indoor	6.6						
		I	Indoor	22.3						
St Mary's RC Primary School	Primary	A	Indoor	22.5	25.0	41.6	Susana Marland	admin@marycps.brent.sch.uk	020 7624 1830	1
		B	Playground	44.1						
		C	Playground	41.0						
		D	Playground	39.9						
		E	Playground	40.1						
		F	Indoor	27.4						
		G	Unspecified Outdoor	48.8						
		H	Roadside	35.6						
St Nicholas School	Primary	A	Indoor	24.6	25.0	36.1	Matt Donaldson	admin@stnicholasschool.org.uk	020 8205 7153	2
		B	Unspecified Outdoor	35.4						
		C	Roadside	37.3						
		D	Unspecified Outdoor	34.8						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		E	Unspecified Outdoor	36.9						
		F	Indoor	25.4						
St Robert Southwell RC Primary School	Primary	**A**	Roadside	18.1	6.9	16.2	Honor Beck	head@robsouth.brent.sch.uk	0208 204 6148	1
		B	Roadside	16.4						
		C	Playground	16.0						
		D	Indoor	1.9						
		E	Unspecified Outdoor	14.2						
		F	Indoor	11.9						
Sudbury Primary School	Primary	A	Indoor	18.0	18.9	33.7	Stephen Anti	santi@sudbury.brent.sch.uk	020 8385 4444	2
		B	Unspecified Outdoor	32.2						
		C	Indoor	19.1						
		D	Playground	34.8						
		E	Playground	36.2						
		F	Playground	36.4						
		G	Playground	34.9						
		H	Playground	27.6						
		I	Indoor	19.5						
The Crest Academy	Secondary and 16-18	A	Unspecified Outdoor	25.5	18.4	27.6	Sophie Grant	Sophie.Grant@E-ACT.org.uk	020 8452 4842	2
		B	Unspecified Outdoor	28.0						
		C	Indoor	15.8						
		D	Unspecified Outdoor	31.6						
		E	Indoor	21.1						
		F	Playground	27.5						
		G	Playground	29.9						
		H	Indoor	18.1						
		I	Playground	23.1						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
The Kilburn Park School Foundation	Primary	A	Playground	32.9	26.2	35.2	Marina Shah	mshah@kilburnpark.brent.sch.uk	020 7624 7603	2
		B	Playground	38.1						
		C	Playground	39.3						
		D	Indoor	27.9						
		E	Roadside	32.2						
		F	Unspecified Outdoor	34.0						
		G	Indoor	24.5						
		H	Playground	36.7						
		I	Playground	33.6						
The Stonebridge School	Primary	**A**	Unspecified Outdoor	24.0	19.9	24.9	Sophie Allen	sallen@stonebridge.brent.sch.uk	020 8965 6965	2
		B	Unspecified Outdoor	25.1						
		C	Unspecified Outdoor	26.7						
		D	Indoor	18.1						
		E	Indoor	21.7						
		F	Playground	23.7						
The Village School	Primary, Secondary and 16-18	**A**	Playground	17.4	14.1	21.2	Ian Ludgate	ianl@tvs.brent.sch.uk	020 8204 5396	2
		B	Playground	18.1						
		C	Unspecified Outdoor	19.5						
		D	Indoor	14.1						
		E	Playground	17.8						
		F	Unspecified Outdoor	32.9						
Uxendon Manor Primary School	Primary	A	Playground		13.1	20.7	Serena Addari	serena.addari@uxendonmanor.com	020 8907 5019	2
		B	Playground	22.5						
		C	Playground	13.8						
		D	Playground	23.6						
		E	Unspecified Outdoor	19.7						

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		F	Indoor	13.1						
		G	Indoor	13.2						
		H	Roadside	23.8						
Wembley High Technology College	Secondary and 16-18	A	Indoor	20.3	22.2	35.6	Amit Hathi	ahathi@whtc.co.uk	020 8385 4800	2
		B	Roadside	37.0						
		C	Playground	36.5						
		D	Roadside	39.1						
		E	Playground	31.3						
		F	Indoor	24.1						
		G	Roadside	34.9						
		H	Roadside	34.8						
Wembley Primary School	Primary	A	Unspecified Outdoor	35.5	24.6	38.0	Simon Barr	sbarr3.304@lgflmail.org	020 8904 3725	2
		B	Unspecified Outdoor	40.8						
		C	Indoor	35.0						
		D	Playground	36.0						
		E	Indoor	13.1						
		F	Unspecified Outdoor	41.6						
		G	Unspecified Outdoor	39.3						
		H	Playground	35.1						
		I	Indoor	25.7						
Woodfield School	Secondary and 16-18	A	Playground	31.7	24.6	35.7	January O'Donnell	jodonnell@woodfield.brent.sch.uk	020 8205 1977	1
		B	Indoor	29.9						
		C	Unspecified Outdoor	35.7						
		D	Unspecified Outdoor	34.4						
		E	Unspecified Outdoor	36.3						
		F	Indoor							

School		Air Quality Results					School Contact details			No-idling signs
School Name	School Type	Tube	Location	µg/m³	Average Indoor AQ	Average Outdoor AQ	Lead Contact	E-mail	Telephone	# of no-idling signs
		G	Playground	40.6						
		H	Indoor	19.3						
Wykeham Primary School	Primary	A	Playground	22.2	18.5	32.2	Everton Sharpe	admin@wykeham.brent.sch.uk	020 8450 8425	2
		B	Unspecified Outdoor							
		C	Indoor	18.8						
		D	Roadside	23.3						
		E	Indoor	18.2						
		F	Roadside	19.6						
		G	Roadside	49.4						
		H	Roadside	46.7						

Appendix B – Schools with no air quality monitoring

Mayor's School Air Quality Audit Programme

The following schools are now monitored through the Mayor's School Air Quality Audit Programme. Students at these schools received both *Breathe Clean* assemblies, but no additional monitoring was carried out.

School		School Contact details			No-idling signs
School Name	**School Type**	**Lead Contact**	**E-mail**	**Telephone**	**# of no-idling signs**
Ark Franklin Primary Academy	Primary	Janine Ryan	info@arkfranklinprimary.org	020 8969 3846	Already installed
John Keble CofE Primary School	Primary	Catherine Allard	admin@jkeble.brent.sch.uk	0208 965 5072	Already installed

Infant Schools

These Infant schools were engaged through the *Breathe Clean* programme. However, an assembly could not be booked before COVID-19 restrictions meant that no face-to-face assemblies or on-site monitoring could be completed. It was decided that students of infant school age would also struggle to follow and understand an assembly delivered remotely.

School		School Contact details			No-idling signs
School Name	**School Type**	**Lead Contact**	**E-mail**	**Telephone**	**# of no-idling signs**
Mount Stewart Infant School	Primary	Carrie Huvers	c.huvers@tmss.org.uk	020 8907 5113	1
Our Lady of Grace RC Infant and Nursery School	Primary	Patricia Geraghty	admin@ologinfants.brent.sch.uk	020 8450 6757	2
St Joseph's RC Infant School	Primary	Mandy Whelan	mwhelan@sjinf.brent.sch.uk	020 8903 6032	1

Schools that were unresponsive or declined to engage

These schools did not receive air quality monitoring or assemblies as they were either unresponsive to engagement or directly declined to be involved in the programme. Each school, apart from The Swaminarayan School, as it was closing, had No-idling signs installed outside of the school.

School		Engagement	School Contact details			No-idling signs
School Name	**School Type**	**Status**	**Contact**	**E-mail**	**Telephone**	**# of no-idling signs**
Bnos Beis Yaakov Primary School	Primary	Unresponsive to engagement	Mrs E Bialoglowski	frontoffice@beisyaakov.barnet.sch.uk	020 8905 9590	1
Brondesbury College London	Secondary	Unresponsive to engagement	Mr Asad Fazil	a.fazil@brondesburycollege.co.uk	020 8830 4522	2
Islamia Primary School	Primary	Unresponsive to engagement	Babar Mirza	admin@islamia.brent.sch.uk	020 7372 2532	2
Islamia School for Girls'	Secondary	Unresponsive to engagement	Hasana	officemanager@islamiaschools.com	020 7372 3472	1
North West London Jewish Day School	Primary	Unresponsive to engagement	Judith Caplan	jcaplan@nwljds.org.uk	020 8459 3378	2
St Mary Magdalen's Catholic Junior School	Primary	Unresponsive to engagement	Maria Quinn	mquinn@marymag.brent.sch.uk	020 8459 3159	2
The School of the Islamic Republic of Iran	Primary and Secondary	Unresponsive to engagement	Mr Seyed Abbas Hosseini	irisschool@gmail.com	020 7372 8051	2
Michaela Community School	Secondary and 16-18	Declined to engage	Katharine Birbalsingh	info@mcsbrent.co.uk	020 8795 3183	2
Princess Frederica CofE Primary School	Primary	Declined to engage	Hannah Greenaway	admin@princessfrederica.brent.sch.uk	0208 969 7756	2
The Noam Primary School	Primary	Declined to engage	Mrs Gerson	secretary@noamprimary.org	020 8908 9491	2
The Swaminarayan School	Primary, Secondary and 16-18	School closed during programme	Umesh Raja	admin@tssuk.org	020 8965 8381	0

Appendix C - Measures for addressing air quality issues

Below is a list of measures to help reduce exposure to air pollution and improve air quality around schools. This list comes from The Mayor's School Air Quality Audit Programme Toolkit (2018).

1. HIGHWAY MEASURES
Anti-idling
A1 Fines
A2 Campaigns, including driver engagement
A3 Information signage
B Reducing traffic flow
B1 'School Streets'
B2 Collapsible bollards
B3 'Play Streets' *(temporary measure)*
B4 Road closure
B5 Filtered permeability
B6 One-way streets/ No entry restrictions
B7 ULEV-only streets
B8 Width restriction (e.g. 7ft)
B9 Environmental weight limit signs
B10 Reallocate roadspace
B11 Weight restrictions
C Smoothing traffic flow/speed
C1 Modify traffic calming
C2 Optimise traffic signals
C3 Junction improvements
D Reducing drop-off activity
D1 Public Space Protection Orders
D2 School Keep Clear markings
D3 Double/single yellow lines
D4 Improve enforcement of restrictions
E Improved pedestrian and cyclist environment
E1 Improved pedestrian environment - footway widening, kerb build-outs
E2 Improved crossing facilities on desire lines
E3 Traffic calming
E4 Improve Visibility of the School
E5 Cycle hangers
F Promote a switch to low emission vehicles
F1 Ultra-low Emission Zone (ULEZ) & Low Emission Zone (LEZ)
F2 Comprehensive charging provision for ULEVs
G Parking/Loading
G1 Identify a Park & Stride site
G2 Remove or relocate parking/ loading bays and/or amend restrictions

G3 Introduce kerb blip loading restrictions
G4 Enforce parking restrictions
G5 Additional parking charges for more polluting vehicles
G6 Introduce or amend CPZ restrictions around school to restrict non-residents parking
G7 Parking rationalisations with ULEV car clubs
H Buses
H1 Bus stop relocation
H2 Low emission buses
I Freight and Deliveries
I1 Engage with local businesses to reduce freight/ delivery emissions
I2 Promote low emission vehicles for freight and deliveries
I3 Delivery Servicing Plans (DSPs) for new developments
I4 Re-time Borough commercial waste collection
J Construction
J1 Planning conditions to reduce impacts of freight traffic
J2 Managing the impact of dust and emissions during construction and demolition
J3 Retrospective discussions with already permitted developments to lessen the impacts
J4 Non-Road Mobile Machinery Audit
K Planning Policy and Strategy
K1 Healthy Streets approach, sustainable transport and road space reallocation from vehicular traffic
L Green Infrastructure
L1 Green screens
L2 Trees, shrubs, planters
L3 Green Gateways
L4 Pocket parks
2. SCHOOL SITE MEASURES
M School Grounds
M1 Additional scooter/ cycle parking
M2 Staff car parking
M3 Anti-idling for deliveries
M4 Re-timing for deliveries
M5 Reduce number of deliveries, staff/visitor vehicle trips and/or use more sustainable modes
M6 Relocate pedestrian entrances
M7 Green screens
M8 Trees/ shrubs/ planters
M9 Green spaces
M10 Pupil & staff cycle parking
M11 Reduced waiting times to enter school grounds
M12 Relocate playgrounds and free flow spaces
M13 Co-ordinate start/ finish times with nearby schools
M14 Reconsider playground layouts to reduce exposure
M15 Sheltered waiting areas for parents/ guardians
School Building
N School boilers/ heating

N1 Upgrade aging boilers
N2 Install Optimising Compensator Control System for School Boilers
N3 Boiler flues and extraction equipment
N4 Reducing over-heating and tackling heat gain
N5 Replace aging radiators
O Improve product choice (e.g. cleaning products)
O1 Improve product choice (e.g. cleaning products)
P Regular service & maintenance of appliances and equipment
P1 Regular service & maintenance of appliances and equipment
Q Improve school building insulation
Q1 Improve school building insulation
Q2 Upgrade windows
Q3 Replace temporary classrooms with permanent structures
Q4 Green Roofs
R Ventilation / Air Filtration
R1 Installation of Air Conditioning Units
R2 Introduce Air Filtration Systems
R3 Install HEPA Filters in Air Handling Units
R4 Other air filtration systems - air purifiers
S Other
S1 Air quality monitoring and information provision eco-monitors and walking route maps.
3. BEHAVIOURAL MEASURES
T1 Attain improved STARS accreditation status, ultimately Gold status.
T2 Promote cleaner walking routes to school
T3 Promoting Park & Stride
T4 Promoting car sharing
T5 Walking Route Maps / Leaflets
T6 Parent and Public Workshops
T7 Prepare 'Welcome Packs' for new pupils / parents
T8 Deliver Air Quality focused lesson/s to children
T9 Awareness raising session amongst staff
T10 Daily monitoring of London Air website/ app
T11 Add Air Quality to Junior Citizenship Scheme
T12 Anti-idling campaign
T13 Attain an improved Award in Healthy Schools London, ultimately a Gold Award
T14 Awareness raising events amongst the wider community
T15 Cycle training and promotional initiatives
T16 Gamification to promote active travel
T17 Restrict or reduce personal deliveries
T18 CPD supporting teachers subject knowledge on air quality
T19 Walking Buses
4. WIDER MEASURES
U1 Targeted scrappage scheme for polluting vehicles entering London
U2 Reform Vehicle Excise Duty

U3 Promote a transition to electric heating and heat pumps
U4 Reform Buildings Regulations to promote heat pumps