MAYOR OF LONDON

The Mayor of London's School Air Quality Audit Programme

Bonner Primary School, London Borough of Tower Hamlets

MAY 2018

Mayor's Foreword

Poor air quality is a major public health issue and cause of inequality in our city. It is shocking that in London alone, air pollution contributes to thousands of early deaths every year, and has been linked to strokes, heart attacks, asthma, dementia and smaller lungs in our children.

We cannot allow this to continue. That is why, since becoming Mayor, I have made tackling poor air quality a priority. That is also why my administration has nearly doubled spending on cleaning up London's toxic air and we are delivering the boldest and most ambitious plan to tackle air quality anywhere in the world.

This includes introducing a new charge on the oldest, most polluting vehicles coming into central London, consulting on expanding the Ultra Low Emission Zone, making buses in London cleaner and greener, and reducing exposure to air pollution around schools.

As part of this, we launched the Mayor's School Air Quality Audit Programme in January 2017, with the aim of reducing emissions and primary school children's exposure to polluted air. I am delighted that this programme has now been completed, with 50 audits undertaken at primary schools located in the most polluted areas of London.

We are confident that implementing the recommendations from these audits will go a long way to delivering cleaner air, reducing health inequalities and, most importantly, improving the health and wellbeing of our children.

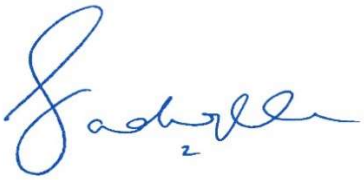
But we want to go even further. The implementation of the recommendations and dissemination of this programme offers us an invaluable opportunity to really make a difference. So, I want to see the London boroughs rolling it out to every school located in pollution hot spots.

The audit recommendations for the 50 schools that have already gone through the process are bespoke to each school, and whilst some recommendations will require funding to implement, there will be some that will not; such as changing walking routes to less exposed routes. Each report also contains a tool kit and template that could be used locally by other schools and similar organisations to undertake their own air quality audit.

We understand that schools and boroughs are under enormous financial pressure, which is why I am encouraging boroughs to prioritise funding through their Local Implementation Plan budgets provided by Transport for London (TfL). I am also urging Clinical Commissioning Groups and local businesses to consider setting aside some funding to support the funding of these recommendations.

In addition, we are keen to encourage schools to sign up to TfL's STARS (Sustainable Travel: Active, Responsible, Safe) programme, if they have not already done so. By swapping car journeys for active travel, through STARS, schools can make a real difference to our city and help create healthier streets for Londoners.

Finally, I would like to commend all those involved in the successful delivery of the School Air Quality Audit Programme - the schools, boroughs, consultants and, above all, the school children.



Sadiq Khan
Mayor of London

THE MAYOR OF LONDON'S SCHOOL AIR QUALITY AUDIT

Bonner Primary School, **London Borough of Tower Hamlets**

ACKNOWLEDGEMENTS & CONTRIBUTIONS

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London Borough of Tower Hamlets – Stefanie Hughes (Environmental Health Practitioner), Jack Ettinger (Travel Plan Officer)

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DISCLAIMER

The contents of this report and its recommendations are principally based on the findings of the independent audit as of the date it was undertaken, and may not account for subsequent changes in local policy, conditions and/or circumstances in and/or around the school.

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Chapter 1 – Introduction

1 INTRODUCTION

1.1 BACKGROUND

1.1.1. As part of the Mayor's ambition to tackle poor air quality, WSP has been commissioned to identify a combination of hard-hitting measures and quick-win solutions to help protect pupils' health from toxic air quality, and examine new ways to lower emissions and exposure to pollution in and around primary schools.

1.1.2. The Mayor has stated that London is experiencing a '*public health crisis'*, and that he is committed to improving air quality, particularly for the most vulnerable Londoners. Over 400 primary schools are located in areas which exceed legal pollution limits, and 25% of primary schools are in areas with dangerously high levels of air pollution.

1.1.3. Primary school children are amongst the most vulnerable of the at risk groups, as their lungs are still developing, and toxic air can stunt their growth, causing significant health problems in later life.

1.1.4. Road transport is a major contributor to emissions, has a significant impact on air quality, accounting for around half of NO_x emissions. Whilst private car use is decreasing, congestion is increasing[1]. Without significant intervention, as the Capital grows rapidly these trends are set to continue.

1.1.5. In response the Mayor is implementing a significant programme of measures, including bold proposals to reduce London's deadly air pollution and protect the health and wellbeing of all Londoners, including:

[1] London Assembly, London stalling: Reducing traffic congestion in London, January 2017, Transport for London, Travel in London - Report 9 data, 2017

- **The Toxicity Charge** (T-Charge) now applies to older, more polluting vehicles in central London, which means that including the Congestion Charge drivers with these vehicles will now pay £21.50 total during peak congestion.
- **Cleaning up London's Buses** - The Mayor is spending more than £300 million to transform London's bus fleet by retrofitting thousands of buses and committing to phase out pure diesel double deck buses from 2018. 12 Low Emission Bus Zones have been announced, two of which have already been delivered, putting the greenest buses on the capital's most polluted routes. The zones are expected to reduce NO_x emissions by 84 per cent and thousands of school children in these areas will benefit from cleaner air.
- **The Ultra Low Emission Zone** (ULEZ) will supersede the T-Charge, and operate 24 hours a day, 7 days a week within the same area as the current Congestion Charging Zone (CCZ), The world's first Ultra Low Emission Zone (ULEZ) is to start 8 April 2019, approximately 17 months earlier than planned, and create stricter emissions standards for diesel vehicles, 24 hours, 7 days a week. Those that do not comply will face a charge. This is expected to reduce harmful NO_x (Nitrogen Oxides) emissions by about 50 per cent in central London, 40 per cent in inner London and 30 per cent in outer London.
- **Expanding the ULEZ and tightening the Low Emission Zone (LEZ)** - As part of the Mayor's pledge to help improve air quality and health for all Londoners, he is also proposing to make the London-wide Low Emission Zone (LEZ) stronger, and expand the Ultra Low Emission Zone (ULEZ) requirements for vehicles. This involves introducing a Euro 6 emissions standard London-wide for heavy duty vehicles (i.e. buses, coaches, Heavy Goods Vehicles (HGVs) vehicles) from 26 October 2020, and expanding the ULEZ for light duty vehicles (i.e. cars, vans and motorcycles) so that all vehicles are subject to emissions standards within an area roughly bounded by the North and South Circular Roads from 25 October 2021. The introduction and expansion of the ULEZ, and tightening of the LEZ standards, is forecast to result in a significant reduction in NOx emissions across London.
- **London's taxis –** New taxis licensed after 1 January 2018 will need to be zero emission capable to help clean up London's dirty air, with new 'zero emission' ranks for drivers who pioneer green technology alongside a network of rapid electric charge points.
- **Low emission neighbourhoods –** five low emission neighbourhoods have been founded across London to pioneer bold new measures to promote the use of low emission vehicles and improve local air quality, including low emission vehicle only streets, measures to promote deliveries by cycle cargo bikes and low emission vehicles, and bold proposals to promote walking and cycling.
- **The London Environment Strategy** – is a bold and ambitious strategy, with a particular focus on air quality. The strategy was consulted on in 2017 and will be published in 2018, and seeks to address the most urgent environmental challenges facing our London, to safeguard its environment over the longer term. This will be the first strategy to bring together approaches to every aspect of London's environment, including: air quality, green infrastructure, climate change mitigation and energy, waste, adapting to climate change and ambient noise. To make the Mayor's vision of transforming the city's environment a reality, this strategy establishes some key aims for London, which include having the best air quality of any major city, making more than half of London's area green and for tree canopy cover to increase by ten per cent by 2050, and making London a zero carbon city by 2050, with energy efficient buildings, clean transport and clean energy.

- **The Draft London Plan -** published in November 2017, places a considerable emphasis on air quality, with policy S|1 stating that London's air quality should be significantly improved, and exposure to poor air quality, especially for vulnerable people, should be reduced. The aim of this policy is to ensure that new developments are designed and built, as far as is possible, to improve local air quality and reduce the extent to which the public are exposed to poor air quality. This means that new developments, as a minimum, must not cause new exceedances of legal air quality standards, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits. Where legal limits are already met, or are predicted to be met at the time of completion, new developments must endeavour to maintain the best ambient air quality compatible with sustainable development principles. The draft London plan also highlights the importance of creating new, accessible green open space, particularly in areas where this access is lacking. The Mayor is providing funding through his Greener City Fund to create and improve green spaces and to plant trees, including in schools. A proposed new Urban Greening Factor seeks to encourage major new developments to contribute to the greening of London by incorporating measures such as green roofs, tree planting and green walls.
- **Healthy Streets Approach** - the Mayor is embedding the 'Healthy Streets' approach in transport strategy. This promotes a holistic approach that can fulfill multiple objectives such as improving the health, liveability, social cohesion and economic prosperity of an area.
- **The Mayor's Transport Strategy 2018 -** The Mayor has set out ambitious plans to improve transport in London over the next 25 years in his draft Transport Strategy, which will act as the backbone of transport planning across London, helping to deliver The Mayor's ambition for 80% of trips in London to be made on foot, by cycle or using public transport by 2041. It includes record investment in new and improved rail, tube and bus services, an unprecedented focus on walking and cycling, and a commitment to make the entire transport system zero-emission by 2050.

1.1.6. These measures in combination will dramatically improve London's air quality. However, the Mayor also wanted to take early action at 50 primary schools located in areas with some of the highest air pollution levels, so has provided £250k funding to commission The Mayor of London's School Air Quality Audits programme, to identify ***hard-hitting measures*** to minimise the impacts of toxic air on primary school children in some of the worse affected areas across London. This is both in terms of ***reducing the sources*** of harmful emissions, as well as ***reducing the exposure*** to these emissions. The aim is to establish a robust process and toolkit of measures, which the London boroughs and primary schools can roll out, so that every school that is located in an area of high pollution can benefit from this approach.

1.2 OBJECTIVES

1.2.1. The key objectives of the Mayor of London's School Air Quality Audit Programme is to:

- Identify the sources of outdoor air quality and potential exposure by primary school children at the school and their surrounding catchment areas, and potential indoor exposure through the internal audits.
- Identify, evaluate and recommend a combination of hard hitting measures and pragmatic approaches, both within and around the school that will help a borough to reduce emissions or reduce primary school children's exposure to poor air quality at those sites, which could be delivered as part of the boroughs' Local Implementation Plan (LIP) funding schemes, as well as

other sources of funding such Clinical Commissioning Groups, local businesses and charitable trusts.

- Engage school communities to educate stakeholders about the impacts of air pollution and contribute towards activities, initiatives and policies that the primary school community could implement.
- Engage eligible London boroughs and other relevant stakeholders to inform the feasibility of the proposed recommendations.
- Provide recommendations for the boroughs' consideration and future implementation, and wider dissemination.

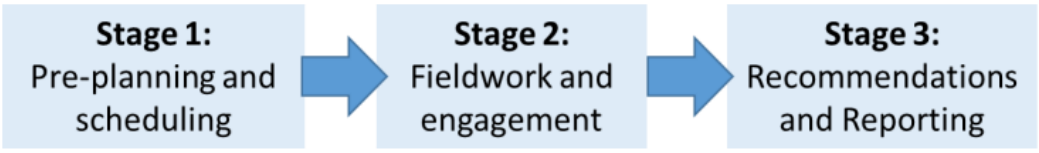
Chapter 2 – Audit Approach

2 AUDIT APPROACH

2.1 OVERALL AUDIT APPROACH

2.1.1. The Mayor of London's School Air Quality Audits follow a structured approach, summarised in Figure 1.

Figure 1 – Overview of Approach



2.1.2. Each audits consists of broadly three key stages:

- **Stage 1:** Pre-planning and scheduling
- **Stage 2:** Fieldwork and engagement
- **Stage 3:** Recommendations and Reporting

Pre-planning and scheduling

2.1.3. The borough air quality primary contacts were contacted by the lead Auditor, and mutually available potential dates for the audit were agreed. The borough then introduced the auditor to the school, and a schedule for the tasks to be undertaken was agreed to fit in with the operations of the school and availability of key staff contributing to the audit.

2.1.4. Prior to the audit air quality modelling was undertaken for the area around the school, with an assessment of the contribution to emissions made by each vehicle type on the roads around the school.

2.1.5. A desktop review of the local areas around the school site, and the wider catchment was also undertaken, to highlight key features for the auditor to assess further on site. This includes sources of pollution, causes of exposure, and notable features in the local area which may have a bearing on the potential mitigation measures (i.e. bus routes, pedestrian crossing locations, nearby construction sites, physical barriers such as railways or rivers). The school's STARS2 travel plan progress was also reviewed for reference ahead of the audits. Engagement materials were developed for use in delivering bespoke awareness raising interactive presentations to the children. A toolkit of measures for addressing air quality issues was developed for use in informing our recommendations for each school.

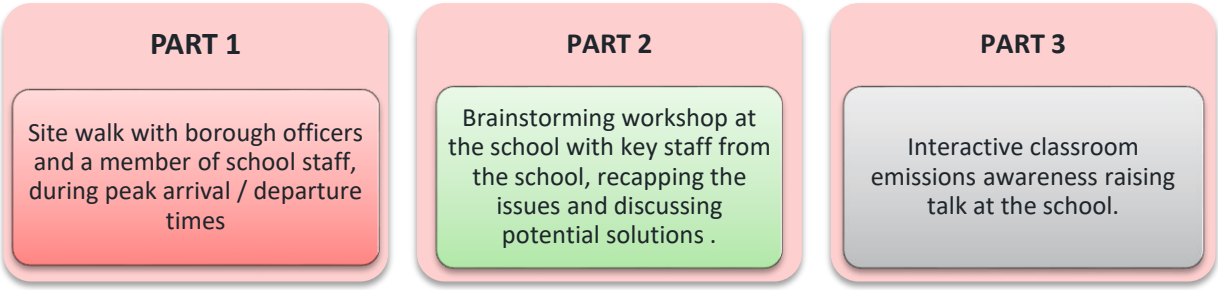
Fieldwork and engagement

2.1.6. The approach taken in carrying out the audit comprised of several elements, including a visit to the school by the WSP auditor and officers at the borough who deal with air quality, transport planning and school travel. A key element of the audits was to capture the views of school staff, wider school

[2] STARS is TfL's accreditation scheme for London schools and nurseries, promoting travel to school sustainably, actively, responsibly and safely by championing walking, scooting and cycling.

community and relevant borough officers, in understanding operational considerations, behavioural traits and recent history of the school. As such, we proposed a three-fold approach summarised below:

Figure 2 – Key elements of the Audit



2.1.7. Initial observations and site familiarisation were undertaken by the auditor prior to the school opening. This allowed us to sense check the context maps compiled initially from desktop assessments. Observations with the borough officers and school staff were then undertaken throughout the period of drop-off and waiting activity, prior to the school gates opening, until parents have dispersed. During this critical period the auditors captured as much information as possible on activity in and around the school, with comprehensive photo records and discussions with the school staff to capture issues which often occur but were not evident during our observations. The external observations were then followed by a walk around the school building and grounds to enable the auditor to familiarise themselves with its layout, and the proximity of classrooms, nurseries, playgrounds etc to areas of poor air quality.

2.1.8. A brainstorming session was then undertaken, with key staff from the school and the borough officers in attendance. This session served several functions. It enabled the auditor to capture additional information on other issues and concerns not observed directly, and additional information on issues such as whether there are any plans for extensions or additional pupil intake for example. Whilst from the borough officers we were able to establish what planned or committed development is nearby, proposed or previously considered transport schemes etc. We then discussed a range of potential measures to address the issues discussed and collected feedback and suggestions from the borough and school representatives to inform the recommended measures.

2.1.9. An interactive and bespoke engagement activity was then delivered to a school council using presentation slides to raise awareness of air pollution, its causes, the health impact, areas of pollution near the school and a range of measures to reduce air pollution. An audit of the building was then undertaken with the assistance of the facilities manager, including a review of the school's boilers, their flues, the ventilation systems and kitchen extraction.

2.2 AUDIT SCHEDULE – BONNER PRIMARY SCHOOL

2.2.1. Table 1 provides further detail of the audit schedule and key participants from the school and borough.

Table 1 – Audit Details

Date of Audit	Monday 6th November 2017	
School Representatives	Paulette Coulson (School Business Manager), Elly Ross (Associate Head), Oliver Larkin (Class Teacher)	
Borough Representatives	Stefanie Hughes (Environmental Health Practitioner), Jack Ettinger (Travel Plan Officer)	
WSP Auditors	George Buxton, Muhamad Khalil	
Itinerary (Bethnal Green)	**Timings**	**Description**
	0800 – 0815hrs	Initial observations and site familiarisation by WSP auditors
	0815 – 0900hrs	External site walk to observe pupil arrivals and drop-off / pick-up activity
	0900 – 0940hrs	Internal site walk to view the layout of school buildings, playgrounds etc.
	0940 – 1110hrs	Brainstorming workshop with school staff and borough officers
	1110 – 1140hrs	WSP auditors visit plant room
	1140 – 1215hrs	Engagement activity – interactive presentation at school council
Travel to Mile End		
Itinerary (Mile End)	1330 – 1400hrs	Internal site walk to view the layout of school buildings, playgrounds etc.
	1400-1430	Engagement activity – interactive presentation at school council
	1430-1500	WSP auditors visit plant room
	1500-1530	External site walk to observe pupil arrivals and drop-off / pick-up activity

Recommendations and Reporting

2.2.2. The auditor reviewed the findings of the audit and preparatory assessments, with the specialist support of air quality, transport planning and buildings specialists, to develop advice and recommendations, based on a toolkit of best practice measures and case study examples.

Chapter 3 – Context and Initiatives

3 CONTEXT AND INITIATIVES

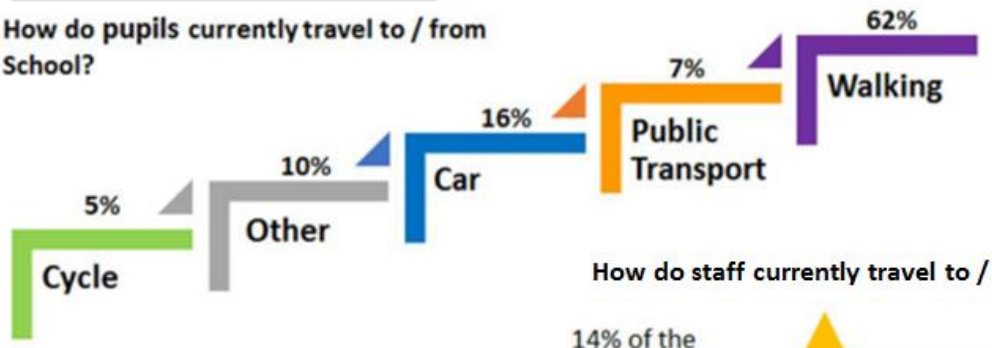
3.1 SCHOOL CONTEXT

Borough: Tower Hamlets

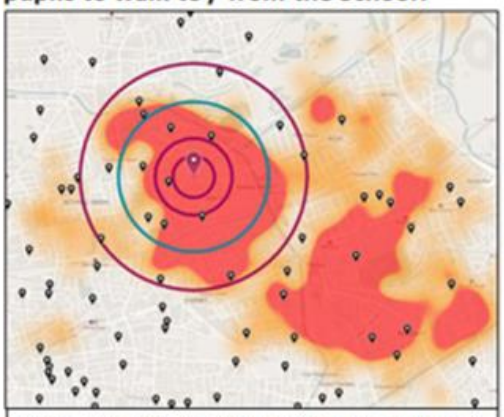
Address: Bethnal Green: Stainsbury Street, E2 0NF
Mile End: Ropery Street, E3 4QE
Pupil Numbers: 880 approximately (combined)

Age Primary | Gender Mixed | Type Community

How do pupils currently travel to / from School?



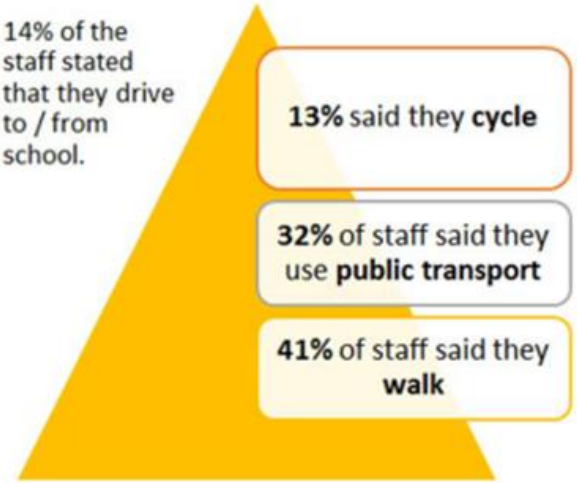
What is the catchment area for the school and how long would it take for pupils to walk to / from the School?



1st Quartile 25% - 0.26km; walking time 3 minutes
2nd Quartile 50% - 0.48km; walking time 6 minutes
3rd Quartile 75% - 1.42km; walking time 18 minutes
Mean – 0.94km; walking time 12 minutes

How do staff currently travel to / from the School?

14% of the staff stated that they drive to / from school.



The map to the left confirms that half of the pupils can travel to / from school within a 9 minute walk, and 75% within a 13 minute walk. The average walking time for pupils is 14 minutes.

3.1.1. Bonner Primary School is a single school across two sites, Bethnal Green and Mile End, both of which lie within the London Borough of Tower Hamlets (LBTH).

3.1.2. The Bethnal Green site is in a residential area, and has its main entrance on the corner of Stainsbury Street and Hartley Street, both of which are 20mph roads. The visitor entrance is located further north on Stainsbury Street.

3.1.3. The Mile End site is located in a residential area around one kilometre south-east of Mile End station, at the corner of Ropery Street and Southern Grove.

3.1.4. Approximately 14,000 vehicles per day travel on the core roads within a 200m radius of the Bethnal Green site[3]. This is within the 2nd quartile (25-50%) in terms of traffic volumes amongst of the 50 schools assessed as part of this programme. The volume of traffic passing near to the Mile End site, by comparison, is lower: approximately 7,400 vehicles travel within 200m of the site daily.

3.1.5. The desktop review and subsequent discussions with the school confirmed that over half of pupils currently travel to / from school on foot (62%), 16% via car, 10% other mode which in this case is scooting. 7% travel by public transport and 5% cycle to / from school. This indicates that, while many pupils live within close proximity of the school and choose to walk, others travel by car even though walking or public transport may be viable alternatives. From discussions with school staff, many pupils live in the flats and houses on the eastern side of Bonner Street and thus not only live a short distance from the school but also only have to cross one road (Bonner Street) to access it.

3.1.6. At the Bethnal Green site the staff car park is located at the western end of the school campus, on the corner of Hunslett Street and Hartley Street. The car park has around a dozen spaces and is generally full on a typical day. Other staff travelling to the school from further afield also make use of the public transport services serving the site, including bus routes 8 and D6 along Roman Road and Bethnal Green station on the Central line which is a five minute walk from the school. The Mile End site has a staff car park with space for six cars.

3.1.7. The subsequent two pages illustrates the inner and outer context plans for the school that provides detail on the main access (both pedestrian and vehicular) to the school, the location of the playgrounds where children are most exposed to air pollution, as well as bus routes in the near vicinity of the school and the catchment area for the school.

[3] Each site, take a baseline year, take DfTs – look on LAEI for descriptor. Only covers main roads. LAEI modelled roads

Figure 3 – Outer Context Plan – Bethnal Green

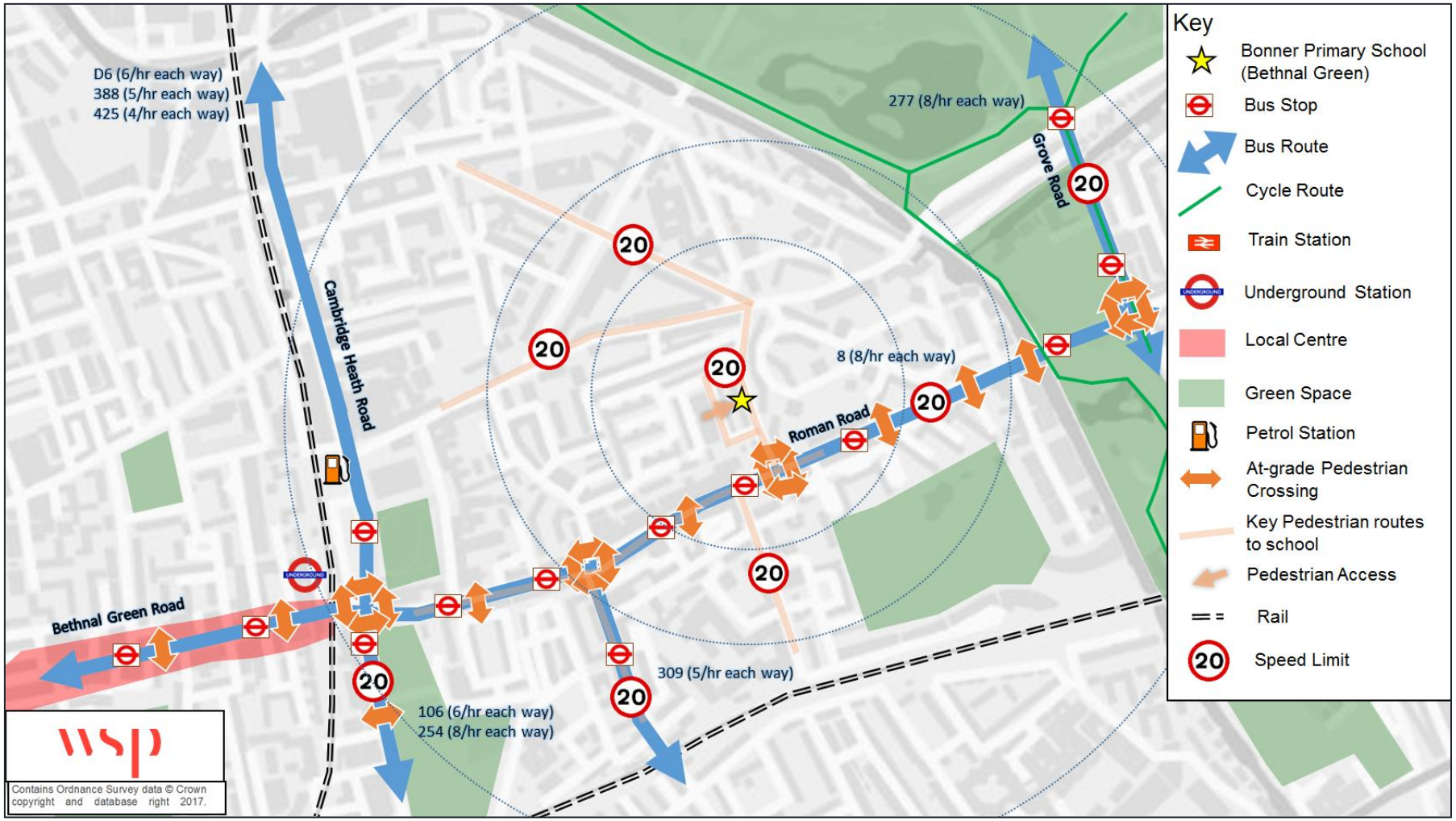


Figure 4 – Outer Context Plan – Mile End

Figure 5 - Inner Context Plan – Bethnal Green

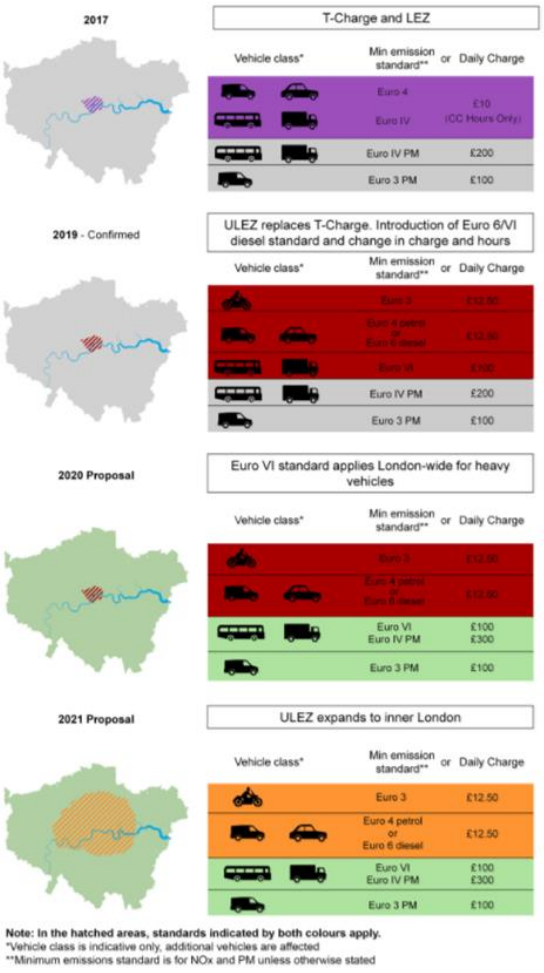
Figure 6 – Inner Context Plan – Mile End

3.2 PLANNED SCHEMES & RECENT INITIATIVES

3.2.1. Whilst there are no major developments planned within the immediate locality of the school, a number of notable transport schemes were highlighted that will have a significant bearing on the air quality around the school, these include:

ULTRA LOW EMISSION ZONE (ULEZ) AND LOW EMISSION ZONE (LEZ)

3.2.2. The ULEZ will operate 24 hours a day, 7 days a week within the same area as the current Congestion Charging Zone (CCZ), and comes into force on 8th April 2019. The introduction of the ULEZ will reduce exhaust emissions of NO_2 and particulate matter PM_{10} and $PM_{2.5}$. In 2019, all cars, motorcycles, vans, minibuses, buses, coaches and heavy goods vehicles (HGVs) will need to meet exhaust emission standards, or pay a daily charge. In the case of petrol cars and vans this means Euro 4, and Euro 6 for diesels. HGVs and coaches are also Euro 6.



3.2.3. As part of the Mayor's pledge to help improve air quality and health for all Londoners, he is proposing to make the London-wide Low Emission Zone (LEZ) stronger and expand the Ultra Low Emission Zone (ULEZ). This involves introducing a Euro VI emissions standard London-wide for heavy duty vehicles (buses, coaches, Heavy Goods Vehicles (HGVs) and other specialist heavy vehicles) from 26 October 2020 and expanding the ULEZ for light duty vehicles (such as cars, vans and motorcycles) so that all vehicles are subject to emissions standards within an area roughly bounded by the North and South Circular Roads from 25 October 2021.

3.2.4. The introduction and expansion of the ULEZ, and tightening of the LEZ standards, is forecast to result in a 19% reduction in NO_x emissions in the London Borough of Tower Hamlets by 2020.

3.2.5. A transition towards cleaner buses would therefore benefit the air quality in the area local to Bonner Primary School Bethnal Green. Buses represent 2% of the vehicle numbers in the local area but make up 23% of the emissions, and thus have a disproportionately high impact on air quality. No bus routes pass directly outside the Mile End site and thus conversion to a Low Emission Bus Zone would be likely to have a less marked impact here.

LOW EMISSION BUS ZONES

3.2.6. TfL has started to deliver on plans to introduce around 3,000 Low Emission double-deck buses in central London by 2019 and over 250 Zero Emission single-deck buses into central London by 2020. They have also announced plans for 12 low emission bus zones outside central London. The new buses, will be a combination of hybrid and clean buses that meet Euro VI standards, and expected to reduce NO_x emissions from buses along the routes by around 84 per cent. The Mayor's manifesto

commitment is to introduce Low Emission Bus Zones by 2020. Of relevance locally is the proposed low emission bus zone in Stratford, from Abbey Lane via Mile End Road to Woodgrange Road.

SCHOOL STARS ACTIVITIES

3.2.7. STARS (Sustainable Travel: Active, Responsible, Safe), is TfL's accreditation scheme for London schools and nurseries, to inspire young Londoners to travel to school sustainably, actively, responsibly and safely by championing walking, scooting and cycling.

3.2.8. As part of the STARS scheme schools receive bespoke guidance from the borough, high quality on-line resources with over 120 activity cards, access to a London-wide community of schools, priority access to funding, accreditation and recognition.

3.2.9. Bonner Primary School currently holds Bronze status of the STARS programme, and is currently undertaking travel surveys in class as well as drafting the next version of the School Travel Plan.

HEALTHY SCHOOLS LONDON ACCREDITATION

3.2.10. Healthy Schools London is a programme that supports London's schools to provide an environment and culture that helps their pupils grow to be healthy happy and learn. This programme supports schools as they work towards an award scheme (sponsored by the Mayor of London), with a network of local coordinators, and a range of resources, tools and advice provided through this website and regular workshops for schools.

3.2.11. Bonner Primary School currently has Bronze accreditation for Healthy Schools.

OTHER ACTIVITIES

3.2.12. Bonner Primary School is already actively engaged in promoting sustainable travel modes in many ways. The initiatives which they already engage in include:

- At Bethnal Green, offering pupils cycling proficiency training (culminating in sessions in Victoria Park in Hackney);
- Complementing this with cycling sessions for parents, thereby encouraging them to cycle with their children;
- At Mile End, participation in Beat the Street (encouraging walking to school).

3.2.13. Bonner Primary School also organises an annual Science Week across both its Bethnal Green and Mile End sites, and as a consequence pupils have good awareness of environmental issues and take a keen interest in pollution. The school is already well equipped with curriculum material to facilitate these lessons.

Tap-in column for Beat the Street outside the Mile End site

Chapter 4 – Audit Findings: Sources of Emissions and Exposure

4 AUDIT FINDINGS: SOURCES OF EMISSIONS & EXPOSURE

4.1 INTRODUCTION

4.1.1. The audit findings are summarised in this chapter as follows:

- Air quality data
- Observed issues, emission source or exposure:
  - Highways
  - School grounds and buildings

4.2 AIR QUALITY IN THE SURROUNDING AREA

4.2.1. The air quality data used to assess the pollution climate immediately around each school has used a combination of modelled and measured data. Modelled baseline NO_2 annual mean concentrations have been taken from the 2013 London Atmospheric Emissions Inventory (LAEI) model. NO_2 measurements have been derived for the past ten years (2006-16) for the closest monitoring site to the school from a combination of measurements taken from the London Air Quality Network (LAQN) and Local Authority diffusion tube sites, where available.

Figure 7 - Localised Air Quality modelling around Bonner Primary School (Bethnal Green)

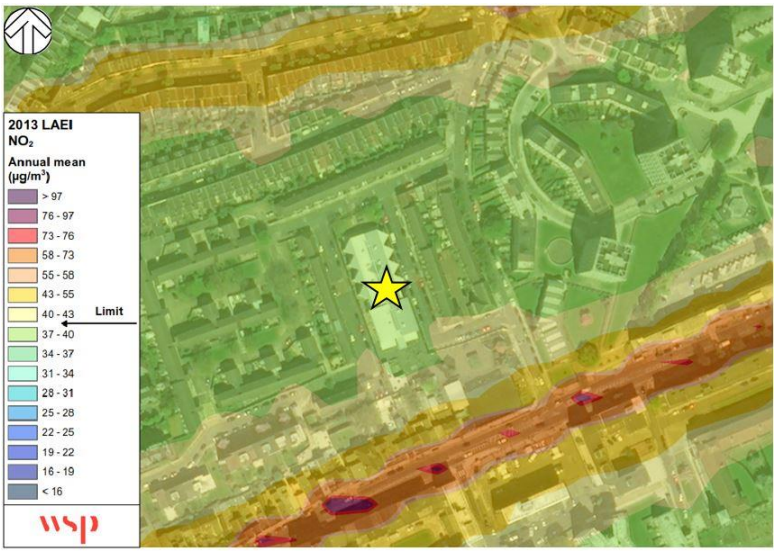


Figure 8 - Localised Air Quality modelling around Bonner Primary School (Mile End)

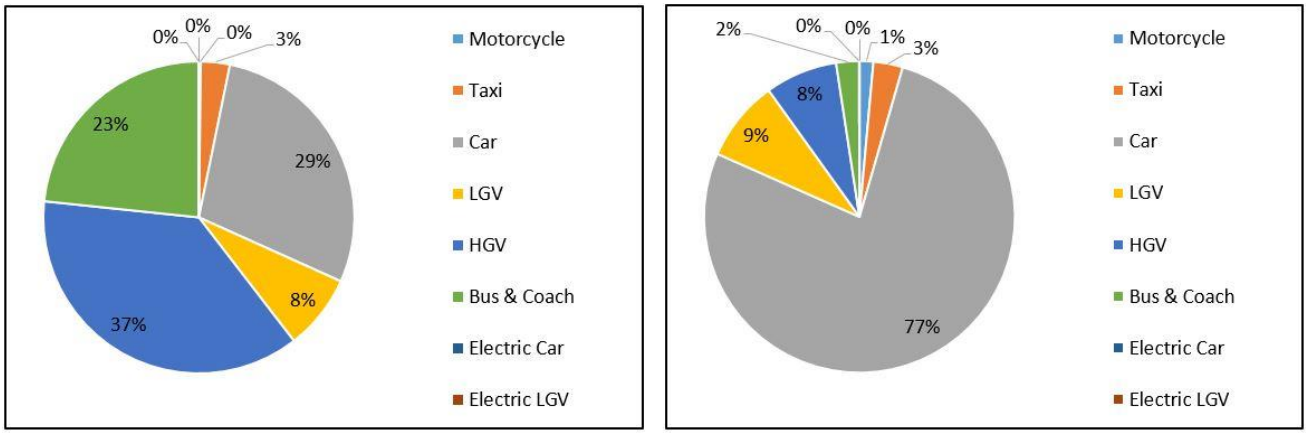
4.2.2. Briefly, the LAEI model provides mapped annual mean NO_x, NO_2, PM_{10} and $PM_{2.5}$ concentrations on a 20m x 20m basis for the whole of London from a base-year of 2013 for 2020, 2025 and 2030. The LAEI uses air pollution emission estimates from a wide range of sources including transport, industrial, domestic and commercial combustion, agriculture and long-range transport using the most up-to-date activity data, emission factors and projection factors.

4.2.3. Figure 7 shows the 2013 LAEI baseline annual mean NO_2 concentrations within the vicinity of Bonner Primary School (Bethnal Green). The contours (changes in colours) show how the pollution gradient changes, with distance, away from the heavily trafficked Roman Road. NO_2 concentrations are predicted to be higher along the southern boundary of the school, which is closest to the main road.

4.2.4. Figure 8 shows the 2013 LAEI baseline annual mean NO_2 concentrations within the vicinity of Bonner Primary School (Mile End). The contours show how the pollution gradient changes, with distance, away from the heavily trafficked Burdett Road (A1205).

4.2.5. Nearly 50% of NO_x emissions in London are from road transport. Vehicle emissions data for the LAEI modelled road links within 200m of the school, split by source, have been analysed to identify the key sources contributing to NO_2 in the vicinity of the school. Figure 9 shows that HGVs account for 8% of the total traffic in the vicinity of the Bethnal Green site, but contribute 37% of the transport related NO_x emissions locally. Furthermore, buses account for 2% of traffic but contribute 23% of NO_x emissions locally.

Figure 9 - Bethnal Green site: Road Transport NOx Emissions (left) and Traffic Volumes (right)



4.2.6. Figure 10 shows that HGVs account for 7% of the total traffic in the vicinity of the Mile End site, but contribute 26% of the transport related NO_x emissions locally. Furthermore, buses account for 5% of traffic but contribute 42% of NO_x emissions locally.

Figure 10 - Mile End site: Road Transport NOx Emissions (left) and Traffic Volumes (right)

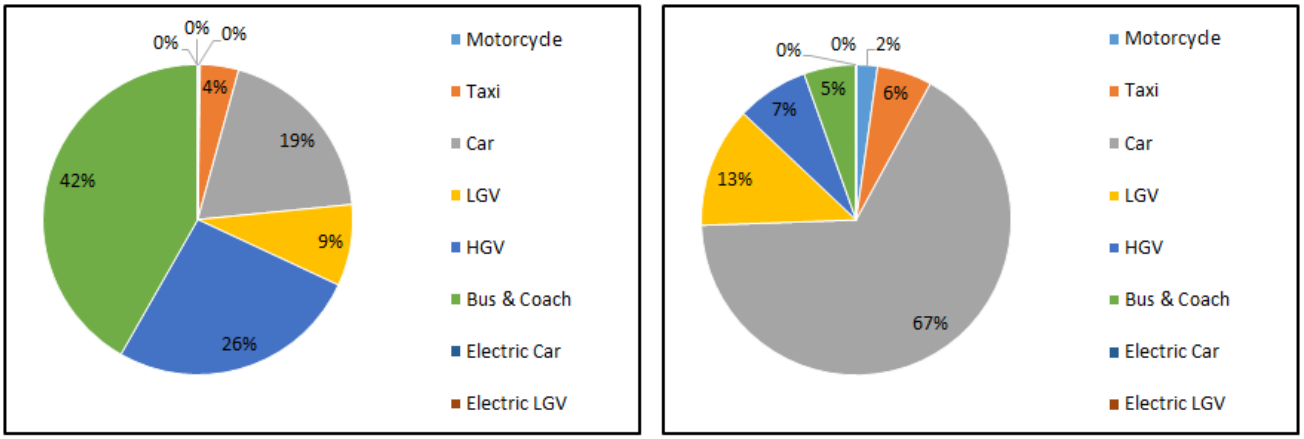
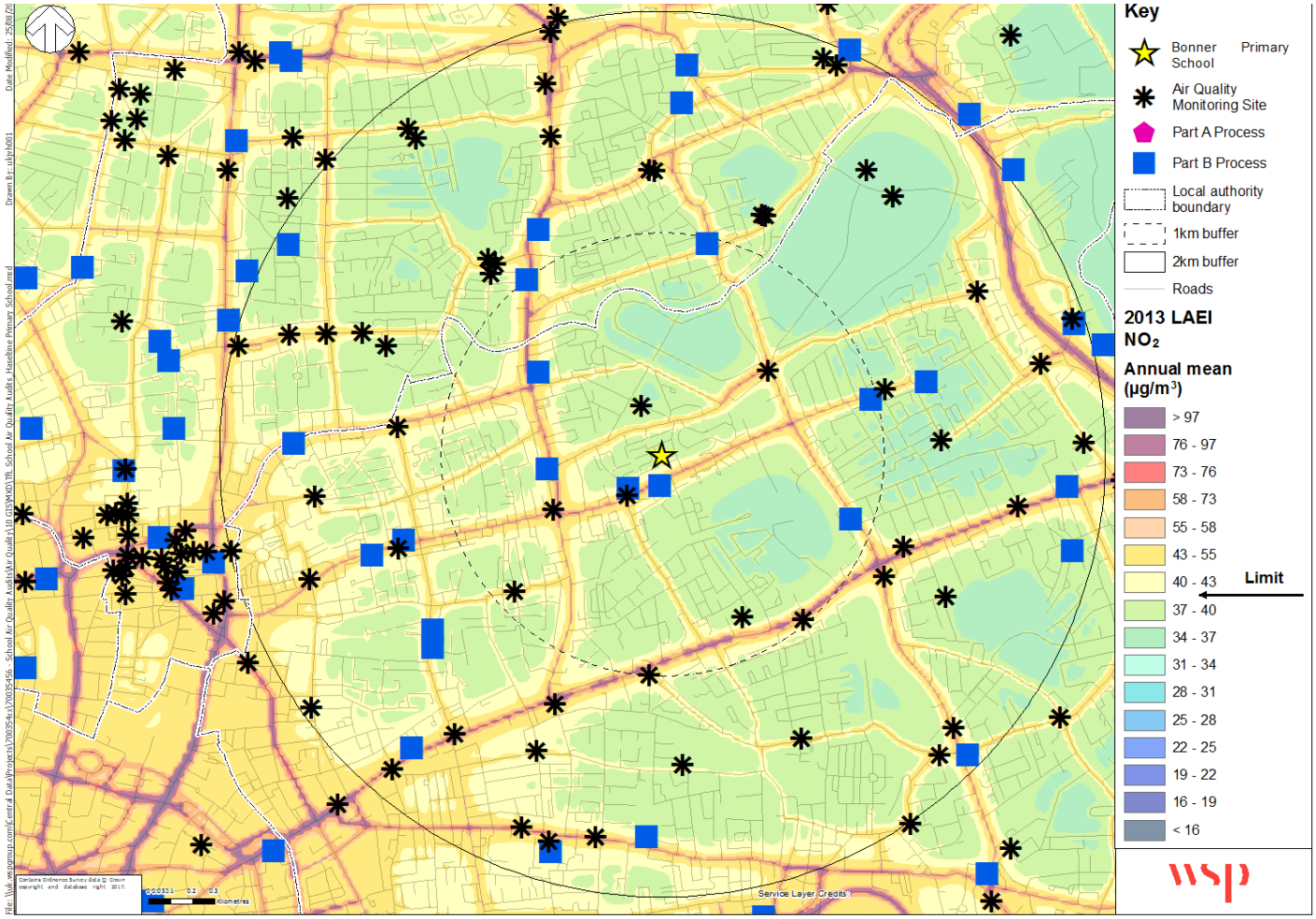
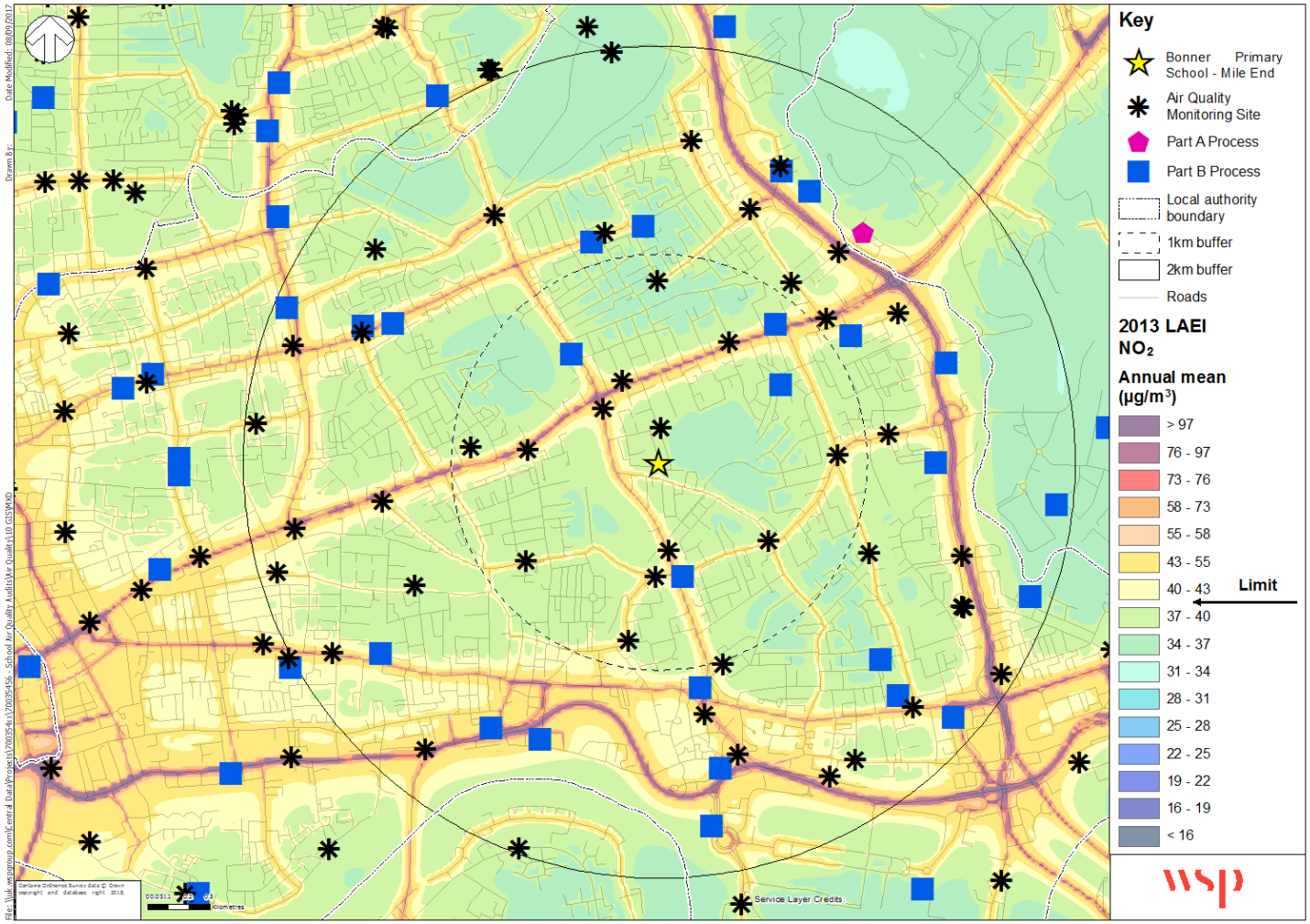


Figure 11 - Air Pollution in the areas surrounding the Bethnal Green site



Note: Part A and B Processes include regulated industrial installations that have the potential to cause pollution and are required to have an Environmental Permit to operate, including facilities which carry out industrial processes, waste activities, mobile plant and solvent emission activities.

Figure 12 - Air Pollution in the areas surrounding the Mile End site



Note: Part A and B Processes include regulated industrial installations that have the potential to cause pollution and are required to have an Environmental Permit to operate, including facilities which carry out industrial processes, waste activities, mobile plant and solvent emission activities.

4.3 HIGHWAYS – KEY OBSERVATIONS

Bethnal Green

Looking east along Hartley Street; traffic cone positioned by school staff to deter unauthorised drop-off activity

Looking north along Bonner Street, the main walking route from Roman Road to the school entrance

4.3.1. The main entrance for pupils is on the corner of Stainsbury Street and Hartley Street, with most pupils approaching from the latter as this leads to the intersection with Roman Road. Pupils approaching from the north walk along Stainsbury Street.

4.3.2. The school day begins at 09:00, with most pupils arriving shortly before this. However there is also a breakfast club (beginning at 08:00) which is well subscribed, and these pupils therefore arrive prior to the AM peak period.

4.3.3. A large number of pupils arrive in the ten minutes prior to the start of the school day, many of whom are dropped off by car.

4.3.4. Only a short section of Hartley Street has school zigzag markings, with the remainder of the kerbside mainly consisting of parking bays. Whilst parking is prohibited during AM and PM peak periods, they are still used for drop-off and pick-up activity.

Roman Road signalised intersection, showing pedestrian crossing facilities and wide footways

4.3.5. As Stainsbury Street and Hartley Street are both narrow two-way roads with bays on both sides, and only one useable lane, congestion occurs as cars struggle to pass each other. This leads to increased vehicle emissions, and also makes the walking routes less attractive and more dangerous for pedestrians, for example due to the unpredictable vehicle movements which represent a potential hazard for pupils crossing the road.

4.3.6. School staff are positioned at the pedestrian entrance gate on the street corner to oversee safety, and are proactively seeking to manage the issue by placing an orange cone across the entrance to deter vehicles from stopping next to the gate; however they cannot manage all the traffic on two streets, with drop-offs occurring in locations which are potentially hazardous; during the site walkover by the auditor, a near miss was observed between a pedestrian and a car which moved suddenly.

4.3.7. The school gate is wide and leads directly into the playground, meaning that pupils and parents can enter the school directly; consequently there is no pedestrian congestion at the entrance.

4.3.8. The wider road network offers a relatively attractive set of pedestrian routes for pupils to travel to and from school. Whilst the volume of traffic on Roman Road is relatively high, speeds are not

excessive and the intersection with Bonner Street is signalised for pedestrians as well as vehicles, thereby allowing pupils to cross safely. Furthermore the pavements on either side of Roman Road are generally of good width, meaning that pedestrians are not obliged to walk very close to the carriageway. The secondary road network close to the Bethnal Green site carries much lower traffic volumes and, aside from peak drop-off and pick-up activity, generally offers a good level of pedestrian service for pupils approaching from the north in particular.

Mile End

4.3.9. The entrance to the Mile End site is located on Ropery Street. This is a two-way road in a 20mph zone.

4.3.10. There is a section of zigzag marking outside the school entrance, which is on the northern side of the carriageway. The majority of the kerbside on both sides of the road consists of residential permit parking bays, meaning that the effective width of the carriageway is reduced to a single lane; however during school hours not all bays are occupied, and there are also passing places along Ropery Street.

4.3.11. There are two 90º turns on Ropery Street immediately east of the school, which can lead to vehicles driving down the middle of the carriageway to navigate the turns. However the turns are in close proximity to one another, and therefore forward visibility is still acceptable.

4.3.12. Some of the kerbs on footways in the vicinity of the Mile End site are relatively tall, including on the southern side opposite the pedestrian entrance which can make it difficult for pedestrians with pushchairs to cross safely. This may in particular affect parents of pupils if they walk to school accompanied by younger offspring in pushchairs.

4.3.13. The streets in the vicinity of the site are all local and residential in nature but feature a range of traffic calming measures and restriction (e.g. cul-de-sacs) to reduce rat-running. These appear to have been effective but indicate too that such issues were present prior to their introduction. Southern Grove is a long, straight road running along the western boundary of Tower Hamlets Cemetery Park; its layout may therefore encourage speeding, though this was not observed or reported to be an issue by school staff.

Summary – Key Issues

- Congestion on roads immediately outside the Bethnal Green site at peak times due to drop-off / pick-up activity, which not only increases emissions but also presents a safety hazard to pedestrians which in turn could deter pupils from walking to school. Staff have already introduced some measures to control traffic but this remains an issue.
- Footways in the vicinity of the Mile End site feature tall kerbs which can present a trip hazard and also make it more difficult to cross with pushchairs or wheelchairs.

Ropery Street frontage, showing single yellow line stretch of kerbside where waiting is not permitted during the times shown

Beat The Street banner attached to the railings outside the main entrance to the Mile End site, with zigzag markings alongside

4.4 SCHOOL GROUNDS / BUILDING - KEY OBSERVATIONS

Bethnal Green

4.4.1. Bonner Primary School (Bethnal Green) has a large amount of outdoor play space. It is noted that the school building is at the northern end of the grounds, and consequently the majority of play space is at the southern end, closest to Roman Road, the source of the majority of localised emissions.

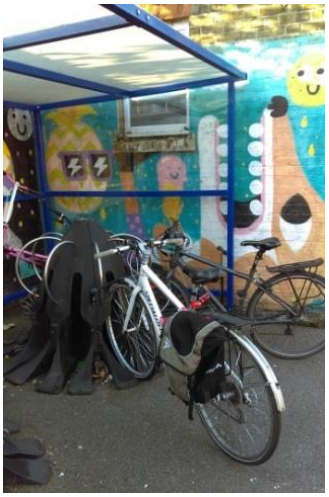
4.4.2. The sports pitch is immediately adjacent to Roman Road and is only partially screened from the traffic: the school boundary is marked by a wall with intermittent sections of fencing. This arrangement also exists along the eastern (Bonner Street) frontage.

Central skylight (Bethnal Green)

4.4.3. The noise levels from traffic on Roman Road are not particularly high (due in part to the slow speeds approaching the junction) but the playground is not well screened.

4.4.4. The classrooms on the eastern frontage (alongside Stainsbury Street) only have a narrow space between the windows and the street, and with fencing rather than more substantial screening separating the windows from the road (which also only has a narrow pavement). Whilst traffic volumes on Stainsbury Street are modest, at peak times this could lead to exposure to emissions, especially in the afternoon when pupils are still in the classrooms but vehicles are idling outside.

4.4.5. Dual cycle/scooter parking racks are located in the school playground. The racks are of the 'wheel bender' variety and do not support the frame of the bicycles parked there; furthermore, the racks are only partially covered by the roofing, leaving bikes exposed to rainfall.



Cycle parking in the playground (Bethnal Green)

4.4.6. The school building is less than twenty years old and therefore benefits from modern standards of construction. The building is oriented on a north-south alignment which minimises the south-facing classrooms which could otherwise overheat in summer. Nevertheless, the large skylight in the centre of the building, whilst providing natural light, can also raise the internal temperature.

4.4.7. Whilst the school building has a ventilation system, it does not have air conditioning or any filtration systems.

4.4.8. The plant room is also equipped to a modern standard with two modern boilers (installed in 2013). They are equipped with safety features including automatic shutdown in the event of gases being detected in the outbound airflow.

4.4.9. The two parallel flues are less than 1m tall but, being situated on the roof, emissions do not interact with children in the playground outside. The kitchen is also fitted with modern equipment including powerful extractor fans.

Mile End

4.4.10. In addition to the main entrance on Ropery Street, the Mile End site has a second pedestrian entrance on its eastern side (Southern Grove). There is also an additional vehicular gate adjacent to this; the level of the playground is slightly higher than the pavement outside, with the result that the gate is unable to fully open inwards. There is also a vehicular gate at the rear of the site, accessed from English Street; servicing deliveries principally take place via this access.

4.4.11. The Mile End site is spread across several buildings in close proximity to one another:

- The main building (in the south-eastern corner) is around a century old, and contains the majority of classrooms plus the hall and kitchens;
- Another building in the north-east corner contains the boiler room on the ground floor together with the after-school club classroom, while a training room is located upstairs;
- In the south-west corner of the site lies a building of more recent construction where the youngest pupils' classrooms are housed.

4.4.12. The buildings are reliant on natural ventilation, through the opening of windows and doors to cool classrooms during the summer, worsening indoor exposure to polluted air. The school is though set back a reasonable distance from the main source of pollution locally, the traffic emissions from Burdett Road.

4.4.13. The boilers heating the Mile End site are relatively new and well-maintained. The flue from the boilers release its vapour at a height of approximately 2m, which is relatively close to head height. However it is noted that the flue is at the rear of one of the school buildings, and therefore in a location which pupils would not normally pass by.

4.4.14. The school buildings, including classrooms, are generally felt to be comfortable with a good temperature range, though in winter time the age of the main buildings can lead to heat loss.

4.4.15. A small area of staff parking (circa six spaces) is located in the north-eastern corner of the school grounds. Cars enter via the English Street gate at times when pupils are not using the playground, i.e. before the start and after the end of the school day.

4.4.16. Secure cycle parking is provided by covered hangars located in the school grounds, which have sufficient capacity to accommodate current and future demand.

Modern and efficient extractors in the Bethnal Green kitchen

Mile End: covered and secure cycle parking

Flue height, shown in relation to ground floor windows at the rear of the northern school building
(Mile End)

4.4.17. The playground wraps around the various buildings, and also comprises dedicated areas for sports and green activities. The central portion of the playground (between the main and reception buildings) is most exposed to Ropery Street, though in general the play areas are relatively well shielded by the main building in particular. Games areas etc. are painted on the tarmac in the centre of the school grounds; at times when vehicular access is required during the school day (e.g. for deliveries, or staff having to drive in or out at short notice), careful management is required to keep pupils safe from moving vehicles in the playground, if these movements take place during break time.

Summary – Key Issues

- At the Bethnal Green site, there is limited screening around the playground, in particular the sections of fencing between the brickwork; whilst the play areas are of good quality and size, pupils using them are exposed to emissions from adjacent roads. Scooter and cycle parking is not of an attractive design and is only partially covered, which could deter usage.
- At the Mile End site, the occasional passage of vehicles (staff cars but also servicing vehicles) through the grounds during the school day can impact on pupils' time spent outdoors. This is in part due to a lack of suitable on-street servicing waiting locations. The main school building is relatively old and does not feature filtration of naturally ventilated air, resulting in pollutants entering the building.

4.5 KEY OBSERVATIONS – SUMMARY OF ISSUES

Figure 13 – Summary Issue Map (Bethnal Green site)

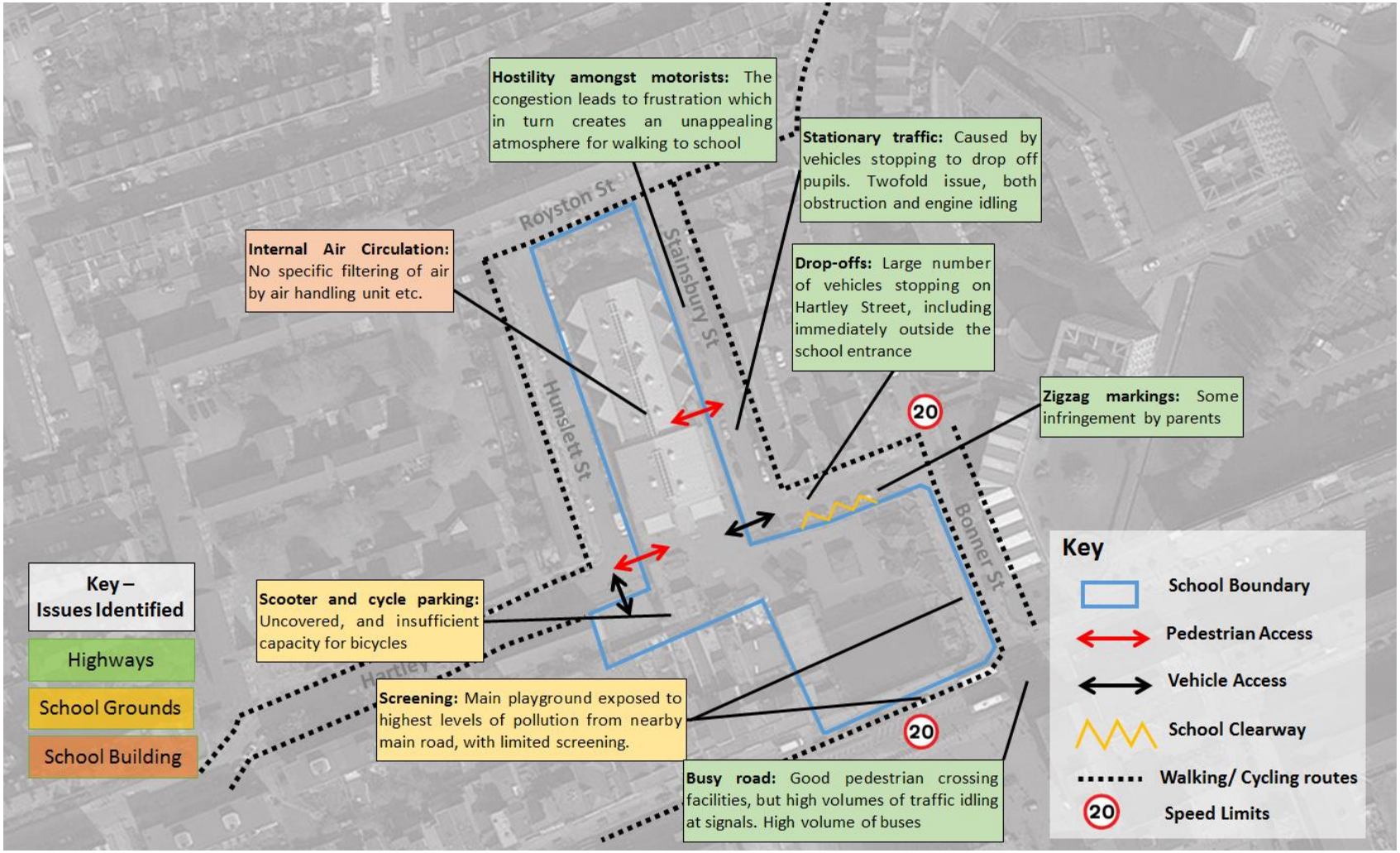
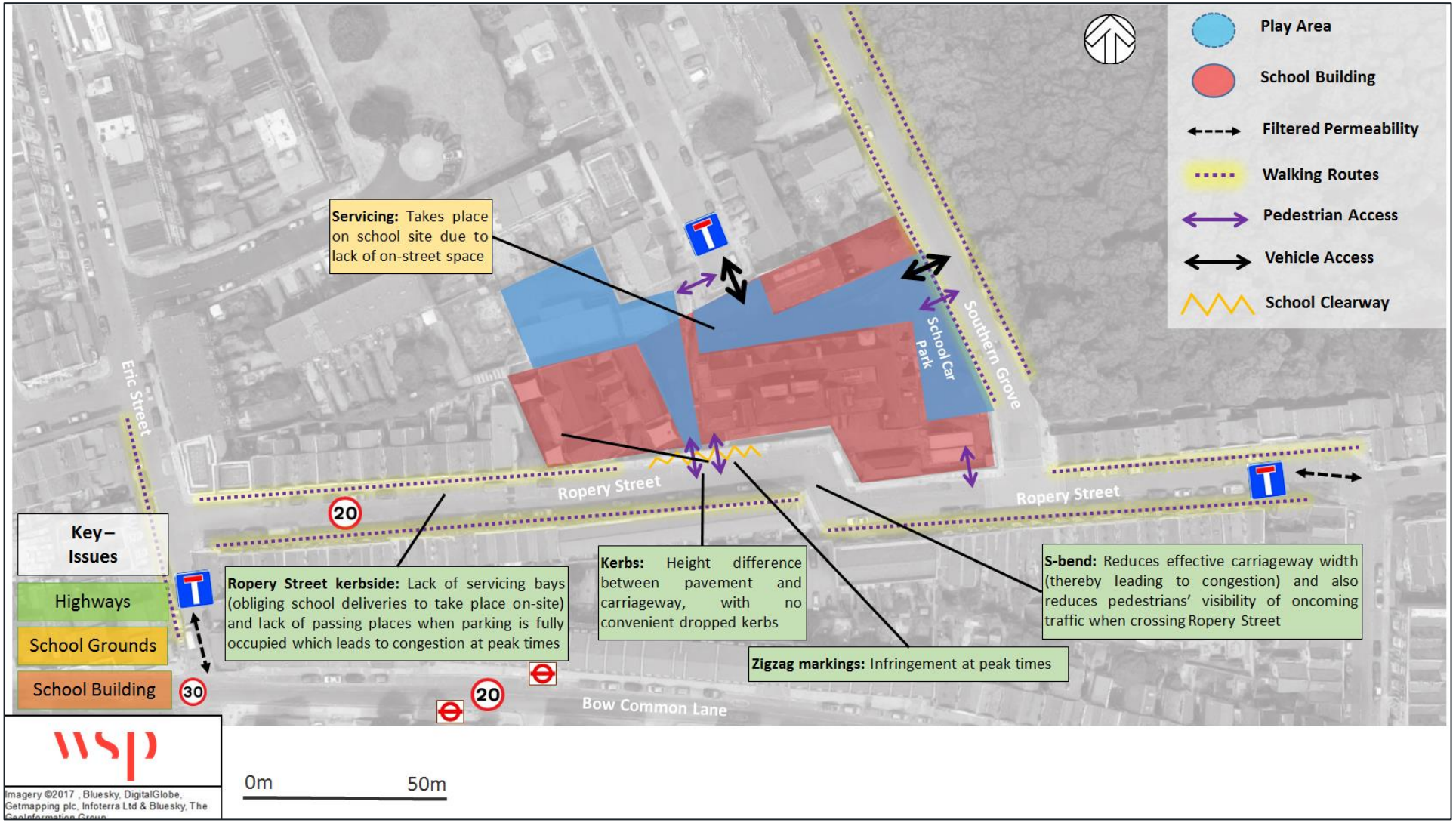


Figure 14 - Summary Issue Map (Mile End site)



Chapter 5 – Recommendations

5 RECOMMENDATIONS

5.1 DEVELOPING THE RECOMMENDATIONS

5.1.1. Based on the preceding desktop research, site audits and stakeholder feedback, a range of recommended measures and initiatives have been identified to deliver air quality improvements and reduced exposure to air pollution. The recommendations will not in themselves solve the air quality problem, but will each contribute directly or indirectly to helping improve the situation in and around the schools.

5.1.2. These recommendations are drawn from a comprehensive School Air Quality Audit Toolkit of Measures, researched and developed as part of the Mayor's Air Quality Audits project (see Appendix D for further details). The toolkit has been compiled from a review of best practice approaches and new technologies, including both well established and simple measures, and more innovative or harder hitting measures. The measures include both physical measures and softer behavioural measures.

5.1.3. The characteristics of the local area, school site and school building have then been accounted for in identifying and tailoring a suitable package of measures to address the issues identified in causing sources of pollution or exposure to air pollution. These recommendations have also sought to be cognisant of any relevant existing plans for the local and wider area around the school (see Section 3.2).

5.1.4. A key facet of this approach, and the palette of measures from which measures were identified, is that they represent a holistic approach, as promoted by the Healthy Streets approach, in seeking to address a broad range of factors which each influence how streets are used, how people travel and consequently how clean the air is in and around the school. As such whilst a number of measures are less directly related to air quality, they were felt to offer the potential for contribute indirectly, for example through creating a better and safer environment for travelling by sustainable modes.

5.1.5. Table 2 on the following page sets out the list of recommendations. For the purposes of this assessment they have been categorised as proposals associated with either Highways, school grounds or school building. In order to enable comparison of each measure, and to assist the school, borough and other stakeholders, in determining which measures to prioritise, each has been assessed against a series of key criteria:

- Potential Air Quality Improvement
  - Low – nominal measureable change but a tangible reduction in sources or exposure
  - Medium – a small measurable change in air quality
  - High – a large measureable improvement in air quality
- Wider Benefits
  - Such as improved safety, visual amenity, child health and welfare, improve learning environments, costs savings, promotion of sustainable transport, contributes to STARS or Healthy Schools London.
- Cost *(Note these reflect the overall costs, but these may vary amongst difference stakeholders*).
  - Low - <£10k
  - Medium - £10k-100k

- High - >100k

- Deliverability
  - Quick Win – readily deliverable within 12 months
  - Medium term – deliverable within 1-3 years
  - Longer term – only deliverable in the longer term (i.e. over 3 years)

- Stakeholder Support
  - Low – likely to be significant objections which could delay/prevent the scheme
  - Medium – may be some objections and will require consultation but not significant delays
  - High – likely to have strong support from key stakeholders

5.1.6. These are high level comparative analyses intended to offer a means of considering the recommendations against one another in relative terms. Further more detailed research and options development would be required to quantify these recommendations in greater detail, such as would be undertaken in a subsequent feasibility study. The implementation of the measures will be dependent on securing funding to enable delivery over time (see section 5.8), as well as undertaking feasibility assessments and scheme prioritisation.

Table 2 – Recommended measures for consideration

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
Highway *(Key Stakeholder: Borough)*																
1	Anti-idling enforcement	**Bethnal Green:** Enforcement against cars unloading on Hartley Street and Stainsbury Street to reduce conflict between pedestrians and vehicles. In particular, enforcement of the restrictions which apply to existing parking bays	Reduce sources and exposure	X			▪ Supports STARS and HSL objectives	X			X					X
2	Extending zigzag markings	**Bethnal Green:** Existing zigzag markings only cover a short section of Hartley Street; recommend extending them, potentially paired with a build out on the north east corner of junction of Hartley Street and Stainsbury Street to prevent inappropriate parking by the school entrance (noting that this was the location where, on the day of the audit, an idling vehicle caused an obstruction to traffic flow lasting several minutes)	Reduce sources and exposure	X						X		X				X
3	Conversion to one-way streets	**Bethnal Green:** Work with the Borough to convert Hartley Street to one-way westbound and Stainsbury Street to one-way northbound, creating a clockwise loop. This could reduce congestion and emissions (due to less idling), and improve road safety through reduce conflicts but may encourage additional car movements	Reduce sources and exposure		X		▪ Visual amenity ▪ Road safety		X			X			X	
4	Parking enforcement – via enforcement officers of PSPO	**Bethnal Green:** Increase patrolling and enforcement to address unsafe parking on school keep clears and double yellow lines. If this approach does not prove effective consider introducing Public Space Protection Orders enforced by ANPR cameras along the section of Hartley Street and Stainsbury Street around the school gate. A PSPO would prevent illegal parking when dropping off and picking up children. School PSPOs are enforced during school peak periods by Council Enforcement Officers. This would be likely to be contentious (although many affected drivers would be parents of pupils who would benefit), but is more likely to result in sustained and effective enforcement.	Reduce sources and exposure	X			▪ Road safety	X			X				X	
5	Dropped kerbs	**Mile End:** Install dropped kerbs on both sides of Ropery Street	Promote walking by improving facilities	X			▪ Promotion of sustainable transport ▪ Road safety		X		X	X			X	

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
6	Promote cleaner routes to school	Work with partners e.g. Living Streets and www.walkit.com and use mapping software to produce bespoke walking route plans for pupils	Reduce exposure		X		▪ Road safety ▪ Child health and welfare ▪ Promotion of sustainable transport	X			X				X	
7	Reallocate space on the street fronting the school	**Mile End:** Re-allocate some existing kerbside parking to allow servicing at certain times; in addition, allocate certain lengths of kerb to facilitate passing (by prohibiting waiting at peak times). Conversion to one-way operation is not viable due to the number of cul-de-sacs nearby, but these measures would serve to reduce congestion outside the school and also remove the need for on-site servicing	Improve circulation and servicing availability on Ropery Street	X			▪ Road safety ▪ Reduced emissions		X			X				X
8	School Streets	**Mile End**: A scheme where the road outside a school is closed to traffic at school opening and closing times. Closing the street to school and through traffic helps to achieve a safer, more pleasant environment for everyone using the street whilst maintaining access for residents, businesses, pedestrians and cyclists. The street in front of the school is a 'Pedestrian'/ 'Pedestrian and Cycle zone' which operates during set times in the morning and afternoon (often for 45 min periods around start and finish time). Times will vary depending on the school and the location. Vehicles can't enter the street between these times unless they have been given an exemption. Signs will inform drivers of the restrictions. Non-registered vehicles entering the street during the times of operation will be identified by camera and issued a fixed penalty notice.	Reallocate space on the street fronting the school	X			▪ Road safety ▪ Reduced emissions ▪ Promotion of sustainable travel		X			X				X
9	Healthy Streets approach, sustainable transport and roadspace reallocation from vehicular traffic	Promote the Mayor of London's Healthy Streets approach which aims to improve air quality, reduce congestion and help make London's diverse neighbourhoods greener, healthier and more attractive places to live, work, play and do business. Take a proactive role in endorsing the approach and supporting these initiatives.	Reduce sources and exposure			X	▪ Promotion of sustainable travel			X			X			X
10	Additional parking charges for more polluting vehicles	Consider introducing surcharges on top of existing parking charges for more polluting vehicles. A trial in Westminster found that the number of dirtier diesel vehicles using the parking bays dropped by 12%. Westminster's, and Islington also looking to introduce a similar scheme.	Reduce sources and exposure			X			X			X				X

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
11	Non-Road Mobile Machinery Audit	The Council could consider a requirement for a Non-Road Mobile Machinery (NRMM) Audit to be undertaken at construction sites. This requirement is being trialled within some Low Emission Neighbourhoods to help ensure compliance of vehicles used for developments. Currently, NRMM is the third largest contributor of NOx emissions and the fifth largest contributor of PM emissions in London, and any comprehensive plan to reduce London's emissions should attempt to address emissions from construction machinery.	Reduce sources of emissions	X			▪ Reduce noise	X			X				X	
12	Control of Dust and Emissions during Construction and Demolition SPG	Introduce a requirement in planning conditions to manage dust and emissions associated with construction based on the Control of Dust and Emissions during Construction and Demolition SPG prepared by the GLA, which includes requirements for construction sites to monitor air quality and share the results with the borough council – https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/control-dust-and	Reduce sources of emissions	X				X			X				X	
Highway *(Key Stakeholder: TfL)*																
13	Low Emission Buses	By 2020 all buses in London will meet the Euro 6 standard. In addition, from 2018 no new diesel double deck buses have been pro-cured and from 2020 only zero emission single deck buses will be procured. As cleaner buses are introduced or retrofitted these will be prioritised on some of the most polluted corridors through the Low Emission Bus Zone programme. These improvements will have significant benefits for schools.	Reduce sources and exposure			X	▪ Air quality			X		X			X	
School Grounds *(Key Stakeholder: School / Borough)*																
14	Green infrastructure	**Bethnal Green:** Install green screening/climbers along the gaps (currently occupied by fencing) in the eastern and southern perimeter walls, including in the existing planters.	Reduce exposure	X			▪ Visual amenity	X				X				X
15	Improved cycle parking	**Bethnal Green:** Improve the cycle parking in the playground by replacing the existing racks with Sheffield stands (or better), with all	Promoting cycling by providing	X			▪ Promotion of sustainable transport	X			X					X

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
		spaces fully covered.	improved facilities				▪ Supports STARS objectives									
School Building *(Key Stakeholder: School / Borough)*																
16	Install air conditioning	**Bethnal Green:** Install air conditioning, prioritising the southern end of the school building	Reduce sources and exposure	X			▪ Health		X			X			X	
17	Install air filtration system for circulated air	**Bethnal Green:** Consider investing in air filtration systems in classrooms most exposed to poor air quality and reliant on natural ventilation. These systems are relatively high cost, only cover a single room per unit, and do require ongoing maintenance and power consumption, but have demonstrated some encouraging initial scientific evidence of efficacy, with titanium dioxide proven to act as a reducer for NO_x and NO_2, and some claims it will eliminate 99.5% of NO_2. They can also assist with virus elimination/reduction.	Reduce exposure to emissions	X			▪ Improved learning environments		X			X			X	
Behavioural Measures *(Key Stakeholder: School/ Borough)*																
18	Pupil and parent behaviour change	Prepare 'Welcome Packs' for new pupils / parents that includes the promotion of apps / sites such as 'www.walkit.com' to a) promote walking to / from school and b) promote the suitable walking routes to avoid air pollution hotspots	Behavioural measures / reducing exposure to emissions.	X			▪ Awareness raising	X			X				X	
19	Participate in Beat The Street activities	**Bethnal Green:** Beat the Street: this activity involves encouraging children to walk and cycle by setting up a challenge to visit a series of 'checkpoints' around the local area. In this way pupils at Bonner Primary School – Bethnal Green can be encouraged to participate in active lifestyle activities and also explore local walking and cycling routes which have low exposure to emissions. The Mile End site has already taken part, and therefore can provide encouragement to pupils at the Bethnal Green site.	Behavioural measures / reducing exposure to emissions.	X			▪ Health	X			X				X	
20	Attain Silver status in STARS	Strive for Silver status, which would entail achieving a range of measures promoting active travel and reduced emissions, also signposting additional initiatives and avenues of support. The framework also helps document and track progress, and implement recommendations.	Behavioural measures / reducing exposure to emissions.	X			▪ Awareness raising ▪ Supports STARS	X			X					X
Wider Measures *(Key Stakeholder: Borough / TfL / GLA / Central Government)*																

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
21	Targeted scrappage scheme for polluting vehicles entering London	Engage with any future proposals or consultations regarding the introduction of a targeted scrappage scheme, aimed at more polluting vehicles recorded entering London regularly over an extended period, promoting a transition to ultra-low emission vehicles, in conjunction with measures to promote more sustainable transport.	Reduce sources and exposure			X				X			X	X		
22	Reform Vehicle Excise Duty	Lobby national government to reform Vehicle Excise Duty to reflect emissions of local pollutants as well as CO_2, and remove the ongoing incentivisation this lends to diesel vehicles.	Reduce sources and exposure			X			X				X	X		
23	Promote a transition to electric heating and heat pumps	Seek to promote the principles of 'an all-electric city', including reducing/eliminating the use of gas in buildings, which city wide account for over 33% of emissions, by requiring or incentivising the use of electric heating/cooling via heat pumps in new buildings and major redevelopments.	Reduce sources and exposure			X			X				X	X		
24	Reform Buildings Regulations to promote heat pumps	Support and promote dialogue at a national level concerning buildings regulations and how they're calculated to better account for local air quality issues as well as energy efficiency, and so promote wider deployment of technologies such as heat pumps.	Reduce sources and exposure		X				X				X	X		
25	Zero emission zones	Review the effectiveness of planned measures and develop an approach for introducing a zero emission zone in central London and town centres in the short to medium term, and larger inner London and London-wide zones in the longer term. To be developed in conjunction with other policies such as the creation of Liveable Neighbourhoods, reducing road danger and making more efficient use of the street network, including for freight and servicing. Any specific schemes would be subject to statutory consultation.	Reduce sources and exposure			X				X			X	X		

5.2 KEY RECOMMENDATIONS

Figure 15 - Summary Recommendations Map – Bethnal Green

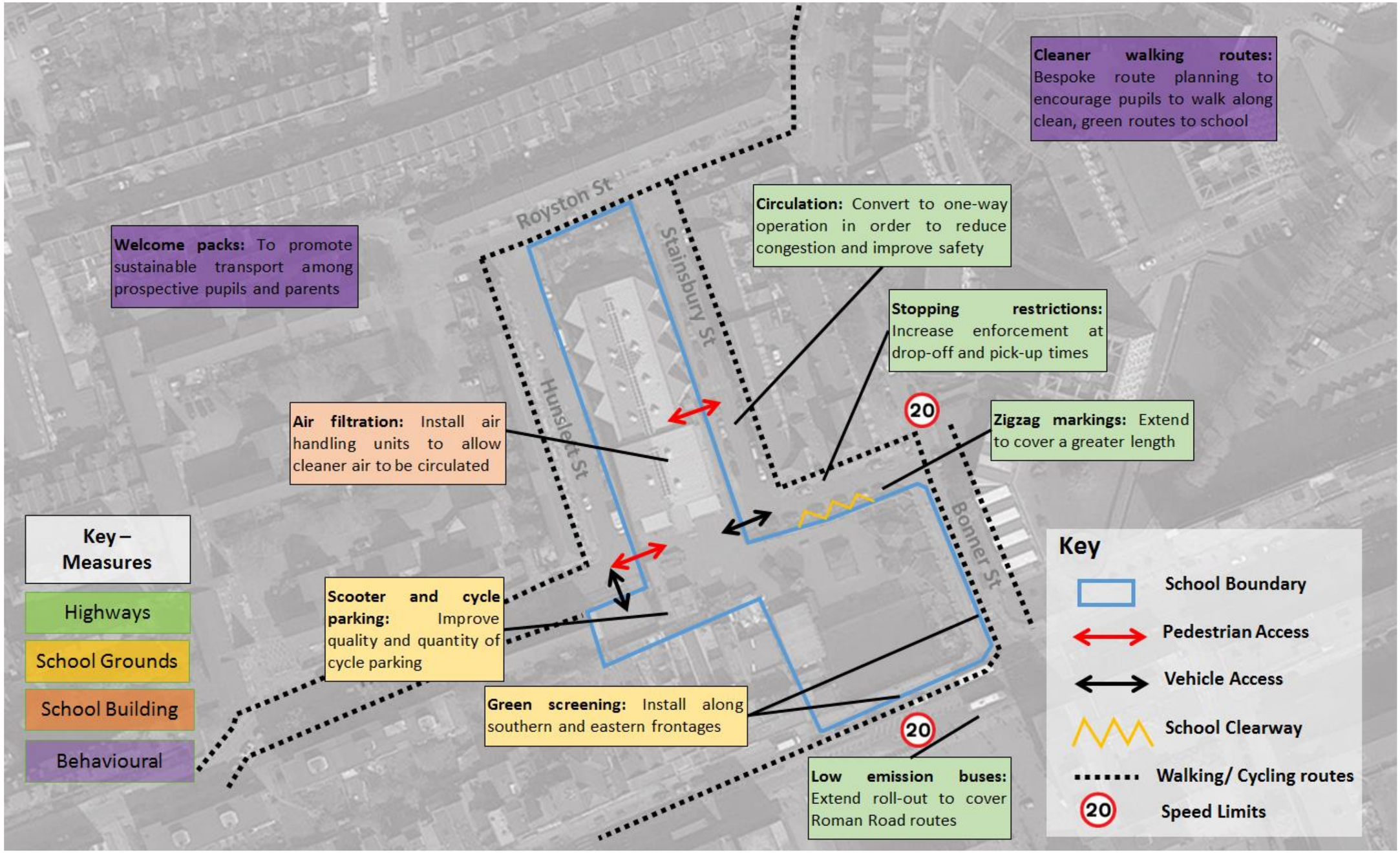
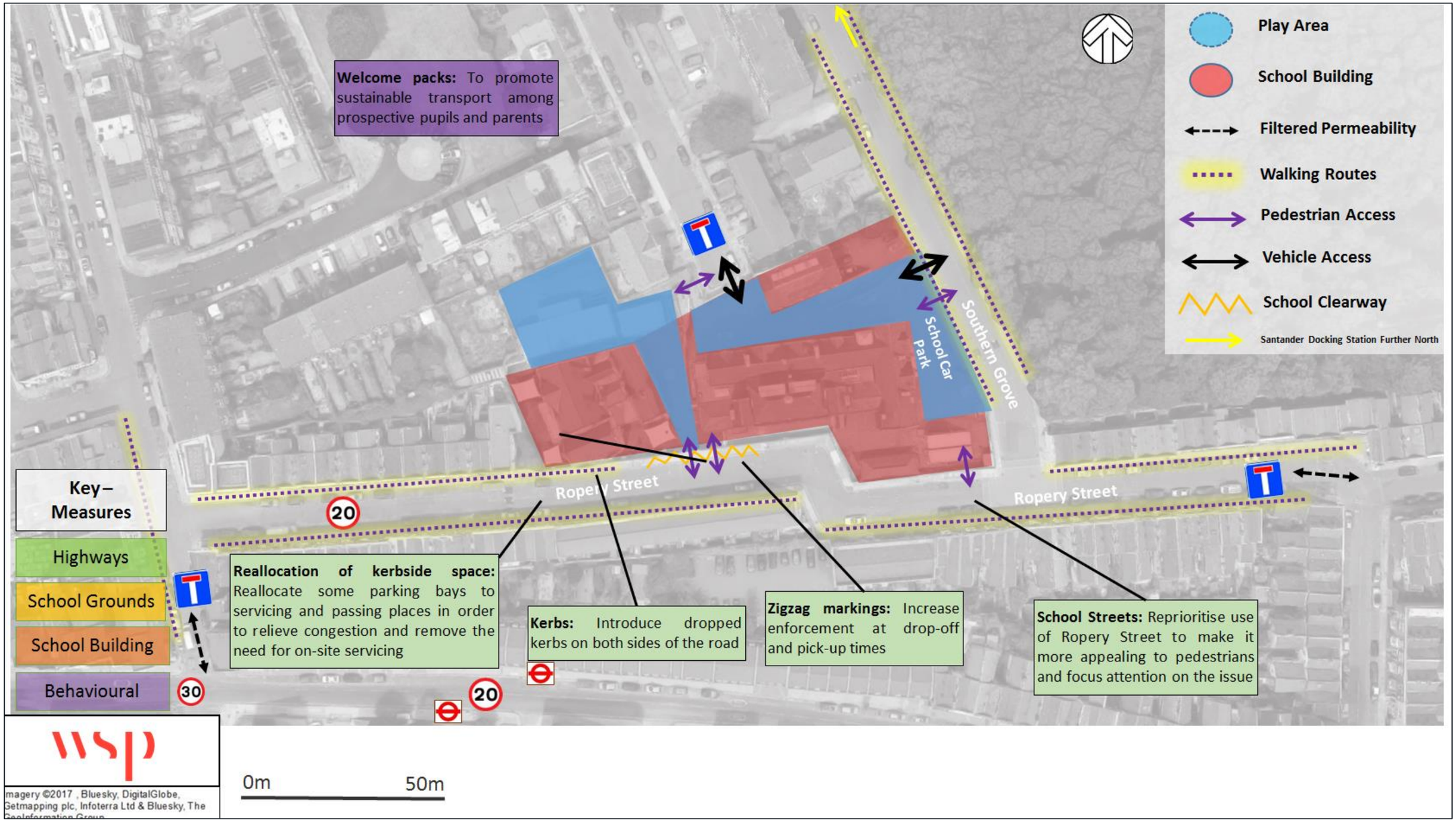


Figure 16 - Summary Recommendations Map – Mile End



5.3 PRIORITISED MEASURES FOR THE SCHOOL

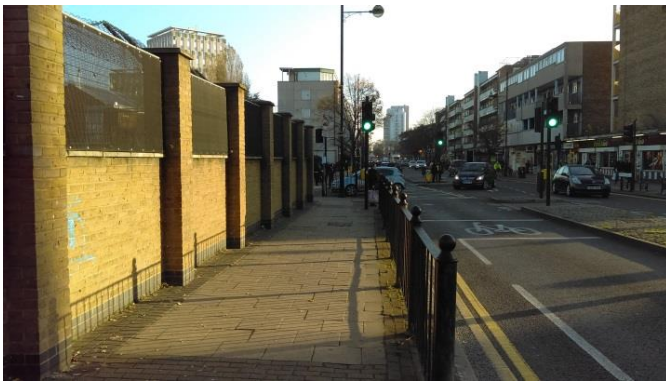
5.3.1. To help prioritise what measures should be progressed for the school, borough officers and representatives of the school were asked:

'*Based on the toolkit of measures and the findings of the observations and initial analysis, what are the top three measures you would prioritise for the school?'*

5.3.2. Three of the more key measures were considered to be (in no particular order):

Green Screening (Bethnal Green)

Installing green screening inside the eastern and southern frontages of the school playground would be beneficial in two ways: not only will the vegetation assist in absorbing emissions from the adjacent roads, but it also forms a visual barrier which enhances the attractiveness of the playground as well as increasing the safeguarding credentials of the school grounds. There are existing planters along part of the boundary wall, and these could therefore be used to plant some of the vegetation. It should be noted however that the same level of reduction would not necessarily be achieved in each instance, as the local conditions and designs are specific to each site



Existing wall and fencing along Roman Road, which would be filled in by green screening inside the school boundary

Extend Zigzag Markings (Bethnal Green)

The existing zigzag markings on Hartley Street are only a few metres in length, and the remainder of the kerbside consists of parking bays which do not prohibit waiting. This not only reduces the effective carriageway width to a single lane, but also presents a safety risk. Zigzag markings act as a better deterrent against unauthorised stopping and will also allow two lanes of traffic to be maintained, whereas retention of parking bays would mean that the effective width problem persists.

Reallocate kerbside space (Mile End)

At present the majority of the kerb length on both sides of Ropery Street accommodates parking bays. This not only leads to congestion when vehicles cannot pass each other (at times when bays are occupied and thus there are limited passing opportunities) but also obliges school servicing to take place on-site because there are no on-street bays. By allocating a section of kerbside for servicing, and also some sections of passing space, these issues can be alleviated. It is likely that a parking beat survey would be required to quantify the existing parking demand and ascertain the potential for this overspill to be accommodated within an acceptable distance, in order to minimise objections from residents.

5.3.3. The third measure could potentially also be combined with School Streets in order to not only reallocate roadspace (focusing on the times when pedestrian activity is greatest) but also draw attention to the importance of safe, sustainable travel for Bonner Primary School pupils.

5.4 STARS ACCREDITATION SCHEME FOR SCHOOLS

5.4.1. STARS is TfL's world leading school travel accreditation scheme, inspiring young Londoners to travel smarter and more sustainably, and should form the framework within which the behaviour change related components of the above recommendations are recorded.

5.4.2. Many of the recommendations would also serve to contribute towards the required 'travel activities' and 'support activities' required to attain Gold status – which should ultimately be the aim for the school.

5.4.3. Equally by embracing the STARS process, delivering sustainable travel activities, achieving modal shift targets and demonstrating effective community engagement, the school will have successfully delivered air quality improvements through reduced travel by cars. The framework of STARS enables the school and borough to document, track and share their continued progress, and embed and implement the recommendations throughout the school community.

5.4.4. Schools are encouraged to note any air quality related activity undertaken on their TfL STARS profile stars.tfl.gov.uk, and to help inspire other schools, they are required to tell their story for each activity they have delivered.

5.4.5. Table 3 outlines the requirements for achieving the Bronze, Silver and Gold accreditation. Bonner Primary School has achieved Bronze accreditation.

Table 3 – STARS Scheme Accreditation Requirements

Bronze	Silver	Gold
– Complete 10 different 'travel activities' from the list of 80. Evidence is not required but it is recommended. – Complete 6 different 'supporting activities' from the list of 40. Evidence is not required but it is recommended. – Complete a hands up survey (with a respondent rate of at least 90%) to get a baseline understanding of how pupils get to school – Set targets for a minimum of two modes	– Complete 20 different 'travel activities' from the list of 80. Evidence is required and must be submitted to the STARS website. – Complete 10 different 'supporting activities' from the list of 40. Evidence is required and must be submitted to the STARS website. – Demonstrate that a shift away from the car has been achieved through hands up survey results – Record its staff travel patterns, through the same hands up survey method	– Complete 25 different 'travel activities' from the list of 80. Evidence is required and must be submitted to the STARS website. – Complete 15 different 'supporting activities' from the list of 40. Evidence is required and must be submitted to the STARS website. – Demonstrate that mode share has been shifted away from the car by at least 6%, or that 90% of travel is done by non-car modes – Demonstrate that the targets

	— Set up a School Travel Plan working group with student representatives — Present various bits of evidence of pupil, governor, staff and school council involvement (such as meeting minutes) — Conduct consultation with parents and show results of this — Carry out research and/or consultation	from the last academic year were achieved or exceeded — Demonstrate that residents and neighbours are aware of the school's plans to promote safer and more active travel — Demonstrate that the travel plan is an agenda item on at least one senior management meeting per year — Demonstrate that safe and active travel is part of the School Development Plan

5.4.6. Our recommended measures for the school include a number of initiatives that would also count towards the School attaining their Gold STARS scheme accreditation, including: 'anti-idling awareness raising measures' and 'school play streets'. STARS activity cards are available for these measures, as well as wide range of other topics https://stars.tfl.gov.uk/Explore/Idea.

5.5 HEALTHY SCHOOLS LONDON

5.5.1. The Healthy Schools London programme should also as framework for promoting sustainable transport measure that will contribute towards improved local air quality. To achieve the Healthy Schools London Bronze award, one of the criteria is that "*the school promotes active travel to and from school*", and provides a number of examples, including:

- By implementing a school travel plan and running active travel initiatives such as:
- walk/cycle to school days
- walkers/cyclers breakfast clubs
- cycling at break times
- pedestrian skills and cycle training
- active travel competitions
- accreditation programmes

5.5.2. The schools must complete the following statements:

- Active Travel is promoted by:
- School travel plan: Date awarded/reviewed
- Active travel initiatives including:

5.5.3. Our recommended measures for the school include a number or initiatives that would also count towards these criteria, including a variety of proposals to promote improved environments for walking, scooting and cycling, and initiatives to promote behaviour change and raise awareness of benefits of active travel.

5.6 AIR QUALITY ALERTS

5.6.1. When high and very high air pollution is forecast, air quality alerts are displayed at many public locations across London including 2,500 bus stop countdown signs and all Tube stations. Alerts and guidance are also available via social media, an app and a text alert service providing information and guidance on the alert level.

5.6.2. The Mayor has recently (January 2018) expanded his existing air quality alerts systems and appointed King's College London to continuously monitor air pollution using the existing air quality monitoring network and cutting-edge modelling tools, delivering alerts as required. They will also directly notify a wider group of stakeholders so that the alerts are disseminated more widely and targeted at Londoners who are most vulnerable to the impacts of poor air, including schools.

5.6.3. Each school has been provided with further information via email on what the alert means, and how to reduce pupils' personal exposure, and they can contact AirQualityLondon@london.gov.uk for more information.

5.7 ENGAGEMENT

5.7.1. Engagement activities to raise awareness of the issue of air quality amongst children and the school community are fundamental to achieving change.

MAYOR'S LONDON CURRICULUM PROGRAMME

5.7.2. The London Curriculum offers a wide range of high-quality teaching resources supporting most subjects on the national curriculum, CPD for teachers and events for children. Resources and activities are inspired by the city's diverse culture, heritage, science and technology, built environment, green spaces and rivers.

5.7.3. The Mayor of London's Air Quality Audits will be supported by a new programme of targeted activity delivered through the London Curriculum. The focus of the programme is to support teacher subject knowledge, and confidence to tackle air quality as a science subject recognising that this requires a wide knowledge and skill base of science, statistics and mapping. Activities associated with the above is detailed in Appendix C, for delivery by the schools / London Curriculum during the spring and summer terms, and summarised below:

AUTUMN TERM

- WSP undertake school AQ audits
- London Curriculum engage with schools / school champion.
- By mid-October publish forward dates for spring term activity.
- Publish London.gov. web page which brings together the offer.

SPRING TERM – TEACHER FOCUSED ACTIVITY

- STEM Learning package of available cpd on air quality
- RGS primary school geography network meeting

- ESRI training on mapping software for schools
- GLA provides schools with results and recommendations from WSP's audits, including outputs to be used for lesson material to use in future projects / initiatives.

SUMMER TERM – PUPIL FOCUSED ACTIVITY

- Schools undertake project with pupils.
- National Clean Air Day June 2018.
- Support from IRIS/Science Learning Partnership/STEM Ambassador TBC.
- Schools recognition of air quality projects/celebration TBC.

HEALTHY EARLY YEARS LONDON (HEYL)

5.7.4. Building on the success of Healthy Schools London, Healthy Early Years London is an awards scheme funded by the Mayor of London that supports and recognises early years setting achievements in child health, wellbeing and school readiness. Healthy Early Years London focuses on the whole child and gives settings a framework for their activity with children, parents, carers and staff and the wider community. HEYL will help to reduce health inequalities by creating environments which support a healthy start to life and promote a whole setting and targeted approach across a number of themes including Sustainability-active travel and air quality.

5.7.5. HEYL complements and enhances the statutory Early Years Foundation Stage (EYFS) framework, providing further focus on children, families and staff health and wellbeing. There are 4 levels of Awards: HEYL First Steps, Bronze, Silver and Gold. HEYL can be used as an improvement tool to support practice in all Early Years settings including active travel:

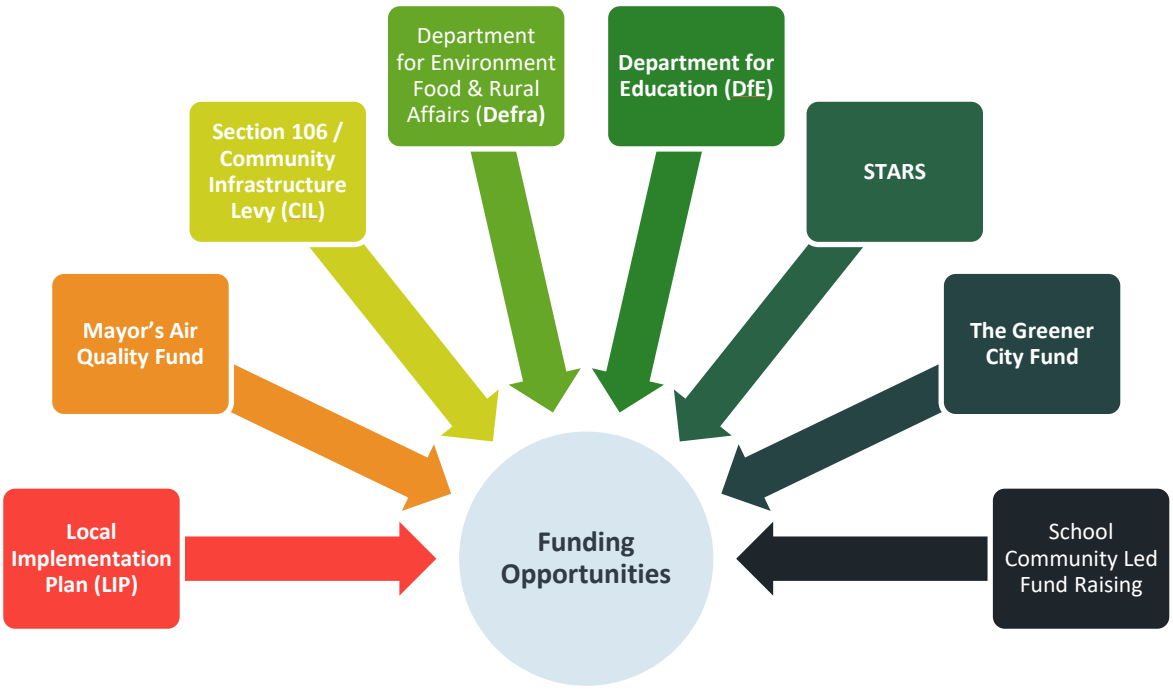
- Active travel is supported and encouraged, both for journeys to and from the setting and for trips (e.g. walking, scooting)
- The setting is signed up to receive air quality alerts from www.airtext.info/alerts
- There are activities and information available for parents and carers to support sustainability including: active travel, recycling or energy saving
- Practitioners are able to discuss and advise parents and carers on active travel

5.7.6. The full programme is due for official launch in spring 2018 which is intended to reach all 13,000+ settings and providers of childcare across London.

5.8 FUNDING OPPORTUNITIES

5.8.1. A wide range of potential funding sources are available and should be considered to progress some of the measures outlined above, as set out in the figure below.

Figure 17 – Summary of funding opportunities



5.8.2. Below, we discuss each of these in turn and set out the criteria associated with obtaining these funding opportunities, to enable the borough / schools to understand what measures they could progress with the funding opportunities that exists.

Local Implementation Plan (LIP)

5.8.3. A primary source of funding is linked to the Local Implementation Plan (LIP) 3 that will provide spending from April 2019 until April 2020, with bidding closing in October 2018. The guidance on bidding specifically references the need to improve air quality at schools:

'2.34 In the short- to medium-term, there must be a particular focus on action to reduce air, pollution, reducing exposure to it and tackling pollution hotspots, which boroughs should support through their LIP. Locations that have large numbers of vulnerable Londoners, such as schools, should be prioritised for action. ***In particular, the boroughs have an important role in ensuring recommendations from the Mayor's school air quality audit programme are implemented, and LIP funding can be directed at both the audits and the delivery of measures****.'*

5.8.4. It is expected that recommendations from the audits can be implemented by the London boroughs using funding from TfL's Local Implementation Plan (LIP) funding stream, but this is subject to boroughs prioritising this area. It is ultimately at the discretion of the borough to follow this guidance and allocate money to fund the measures outlined above.

5.8.5. Whilst the Mayor has allocated funding for the first 50 audits, he expects the London boroughs to roll this out so that every school that is located in an area of high pollution can benefit from this approach. LIP funds are a source of funding for this, and guidance is being developed, alongside an audit toolkit and template, to be used locally to complete school air quality audits for other schools.

Mayor's Air Quality Fund (MAQF)

5.8.6. The MAQF is a £20 million fund, over ten years to support new projects by London boroughs to improve air quality. The first round of funding supported a wide range of projects, including: freight consolidation, green walls, low emission vehicles, reducing pollution from construction sites and digital signage to reduce engine idling.

5.8.7. In summer 2018, the third round of MAQF funding will open for applications (for projects commencing in April 2019).

Section 106 / Community Infrastructure Levy (CIL)

5.8.8. Section 106 (S106) agreements and Community Infrastructure Levy (CIL) are potential sources of funding towards measures to address local air pollution.

5.8.9. S106 agreements, also known as planning obligations, are legal agreements made between local authorities and developers, and designed to address issues that new developments may cause or worsen on local infrastructure. The content of a S106 agreement is agreed during the consultation period of the planning application and the agreement is prepared by the council's solicitor.

5.8.10. A Community Infrastructure Levy (CIL) is a planning charge introduced by the government via the Planning Act 2008. It provides a means of ensuring that a new development contributes to the cost of the infrastructure that the development will rely on, such as schools and roads.

5.8.11. The levy applies to most new buildings and charges are based on the size and type of the floor space being created. The idea behind the CIL is that it's fairer, faster and more certain than the system of S106 planning obligations, which are negotiated on a case-by-case basis and that contributions can be sought in accordance with local policy objectives.

Liveable Neighbourhoods

5.8.12. A Liveable Neighbourhood scheme will deliver attractive, healthy and safe neighbourhoods for people and involves changes to improve conditions for walking and cycling and reducing traffic dominance – all of which can play a part in reducing air pollution. The types of measures that can be funded via this programme may include new pedestrian crossings, a network of good cycle routes, redesigned junctions, restrictions on motor traffic in town centres as well as wider improvements against each of the ten Healthy Streets Indicators.

5.8.13. The programme has a budget totalling £85.9m over the five financial years (2017/18 – 2021/22), excluding the funding for the remaining Major Schemes that will be completed during this period.

Although costs will vary considerably from scheme to scheme, it is expected that TfL contributions for most schemes will fall within a range of £1m to £10m, with the majority probably under £5m.

Department for Environment Food & Rural Affairs (Defra) Air Quality Grant Scheme

5.8.14. Defra's air quality grant scheme provides funding to eligible local authorities to help improve air quality. The scheme helps local authorities to make air quality improvements and to meet their statutory duties under the Environment Act 1995. It has awarded over £52 million in funding to a variety of projects since it started in 1997.

5.8.15. It is noted that the applications for 2017 to 2018 has now passed (December 2017) but it is recommended that Local Authorities submit future applications to implement some of the measures outlined within this report. It is noted that LA's have previously successful applied for funding some behavioural / awareness raising measures. For example, the London borough of Islington was awarded £50,000 as part of a school focussed awareness and engagement campaign.

Department for Education (DfE)

5.8.16. There may be scope for delivering some of the measures identified through DfE funding for school buildings and land, including capital funding for schools and academies, such as the Condition Improvement Fund, Priority School Building Programme, Early Years Capital Fund.

5.8.17. Additionally, the Salix Energy Efficiency Loan Scheme provides funding for schools and colleges through DfE, to reduce energy costs through the installation of energy efficiency technologies. This funding would apply to measures designed to reduce emissions through improving building energy use – such as replacing an older boiler with a heat pump, or increasing building insulation. To receive funding a project would need to save energy as well as improve air quality, and energy savings would need to have a payback period of eight years or less. In addition, the project must not exceed a maximum cost of £200 per tonne of CO_2 saved.

Greener City Fund

5.8.18. The Mayor's Greener City Fund (www.london.gov.uk/greenercity) includes a range of programmes to create and improve green spaces and encourage tree planting in London. This is part of the Mayor's commitment to making a London a National Park City.

5.8.19. Two grant schemes, offering grants between £5,000 and £50,000 are open to applications from schools:

- Community Tree Planting Grants will support applicants to plant trees and help improve children's access to nature. This includes supporting tree planting in areas where there are currently low levels of tree cover, or where trees could help tackle issues such as air pollution. The next funding round will open in spring 2018 for projects to take place in the winter 2018/19.
- Community Green Space Grants aim to improve and increase green space across London, and can include greening playgrounds or routes to school, or natural play space for children. The next funding round will open in summer 2018 for projects to take place in 2019.

RE:FIT

5.8.20. RE:FIT London is jointly funded by the GLA and the European Union European Regional Development Fund, and is helping to achieve the Mayor's aim for London to be a zero carbon city by 2050. The programme is designed to help public sector organisations save carbon, energy and

money by retrofitting buildings to make them more energy efficient, from simple measures like lighting and controls to solar panels. Since it was established in 2009 the programme has not only reduced carbon emissions, but also resulted in large guaranteed energy savings (typically around 15-25%).

5.8.21. The RE:FIT London Programme Delivery Unit is an expert team which provides free end to end support to deliver projects.

5.8.22. The RE:FIT framework of energy service companies saves time and resources for organisations that are procuring retrofit services and works and – because it is an energy performance contracting framework - guarantees energy and cost savings. Schools in particular benefit from being able to procure through this framework via a fast-track route. Further information is available at www.london.gov.uk/refit

TfL STARS Reward Scheme

5.8.23. Whilst there is no specific funding attached to STARS, as gaining STARS accreditation helps boroughs to achieve their targets for reducing school related car travel, and increasing cycling and walking, they often choose to link it to incentives – such as local grant funding through their LIP programmes and priority access to other opportunities.

5.8.24. It is important for boroughs to highlight that a possible benefit of getting STARS Accreditation is that it will potentially enable them to access funding for a variety of measures that contribute towards improving air quality and health. In broad terms, funding can be secured if the proposed measure:

- Promotes one aspect of safer and smarter travel choices (walking, cycling, scooting, safer / smarter driving, public transport and road safety).
- Helps the school reduce congestion (and pollution) in the vicinity of the school.

5.8.25. Ideas include, but are not limited to:

- Training – pedestrian skills, scooter safety, balance bike, cycling
- Cycling – storage, helmets, pool bikes, bike market, Dr Bike
- Resources – sustainable travel and road safety books, reflective and fluorescent products
- Staffing – supply cover to allow STP staff training and workshop attendance.

5.8.26. It is increasingly important that boroughs seek to create a portfolio of funding opportunities, and with that in mind other potential funding sources include:

- **Local Clinical Commissioning Groups.(CCG)** - https://www.nhscc.org/ccgs/
- **Health and Wellbeing Boards:** https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/215261/dh_131733.pdf
- **Charitable Trusts**
- **Local business funding**
- **Consortium approach** – pooling funding with other boroughs and achieve economies of scale

Other Funding Sources

5.8.27. There are several grant funding bodies who may be interested in funding recommendations particularly if a borough links up with a community organisation - https://www.dsc.org.uk/category/fundraising/funding-sources/

5.8.28. Boroughs could also seek to influence the Joint Strategic Needs Assessment process undertaken by Health and Well Being Boards and Directors of Public Health. This is the process which looks at local clinical, health and well -being population needs, and on which CCGs base their funding priorities.

Other sources of funding for green infrastructure

5.8.29. Potential sources of funding for green infrastructure in schools include:

- The Tree Council's **Trees for Schools** programme offers grants between £100 and £700 to fund tree planting www.treecouncil.org.uk/grants/trees-for-schools
- The **Woodland Trust** offers free trees for schools www.woodlandtrust.org.uk/get-involved/schools/trees-for-schools/
- The **Gregg's Foundation Environmental Grants** offer up to £2,000 for projects that improve the physical environment in a way that will improve people's lives, including in schools where the project is accessible to the wider community www.greggsfoundation.org.uk/environmental-grant
- **Tesco Bags of Help** offer up to £4,000 to a wide range of projects, including environmental improvements to school grounds www.groundwork.org.uk/Sites/tescocommunityscheme
- **The Big Lottery Fund's Awards for All programme** offers up to £10,000 for a wide range of projects that "improve the places and spaces that matter to communities", including schools www.biglotteryfund.org.uk
- **Learning Through Landscapes Nature Grants Scheme** –grants will re-open in Spring 2018 www.ltl.org.uk/naturegrants
- **Trees for Cities** – are a charity able to match-fund the remaining shortfall after the financial contribution towards the project from the land owner. Their most notable schools programme is the Edible Playgrounds programme, which includes the design and creation of an edible teaching garden space within school grounds. Their other programmes include School Greening projects (mini forest style spaces, wildlife areas, biodiversity features) and Trees for Schools, a programme funded by Defra and delivered in partnership with the Woodland Trust. https://treesforcities.org/projects/schools/
- **Groundwork London** – are an environmental regeneration charity specialising in community-based green interventions and behaviour change, with a team of Landscape Architects and community officers who can support schools in designing and implementing green interventions, supporting the curriculum and taking a 'whole school' approach to understanding air quality. They also manage programmes that could offer funding for schools in considering their interventions, and fundraising support. Contact londonairquality@groundwork.org.uk, www.groundwork.org.uk/london.

School Community Led Fund Raising Initiatives

5.8.30. As well as the specific funding opportunities outlined above, there is an important role for the School, Ward Councillors, the Parent's Teachers Association (PTA) and School Governors, both in a lobbying and leadership capacity, and as vehicles for fundraising to support and promote particular measures and initiatives.

5.9 MONITORING

5.9.1. An important outcome of the school air quality audits will be in assessing the effectiveness of different schemes and initiatives implemented, so that the findings can be used to continually update and refine the toolkit of measures for use in future audits.

5.9.2. Whilst it will likely prove difficult to disaggregate the impact of a range of measures when implemented simultaneously, by recording this information across all participating schools in London, and pooling the findings, it will provide some useful overall insights into what types of solutions work best in practice amongst a given set of conditions.

5.9.3. In order to undertake these assessments and build on the existing evidence available, it will be essential to establish an effective baseline dataset, and plan a programme of monitoring post implementation of any measures. This monitoring may include a wide range of metrics including surveys, traffic information, and air quality monitoring. The scope for monitoring should be proportionate to the extent of the problem and the scale of the investment.

5.9.4. Where possible such monitoring should cover:

- Key pollutants (NO_x, PM_{10}, $PM_{2.5}$), and/or
- a range of other suitable metrics (i.e. travel to school mode shares, STARS and Healthy Schools accreditations, traffic counts (as a proxy for road transport emissions), school buildings and boiler conditions, surveys and behavioural responses of parents/staff).

5.9.5. The Mayor recently announced the trial of new air quality monitoring sensors in hundreds of hot spots across London, including schools, as well as fleet of mobile sensors, which if successful may be used to monitor localised air quality around the school, in addition to the network of existing monitors when already located near the school.

5.9.6. The GLA will be seeking to maintain the dialogue with boroughs, and to facilitate the sharing of findings and experiences as different measures and initiatives are implemented following the audits. This will enable an assessment of their effectiveness in reducing sources of, or exposure to, local air pollution. It is envisaged this will take place 6-12 months after the audit programme is concluded.

Chapter 6 – Next Steps

6 NEXT STEPS

6.1.1. Based on our experiences in undertaking the audit, we found there to be a passionate group of individuals representing both the school and the borough council, who were eager to make a difference, and enthusiastic about delivering a range of solutions to improve local air quality for the children, and the wider community as a whole.

6.1.2. The borough and key stakeholders should investigate the scope for rapidly delivering key measures from the recommendations, in order achieve a combination of quick win improvements for the school, but also thinking more holistically about how some of the medium to longer term recommendations can be progressed, to deliver transformational change, to the lasting benefit of future generations.'

6.1.3. By participating in this audit the following steps have been completed:

- Identified the sources of outdoor air quality and potential exposure by primary school children.
- Engaged school communities, including in a review of their TfL STARS travel plan, educating stakeholders about the impacts of air pollution and providing recommendations on activities, initiatives and policies that the primary school could implement to further reduce emissions and/or exposure.
- Engaged with the borough to inform the feasibility of the proposed recommendations.
- Recommendations for the boroughs consideration and future implementation.

6.1.4. In order to take forwards the recommendations identified within this report, the borough council will need to continue to work closely with the school and local community, building on the relationships already in place.

6.1.5. A wide range of potential funding sources are identified within the report, and borough councils and schools are encouraged to apply for these where appropriate to maximise the potential for delivering the recommendations.

6.1.6. The School and wider school community, including School Governors, have an important leadership role in ensuring that measures to reduce exposure and emissions are included in the school's strategic plan.

6.1.7. STARS is an ongoing process, and the school should continue working towards the targets they have set, and continue adding to their air quality related activities, and uploading evidence to contribute towards achieving and sustaining higher levels of accreditation.

6.1.8. An important outcome from this project will be to build on our knowledge of how effective different measures prove to be over time, so that the findings can be used to continually update and refine the toolkit of measures for use in future audits.

6.1.9. We also hope that the borough and school will come together as part of a wider School Air Quality forum, to share their experiences with other boroughs and schools facing similar challenges.

6.1.10. A wide range of guidance and useful literature is available to support further studies, schemes or initiatives with the aim of improving local air quality:

- **GLA** – Local Authorities and Air Quality – A summary of action taken by London boroughs to improve air quality - https://www.london.gov.uk/sites/default/files/borough_air_quality_report_2017_final_2.pdf
- **GLA** – Updated Analysis of Air Pollution Exposure in London https://www.london.gov.uk/sites/default/files/aether_updated_london_air_pollution_exposure_final_20-2-17.pdf
- **British Lung Foundation** - Air Pollution Guidance for School Staff (https://neu.org.uk/system/files_force/publication-files/NEU%20BHF%20air%20pollution%20guidance%20FINAL.PDF?download=1
- **DfE** - Guidelines on ventilation, thermal comfort, and indoor air quality in schools
- Better Places for People (World Green Building Council) – Indoor Air Quality at Schools

Appendix A – The Mayor’s commitment to improving air quality: Key Documents

The Mayor's commitment to improving air quality: Key Documents

The Mayor is implementing a significant programme of measures to reduce London's deadly air pollution and protect the health and wellbeing of all Londoners, enshrined within the following key documents:

- **The London Environment Strategy** – a bold and ambitious strategy, with a particular focus on air quality. This is the first strategy to bring together approaches to every aspect of London's environment, including: air quality, green infrastructure, climate change mitigation and energy, waste, adapting to climate change and ambient noise. https://www.london.gov.uk/sites/default/files/london_environment_strategy-_draft_for_public_consultation.pdf

- **The Draft London Plan -** published in November 2017, places a considerable emphasis on air quality, with policy S|1 stating that London's air quality should be significantly improved, and exposure to poor air quality, especially for vulnerable people, should be reduced. https://www.london.gov.uk/what-we-do/planning/london-plan

- **The Mayor's Transport Strategy 2018 -** The Mayor has set out ambitious plans to improve transport in London over the next 25 years in his draft Transport Strategy. It includes record investment in new and improved rail, tube and bus services, an unprecedented focus on walking and cycling, and a commitment to make the entire transport system zero-emission by 2050. https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf

- **Expanding the Ultra Low Emission Zone (ULEZ) and tightening the Low Emission Zone (LEZ)** https://consultations.tfl.gov.uk/environment/air-quality-consultation-phase-3b/user_uploads/suporting-information-document-updated-12.12.17.pdf

A wide range of further information, guidance, funding and useful literature is available to support further studies, schemes or initiatives with the aim of improving local air quality, including, but not limited to:

- **Local Authorities and Air Quality** – A summary by the GLA of action taken by London boroughs to improve air quality - https://www.london.gov.uk/sites/default/files/borough_air_quality_report_2017_final_2.pdf
- **Updated Analysis of Air Pollution Exposure in London** – GLA https://www.london.gov.uk/sites/default/files/aether_updated_london_air_pollution_exposure_final_20-2-17.pdf
- **British Lung Foundation** - Air Pollution Guidance for School Staff (https://neu.org.uk/system/files_force/publication-files/NEU%20BHF%20air%20pollution%20guidance%20FINAL.PDF?download=1
- **Guidelines on ventilation, thermal comfort, and indoor air quality in schools** – DfE - https://www.gov.uk/government/consultations/ventilation-thermal-comfort-and-indoor-air-quality-in-schools
- **Better Places for People** (World Green Building Council) – Indoor Air Quality at Schools - http://www.worldgbc.org/sites/default/files/Better%20Places%20for%20People%20-%20Schools%20Briefing%20Notes%20-IAQ.pdf
- **Air quality alerts** - Each school has been provided with further information via email on what the alert means, and how to reduce pupils' personal exposure AirQualityLondon@london.gov.uk
- **Control of Dust and Emissions during Construction and Demolition SPG** prepared by the GLA, which includes requirements for construction sites to monitor air quality and share the results with the borough – https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/control-dust-and
- **The Mayor's Greener City Fund** - www.london.gov.uk/greenercity
- **RE:FIT London** - jointly funded by the GLA and the European Union European Regional Development Fund, and helping to achieve the Mayor's aim for London to be a zero carbon city by 2050 as part of the Mayor's £34m Energy for Londoners programme. The programme is designed to help public sector organisations save carbon, energy and money by retrofitting buildings to make them more energy efficient. The RE:FIT framework of energy service companies saves time and resources procuring retrofit services and works. Schools in particular benefit from being able to procure through this framework via a fast-track route. Further information is available at www.london.gov.uk/refit

Appendix B – Audit Template

SCHOOL AIR QUALITY AUDIT TEMPLATE

School Name:

Address:

Key Telephone Contact:

Key Email Contact:

Head Teacher:

School Staff (name/role):

School Staff (name/role):

School Staff (name/role):

Borough Name:

Sub-region:

Borough AQ Officer:

Borough TP Officer:

Borough School Transport Officer:

WSP Auditor/s:

Audit Date:

Audit Time:

Weather Conditions:

Any exceptional circumstances:

Notable Events/ Traffic incidents:

Background Information

1. Pupil Numbers:

2. Building Description

3. School Building Age
    a. Any extensions (building age)
    b. Any planned growth?
    c. BREEAM rating (if available)

4. Mode share and trip numbers, recent trends
    a. Walk
    b. Cycle
    c. Public Transport
    d. Car
    e. Other

5. STARS status:

6. Local Area Type
    a. City Centre b. Major Centre c. Metropolitan Centre
    d. Suburban e. Residential

7. Road Type
    a. TLRN Road
    b. Main Road
    c. Near Main Road
    d. Residential Street
    e. Cul-de-sac

8. Street Type (Movement/Place)

9. Proximity to Road

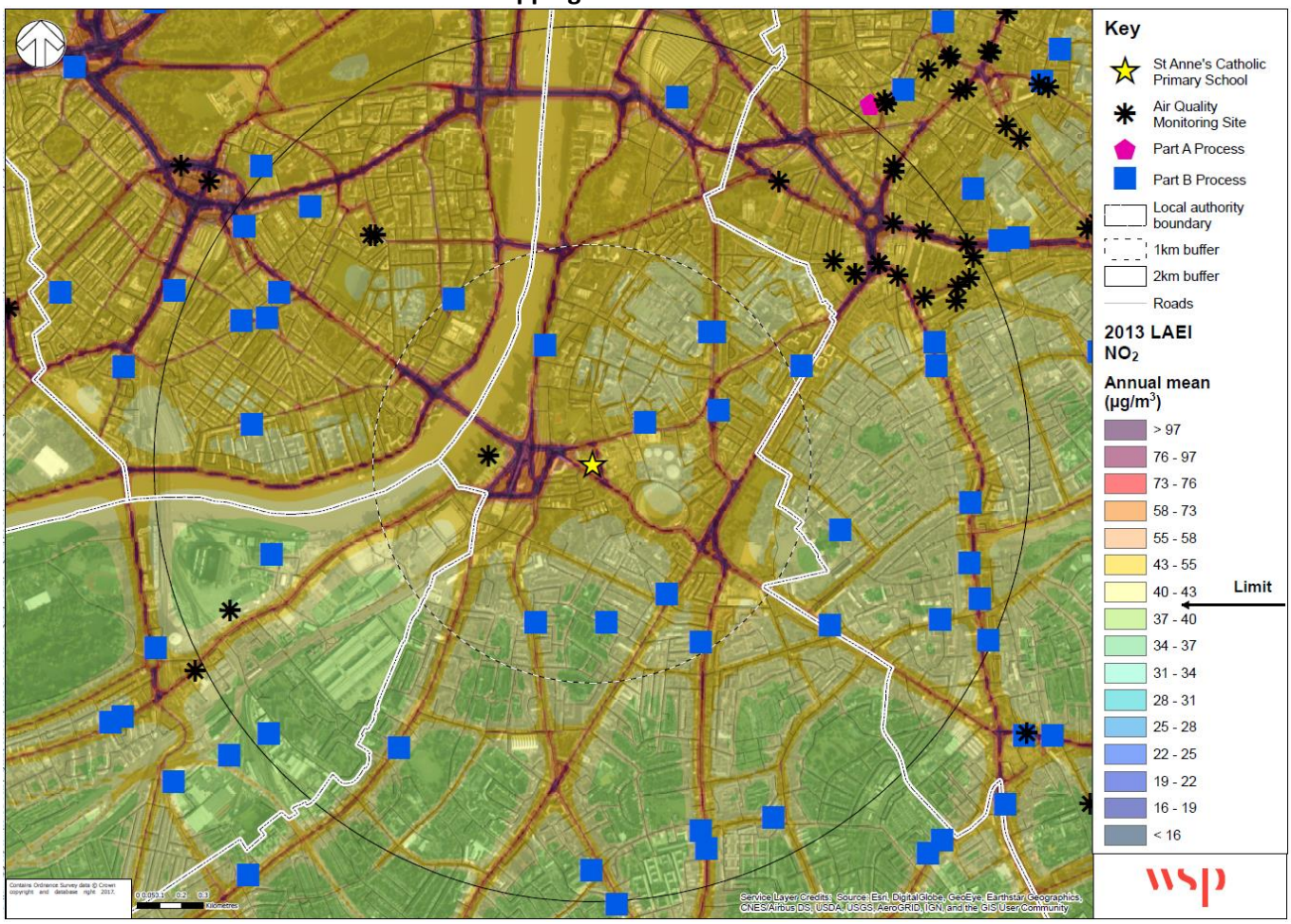
Distance to largest adjacent road (m):

10. Context Notes from School/Borough:

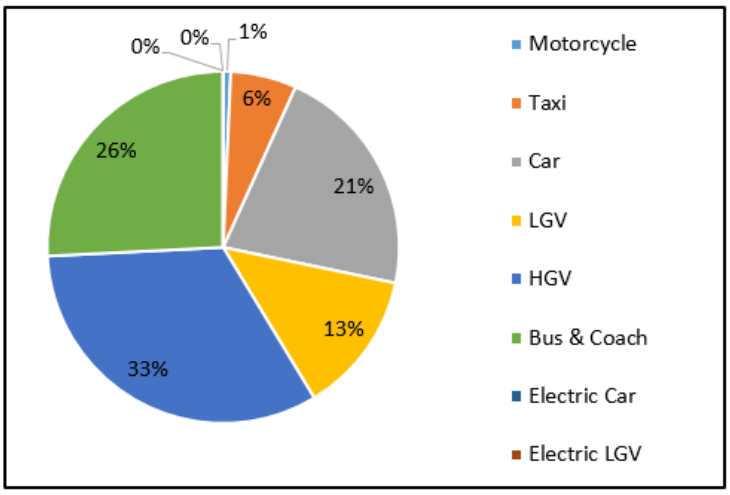
GREATER LONDON AUTHORITY Transport for London WSP

AIR QUALITY MODELLING RESULTS

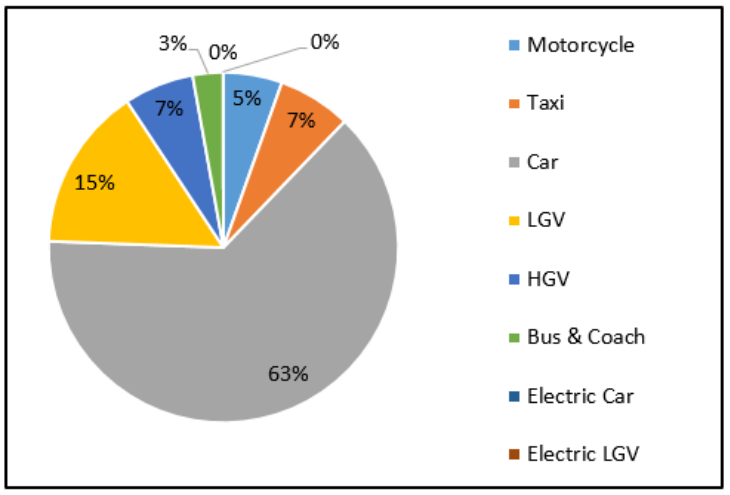
NO2 Mapping



Road Transport Emissions – Split by Source Sector



Road Transport Volumes (Split by Type)



GREATER LONDON AUTHORITY

Transport for London

wsp

SCHOOL GROUNDS AUDIT CHECKLIST

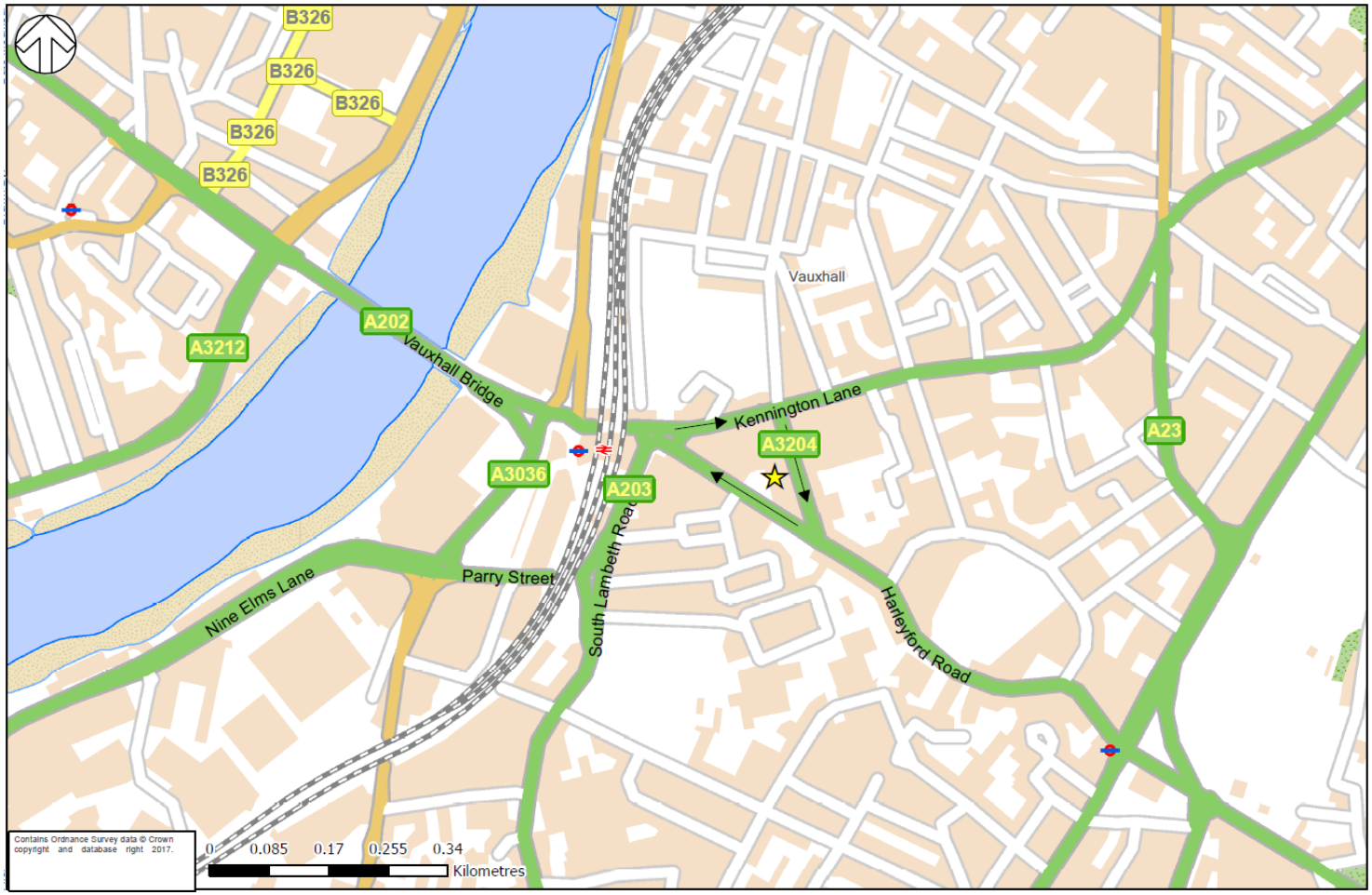
1) Work through checklist - Label each observation/issue with applicable letter (A, B, C)
2) Add number prefix if multiple (A1, A2)
3) Verify context plan – i.e. bus stop, tube station locations

School Grounds Checklist			
A	Vehicle access & egresses	S	School Visitor parking
B	Pedestrian access & egresses	T	School Staff parking
C	Key walking routes and pedestrian environment quality	U	School Vehicles (i.e. Minibus)
D	Pedestrian crossings/ School crossing patrols	V	Other Parking
E	Configuration and use of school outdoor space	Y	Cycling environment quality
J	Pick-up/ drop off activity	Z	Extent of Trees/ Shrubs/ Green barriers
K	Idling activity	*	Emissions from on-site energy generating plant
L	Road safety	+	Localised industrial sources
P	Enforcement	!	Construction activity
R	Delivery/ Servicing/ waste collection activity	#	Street canyons

SCHOOL GROUNDS OBSERVATION NOTES	**Source** (i.e. factors influencing output of harmful emissions)	**Exposure** (i.e. factors influencing movement of children through an area, or waiting in an area)	**Feedback Notes** (i.e. from consultations, during observations/brainstorming session)

SCHOOL APPROACHES AUDIT CHECKLIST

1) Work through checklist - Label each observation/issue with applicable letter (A, B, C)
2) Add number prefix if multiple (A1, A2)
3) Verify context plan – i.e. bus stop, tube station locations



School Approaches Checklist

C	Key walking routes and pedestrian environment quality
D	Pedestrian crossings/ School crossing patrols
F	Other pedestrian waiting spaces
G	Traffic volumes, flow and composition
H	Congested junctions
I	Road widths, speed limit and traffic calming measures
J	Pick-up/ drop off activity
K	Idling activity
L	Road safety
M	Road access restrictions
N	School Keep Clear hatching
O	Waiting and Loading restrictions
P	Enforcement
Q	Bus stops/ Coach stops
R	Delivery/ Servicing/ waste collection activity
S	School Visitor parking
T	School Staff parking
U	School Vehicles (i.e. Minibus)
V	Other Parking
W	On-street parking restrictions
X	Key nearby attractors/ traffic generators
Y	Cycling environment quality
Z	Extent of Trees/ Shrubs/ Green barriers
*	Emissions from off-site energy generating plant
+	Localised industrial sources
!	Construction activity
#	Street canyons

SCHOOL APPROACHES OBSERVATION NOTES	**Source** (i.e. factors influencing output of harmful emissions)	**Exposure** (i.e. factors influencing movement of children through an area, or waiting in an area)	**Feedback Notes** (i.e. from consultations, during observations/brainstorming session)

EXTERNAL CHECKLIST FACTORS – GUIDANCE FOR AUDITORS

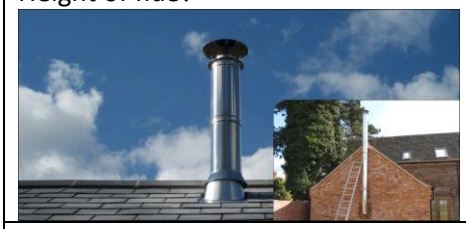
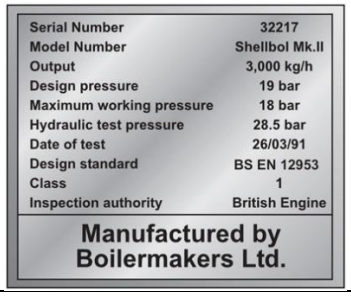
Checklist Factors		Description	School Grounds	School Approaches
A	Vehicle access & egresses	Level of activity (indic % of total movements)	x	
B	Pedestrian access & egresses	Level of activity (indic % of total movements)	x	
C	Key walking routes and pedestrian environment quality	Pedestrian Desire lines catered for? Footway widths (distance of peds from carriageway). Barriers/ obstacles to walking? Lighting? Public realm quality? Pedestrians from all walks of life? Shade and shelter? Places to stop and rest? Not too noisy? People feel safe? Things to see and do? People feel relaxed?	x	x
D	Pedestrian crossings/ School crossing patrols	Proximity to emissions sources? Safety. Convenience. Routed over crossing in proximity to traffic emissions? Wait time? Maintenance condition? Personal safety? Accessibility?	x	x
E	Configuration and use of school outdoor space	Playgrounds, outdoor spaces. Proximity to emissions sources, particularly where children are exposed for longer durations. Where do children spend time outside, during breaks, PE, queuing, off-site? Differ by age groups?	x	
F	Other pedestrian waiting spaces	i.e. outside the school gates, other areas children/parents wait		x
G	Traffic volumes, flow and composition	HGVs? LGVs? Taxis? ULEVs? Nature of flow – speed, stop-start?		x
H	Congested junctions	Congested - resulting in queuing vehicles, stop-start traffic and additional emissions?		x
I	Road widths, speed limit and traffic calming measures	Conducive to speeding, long crossing distances? Hostile/ unsafe?		x
J	Pick-up/ drop off activity	Drop off location/ activity	x	x
K	Idling activity	Where do vehicles idle, type, approx age, time, duration	x	x
L	Road safety	Illegal or undesirable manoeuvring, pedestrian accident data	x	x
M	Road access restrictions	Pedestrian Zones? No Motor Vehicles? Time based access restrictions?		x
N	School Keep Clear hatching	Where? Observed/ enforced?		x
O	Waiting /Loading restrictions	Single, double yellow lines? Kerb blips? Signage		x
P	Enforcement	How well are restrictions obeyed/ enforced?		x
Q	Bus stops/ Coach stops	Where do vehicles stop, type, approx age, time, duration? Which are used by children, where do children wait?		x
R	Delivery/ Servicing/ waste collection activity	Delivery to school or other site? Vehicle types, routing, timings, goods, locations	x	x
S	School Visitor parking	Where, how many, vehicle mix, active during visit	x	x
T	School Staff parking	Where, how many, vehicle mix, active during visit	x	x
U	School Vehicles (i.e. Minibus)	Where, how many, vehicle mix, active during visit	x	x
V	Other Parking	Nearby Resident/ P+D/ Business. Parking On-street/ off-street? Utilisation? Activity?	x	x
W	On-street parking restrictions	Resident Permit holder only? Business Permit holder? P+D? Unrestricted?		x
X	Key nearby attractors/ traffic generators	i.e. employment, supermarkets, shops, stations		x
Y	Cycling environment quality	Cycle parking? Evidence of demand? Cycle friendly/hostile? Cycle routes?	x	x
Z	Extent of Trees/ Shrubs/ Green barriers	Presence of planting and screening from roads	x	x
*	Emissions from on-site/ off-site energy generating plant	Gas-fired boilers and CHP Units	x	x
+	Localised industrial sources	Look out for additional part B sources not mapped – i.e. Dry cleaners, takeaway's etc. Car garages – painting cars	x	X
!	Construction activity	Are there any construction sites? Construction traffic routing? Visible dust? Visible dust suppression/monitoring in place?	x	x
#	Street canyons	Where building height on both sides of the road is greater than road width	x	x

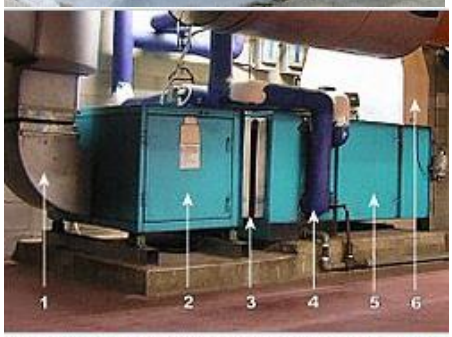
SCHOOL BUILDING AUDIT CHECKLIST

Mark on plant room (i.e. Boiler Room).

Internal Layout	
Layout of building – class rooms and other rooms and exposure to emissions sources	Mark onto map – classrooms/assembly hall/staff room i.e. you could have store rooms or staff offices nearer the roads rather than classrooms. Class room windows fronting onto main road?

Heating	
Heat source type	e.g. gas boiler, heat pump, biomass boiler (wood fired, pellet fired, bio-diesel). Back up diesel generator?
Number	e.g. 3
Heating only or heating & hot water?	
Central or Distributed	i.e. single plant room or smaller local boilers
If central, common flue	i.e. do all the boilers run into a single large flue, or multiple small flues

Height of flue? 	Take a picture Short - <1m (i.e. similar to domestic boiler length of flue) Medium – 1m to 2m (small to medium commercial boiler size of flue) Tall – >3m (for larger boilers)
Boiler age	
Boiler manufacturer	
Boiler model	
Boiler Rating (kW output)	
Insert picture of rating plate  	Take a picture – includes info on boiler age, manufacturer, model, rating.
Boiler condition	(fair, poor, excellent etc.)
Supply fan? Variable speed?	(Sending air into boiler)
Boiler control system	Advanced (digital, PC) or manual?
Air Conditioning?	If so is it used – at what times of year and how frequently?
Local Heaters?	Standalone heaters around the school?
Are these used?	(e.g. in sports hall)
If yes, what kind?	Convection (warm air blower), radiant?
Fuel source	Gas or electric
Flue system	I.e. flue to outside building?
Control system	Simple, or advanced (e.g. tied to PC)
Maintenance Regularity	

Ventilation	
Form	i.e. centralised (air handling units), passive (windows)
If windows then	Do any of the classroom windows which are regularly opened for ventilation or cooling purposes, front onto pollution sources (i.e. main roads)?
If centralised system then	i.e. air handling units?
Air Handling Units   An air handling unit; air flow is from the right to left in this case. Some AHU components shown are 1 – Supply duct 2 – Fan compartment 3 – Vibration isolator ('flex joint') 4 – Heating and/or cooling coil 5 – Filter compartment 6 – Mixed (recirculated + outside) air duct	Single or multiple?
Fed from boiler or direct fired?	
Filters in place and changed regularly	should have bag and screen filters, changed at least every 6 months or on pressure difference
Air intake location	roof level?
Air intake suitable	clear of other vents, heat sources, extract outputs?
General condition of system	appears in good condition, average, dilapidated?
Extract from classrooms?	
Recirculation of extract air?	If so how much.

Control system	manual, PC (i.e. building management system)
Variable speed supply & extract?	Speed control on internal CO2 basis or temperature?

Hot Water	
Same as above or separate system?	
If separate:	
Gas or electric?	
Central or local?	i.e. one large central system or lots of small local water heaters
Control system?	i.e. timer, thermostat?
Well insulated?	must be greater than 25mm, ideally around 50mm on tank and pipework

Kitchen	
Extract system in place?	most likely extract from e.g. hobs
Extracts to…	Should exit to roof
Filtered?	Should have local filters for great if above hobs
Control System	Always on? On timed control?

Internal Conditions	
Incidence of overheating	Occasional/regular/severe + temperature
Fresh Air	Does it feel "stuffy"? Need more fresh air?
Green plants within building?	If so, where?
Damp or mould present?	If so, where and to what extent?

Comments

STAKEHOLDER DISCUSSION POINTS:

1) Is there anything you would like to add or comment on regarding our recorded observations? Where do children spend time outside, during breaks, PE, queuing, off-site? Differ by age groups?

2) Any comments on recent trends/ issues regarding travel to school? Travel patterns of children and parents etc.

3) What do you feel are likely to be key sources of emissions in and around the school?

4) Where do you feel exposure to poor air quality is greatest in and around to school?

5) Key initiatives already underway to promote sustainable travel and reduce emissions? Which have worked well? Which haven't?

6) What more could the school do to lessen incidents of exposure and reduce sources of emissions?

7) Based on the toolkit of measures, and the findings of the observations and analysis, what are the top 3 measures you would prioritise for the school?

8) What sources of funding do you feel may be available to contribute towards localised schemes to address poor air quality at the school?

9) Is there any planned growth at the school (in terms of number of pupils or the school building/ grounds?

10) Are there any notable committed developments planned in the local area?

11) To what extent do you feel issues relating air quality are well understood by the children, parents, teachers, local community, borough officers and decision makers?

12) Are you aware of the air quality related lesson materials available?

13) Any other activities or behaviours not observed today you would wish to highlight?

14) Can you provide us with a copy of the deliveries log for the week of the audit?

STAKEHOLDER FEEDBACK NOTES:

Appendix C – Engagement Material

Supporting material for Air Quality related lessons

Bespoke material for each school is provided to add value to lessons with a focus on air quality and the environment, including:

- Map of air pollution at the school;
- Pie charts summarising the type of traffic near the school and how much air pollution is produced by which vehicles.

For example, this information could be used in conjunction with LSx Part 2: Investigating Air Quality whereby the objectives are listed as:

- Collecting scientific evidence
- Carrying out fieldwork investigations
- Making a labelled field sketch

The bespoke air quality modelling outputs for each school can add value to the lesson plan by being used to summarise the 'baseline' conditions prior to any measures being implemented and to identifying areas to target fieldwork investigations.

The pie charts illustrating the type of traffic near the school and how much air pollution is produced by which vehicles can contribute towards LSx Part 4: Action Planning whereby pupils learn about:

- How decisions and actions can affect the quality of people's lives
- Different ways in which people can improve their environment
- How to present a persuasive argument
- To make real choices and decisions

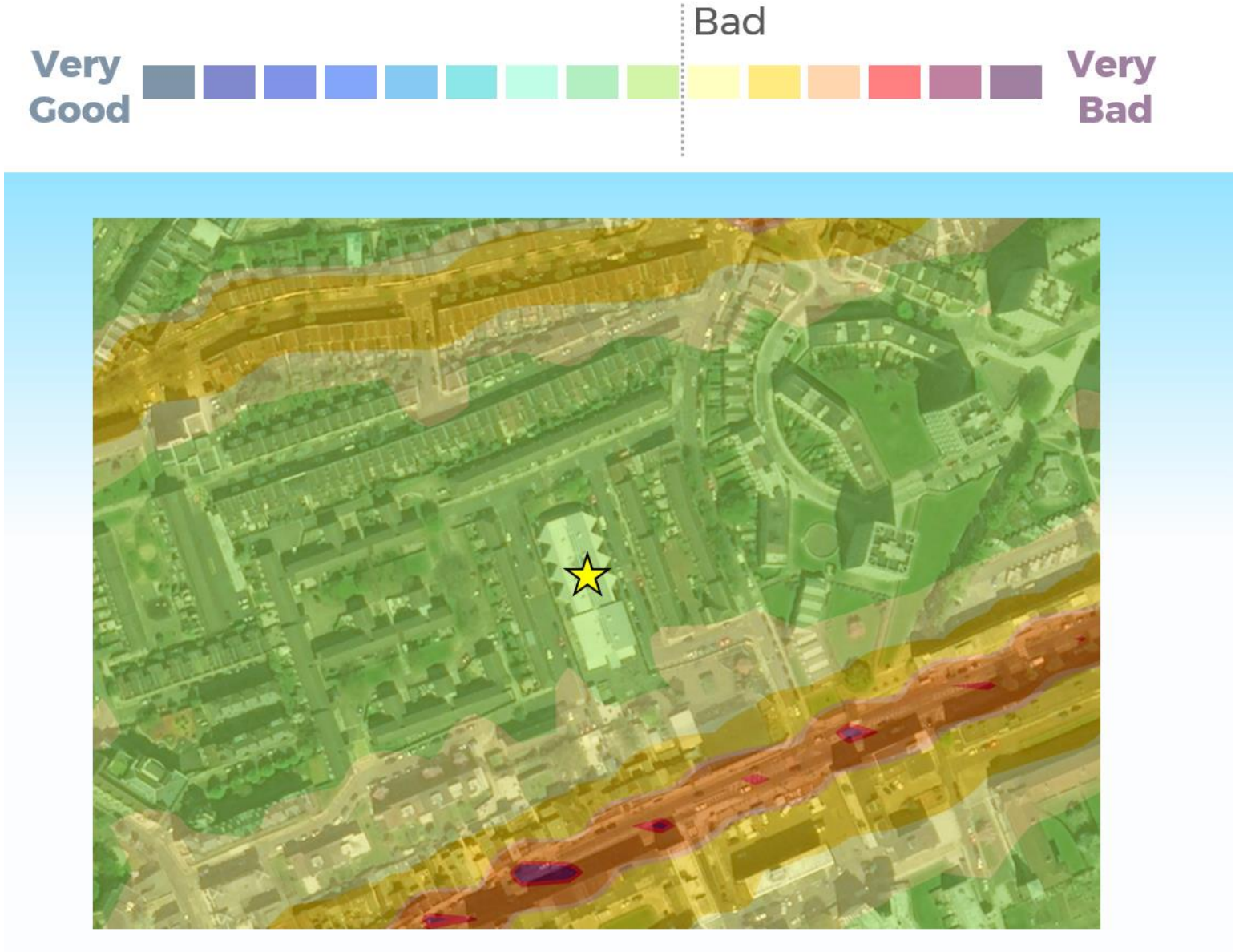
An understanding of how you travel to / from school (as well as other non-school related journeys) and the impacts it has on air quality can provide them with knowledge to travel via active means i.e. walking, scooting and cycling where possible.

The above can be linked to the National Curriculum, namely Science, Geography, PSHE / Citizenship and English Speaking and Listening. It is recommended that these lessons / materials are delivered by teaching staff as part of wider initiatives, such as National Clean Air Day.

Relevant Links:

- LSx: http://www.lsx.org.uk/get-involved/schools/
- National Clean Air Day: https://www.cleanairday.org.uk/
- London Curriculum: https://www.anewdirection.org.uk/what-we-do/london-curriculum

Bonner Primary School (Bethnal Green)



Bonner Primary School (Bethnal Green)

Chart 1 - Traffic near the school

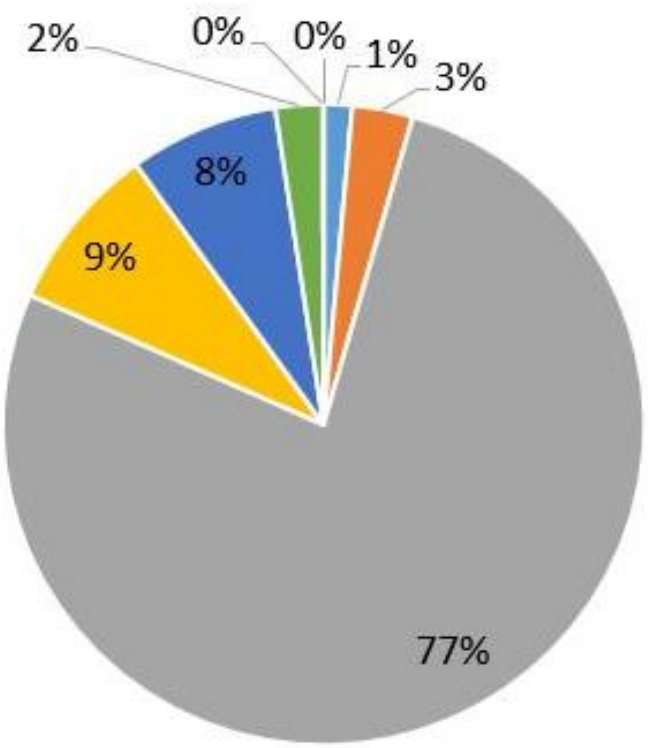
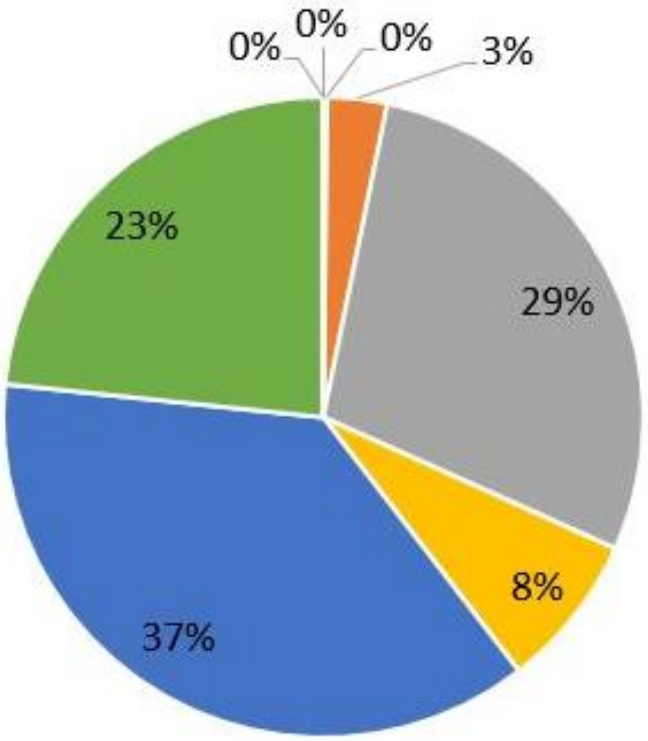


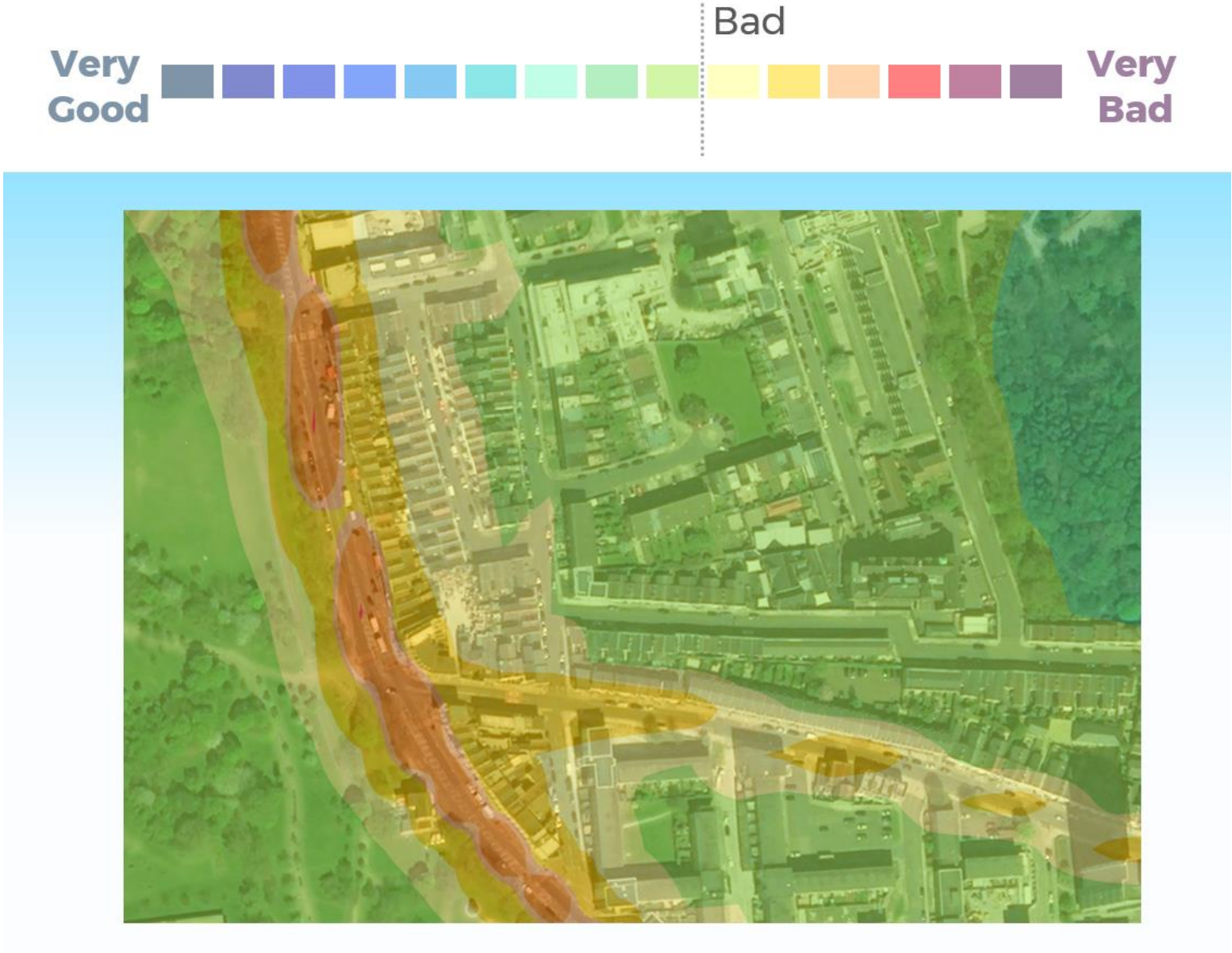
Chart 2 - Air pollution by traffic near the school



Key

- Motorcycle
- Taxi
- Car
- Vans
- Lorries
- Buses & Coaches
- Electric Car
- Electric LGV

Bonner Primary School (Mile End)



Bonner Primary School (Mile End)

Chart 1 - Traffic near the school

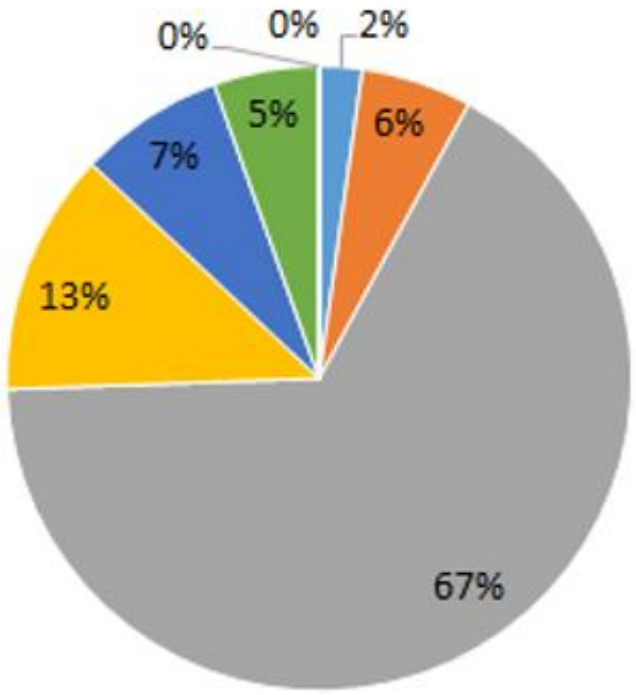
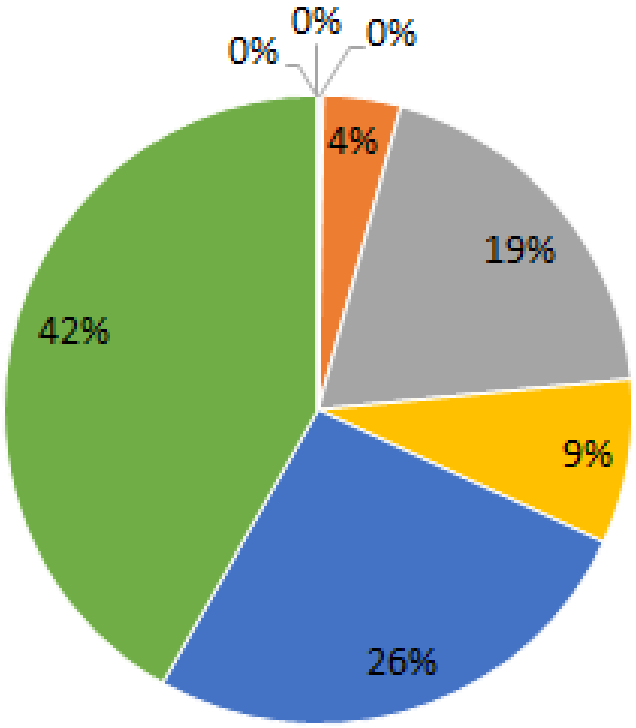


Chart 2 - Air pollution by traffic near the school



Key

- Motorcycle
- Taxi
- Car
- Vans
- Lorries
- Buses & Coaches
- Electric Car
- Electric LGV

Contact x@london.gov.uk to receive the accompanying PowerPoint slides for your school.

Introduction to air pollution (20-30 minutes)

- Interactive presentation highlighting the issue of poor air quality, the causes, the impacts, and the types of measures that can have a positive impact on reducing poor air quality.
- Suitable for KS1 and KS2, with supplementary points for KS2.
- Use the discussion questions on each slide to encourage the children to volunteer their own ideas.
- Then reveal the answers, see if they got them all, and explain any they may have missed.

KS1/KS2

- It can be hard to describe can't it?
- It is made up of fumes (gas or smoke) and dust in the air.
- Sometimes you can see it or smell it.
- They are made up of gases, and tiny particles too small to see with the human eye.

KS2

- Nitrogen Dioxide (fumes/ gases)
- 'Particulate matter' or PM. The two main types are PM_{10} and $PM_{2.5}$.
- Really small particles – you could fit 40 $PM_{2.5}$.particles across the width of a human hair.

KS1/ KS2

- Factories
- Power stations
- Boilers heating houses, businesses, the school
- Chemicals from cleaning products etc.
- Transport produces a lot of pollution:
    - Cars, Taxis,
    - Lorries, Buses
- Large vehicles like lorries and buses cause a lot of pollution.

KS2

- Diesel vehicles are bad as they produce more Nitrogen Dioxide and Particulate matter'.
- Lorries, buses, and vans and taxis are often diesels.

KS1/ KS2

- Cough
- Breathing difficulties
- Asthma – makes it harder for people with asthma to breath
- Makes us ill
- May need to see the doctor or go to hospital

- So it's a real problem we need to something about.

KS1/ KS2

- Can anyone tell me what this image is?
- It's our school – point out features like the playground and main roads to get bearings.

- Based on what we've talked about, and what the causes of air pollution are, which place do you think is most polluted by show of?
  - A
  - B
  - C

KS1/ KS2

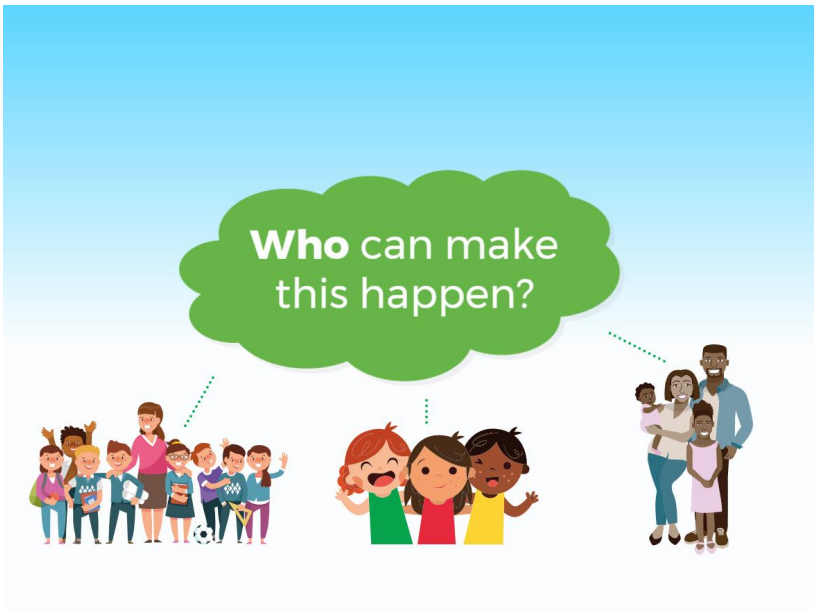
- Explain the bar along the top shows that areas in blue or green are good, areas in yellows/orange/red/purple are more polluted
- Well done to everyone who got it right
- Explain it's because all the traffic on the main roads is a major source of the pollution

KS1/ KS2

- We've seen what a big part transport plays in air pollution, so let's think about how we travel to school
- Show of hands
- Which is best in terms of air pollution?
- Why?

KS1/ KS2

- Key in the ignition = stopping engine idling (where people leave the engine running when parked).
- More travel by walking, scooting, cycling ….or public transport
- Though we know some people may need to travel by car
- Electric cars
- Planting trees to capture and absorb some pollution (particulates)



KS1/ KS2

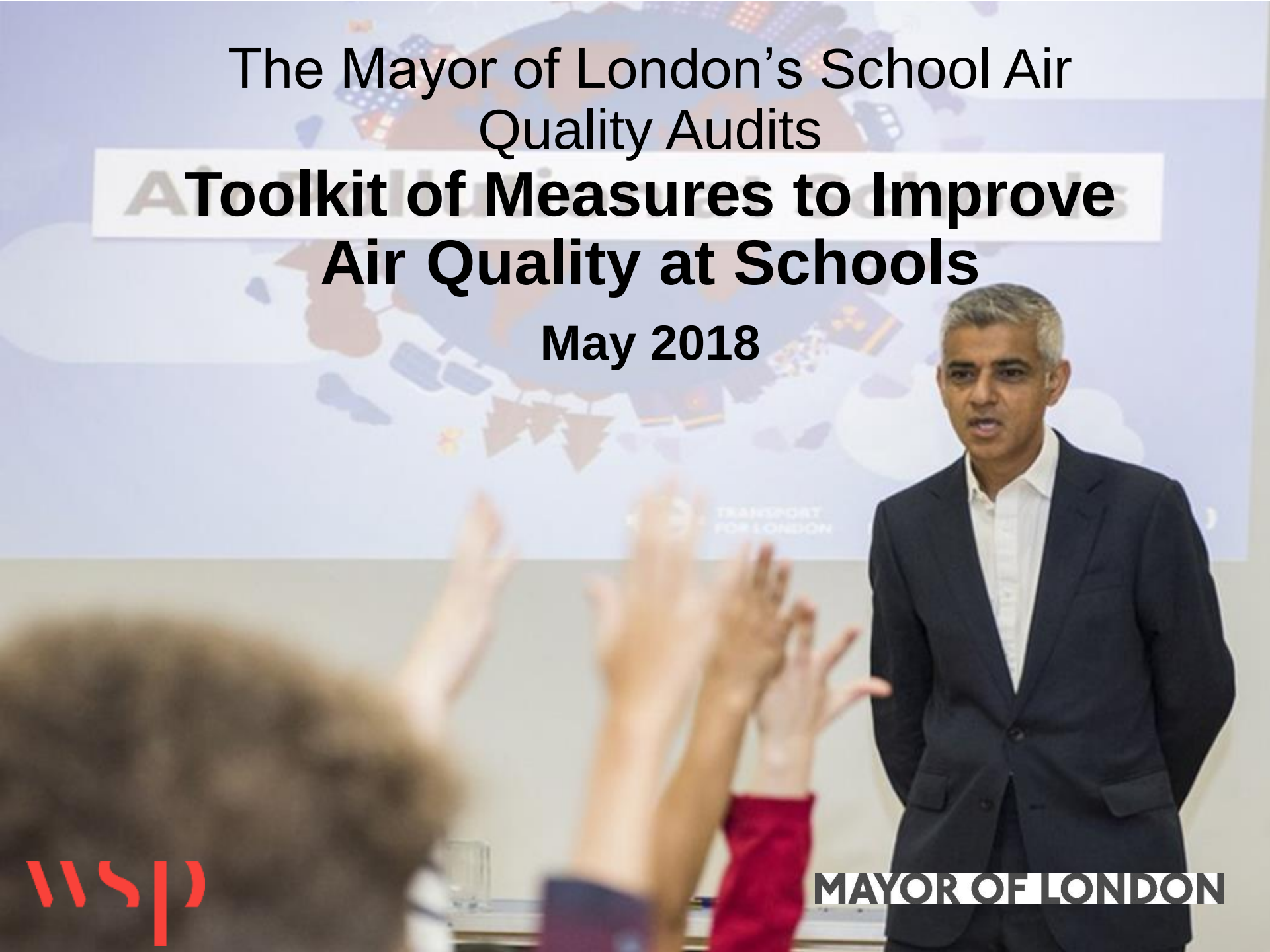
- Themselves
- Class mates
- Teachers
- Family
- Wider community
- The Council
- The Mayor
- Transport for London
- The Government
- ….everyone has a part to play

Appendix D – Toolkit of Measures to Improve Air Quality at Schools

The Mayor of London's School Air Quality Audits

Toolkit of Measures to Improve Air Quality at Schools

May 2018



wsp

MAYOR OF LONDON

Summary of Measures

1. HIGHWAY MEASURES	
A	**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 roadspace 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
S	**Ventilation / Air Filtration**
S1	Installation of Air Conditioning Units
S2	Introduce Air Filtration Systems
S3	Install HEPA Filters in Air Handling Units
S4	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
U5	Zero emission zones

Summary of Measures, including Assessment Criteria

Highway Measures

Air quality audit approach: A.) Air quality assessments and context plan preparation B.) Fieldwork – complete audit templates with input from the school and borough officers (air quality, school travel, transport planning). Use Toolkit as reference. C.) Review findings and identify key issues, sources of emissions and causes of exposure D.) Identify measures from the Toolkit to address these issues, informed by the audit findings E.) Identify funding sources and task owners F.) Establish an approach to monitoring the effectiveness of measures		**Purpose**		**Assessment Criteria**				**Wider Benefits**										**Suitability**		
		Reduce Sources	Reduce Exposure	Potential Air Quality Improvement	Cost	Deliverability	Stakeholder Support	Road safety	Promotion of sustainable transport	Visual amenity	Security, privacy	Noise reduction	Biodiversity	Improved learning environment	Reduced operating costs	Awareness raising	Support STARS and HSL objectives	Main roads	Minor Roads	Suitability for a trial
1. HIGHWAY MEASURES (Key Stakeholder: Borough/ TfL)																				
A	**Anti-idling**																			
A1	Fines	X		L	L	L	H										X	Y	Y	Y
A2	Campaigns, including driver engagement	X		L	L	L	H										X	Y	Y	Y
A3	Information signage	X		L	L	L	H										X	Y	Y	Y
B	**Reducing traffic flow**																			
B1	'School Streets'	X		L	M	M	M	X											Y	Y
B2	Collapsible bollards	X		L	L	M	M	X											Y	Y
B3	'Play Streets' *(temporary measure)*	X		L	L	S	H	X	X							X			Y	Y
B4	Road closure	X	X	H	L-M	S-M	L-M												Y	Y
B5	Filtered permeability	X		M	M	M	L	X	X										Y	Y
B6	One-way streets/ No entry restrictions	X		M	L-H	S-M	M	X	X										Y	Y
B7	ULEV-only streets	X		M	M	M	L		X										Y	Y
B8	Width restriction (e.g. 7ft)	X		L	L	S	M												Y	
B9	Environmental weight limit signs	X		L	L	S	M												Y	
B10	Reallocate roadspace	X		M	H	L	M		X									Y	Y	
B11	Weight restrictions	X		M	L	M	M	X											Y	
C	**Smoothing traffic flow/speed**																			
C1	Modify traffic calming	X		L	M	S	H											Y	Y	
C2	Optimise traffic signals	X		L	L-M	S-M	M											Y	Y	Y
C3	Junction improvements	X		L	M-H	M-L	L											Y	Y	
D	**Reducing drop-off activity**																			
D1	Public Space Protection Orders	X		L	M	M	M	X										Y	Y	
D2	School Keep Clear markings	X		L	L	S	M-H	X										Y	Y	
D3	Double/single yellow lines	X		L	L	S	M	X										Y	Y	
D4	Improve enforcement of restrictions	X		L	L	S-M	M	X										Y	Y	

Summary of Measures, including Assessment Criteria

Highway Measures

1. HIGHWAY MEASURES (Key Stakeholder: Borough/ TfL)																				
E	**Improved pedestrian and cyclist environment**																			
E1	Improved pedestrian environment - footway widening, kerb build-outs	X	X	L	L-M	S-M	H	X	X								Y	Y	Y	
E2	Improved crossing facilities on desire lines		X	L	L-M	S-M	H	X	X								Y	Y	Y	
E3	Traffic calming	X		L	L-M	S-M	H	X	X								Y	Y	Y	
E4	Improve Visibility of the School	X		L	L	S	H	X									Y	Y		
E5	Cycle hangers	X		L	L-M	S	M		X							X	Y	Y		
F	**Promote a switch to low emission vehicles**																			
F1	Ultra-low Emission Zone (ULEZ) & Low Emission Zone (LEZ)	X	X	H	H	M	M		X								Y	Y		
F2	Comprehensive charging provision for ULEVs	X		L	M	M	M		X								Y	Y	Y	
G	**Parking/loading**																			
G1	Identify a Park & Stride site	X		L	L	M	M												Y	
G2	Remove or relocate parking/ loading bays and/or amend restrictions	X		M	L	S-M	M										Y	Y		
G3	Introduce kerb blip loading restrictions	X		L	L	S	M										Y	Y		
G4	Enforce parking restrictions	X		L	L	S	M	X									Y	Y		
G5	Additional parking charges for more polluting vehicles	X		M	M	M	L										Y	Y		
G6	Introduce or amend CPZ restrictions around school to restrict non-residents parking	X		M	M	M	L	X									Y	Y		
G7	Parking rationalisations with ULEV car clubs	X		L	M	L	L		X								Y	Y		
H	**Buses**																			
H1	Bus stop relocation	X		M	M	M	L										Y			
H2	Low emission buses	X		H	H	M	M										Y			

Summary of Measures, including Assessment Criteria

Highway Measures

1. HIGHWAY MEASURES (Key Stakeholder: Borough/ TfL)																							
I	**Freight and Deliveries**																						
I1	Engage with local businesses to reduce freight/ delivery emissions	X		M	L	M	L	X												Y		
I2	Promote low emission vehicles for freight and deliveries	X		M	L	M	L		X											Y		
I3	Delivery Servicing Plans (DSPs) for new developments	X		L	L	M	L													Y	Y	
I4	Re-time Borough commercial waste collection	X		L	M	M	M													Y	Y	
J	**Construction**																						
J1	Planning conditions to reduce impacts of freight traffic	X		M	L	M	L		X											Y		
J2	Managing the impact of dust and emissions during construction and demolition	X	X	L	L	S	M												X	Y		
J3	Retrospective discussions with already permitted developments to lessen the impacts	X		M	L	L	L		X											Y		
J4	Non-Road Mobile Machinery Audit	X		L	L	S	M					X										
K	**Planning Policy and Strategy**																						
K1	Healthy Streets approach, sustainable transport and roadspace reallocation from vehicular traffic	X	X	H	H	L	L		X											Y	Y	
L	**Green Infrastructure**																						
L1	Green screens		X	L	L	S	H			X	X									Y	Y	
L2	Trees, shrubs, planters		X	L	L	S-M	M			X										Y	Y	
L3	Green Gateways		X	L	L	S	H			X										Y	Y	
L4	Pocket parks		X	L	M	S-M	H													Y	Y	

Summary of Measures, including Assessment Criteria

School Site Measures: school grounds

2. SCHOOL SITE MEASURES (Key Stakeholder: School/ Borough)																					
M	**School Grounds**																				
M1	Additional scooter/ cycle parking	X		L	L	S	H		X								X				
M2	Staff car parking	X		L	L	M	L		X												
M3	Anti-idling for deliveries	X		L	L	S	H														
M4	Re-timing for deliveries	X		L	L	S	M	X													
M5	Reduce number of deliveries, staff/visitor vehicle trips and/or use more sustainable modes	X		L	L	M	M		X												
M6	Relocate pedestrian entrances		X	L	L	S	M														
M7	Green screens		X	L	M	M	M			X	X		X								
M8	Trees/ shrubs/ planters			L	L-M	M	H						X			X					
M9	Green spaces		X	L	L	S	H														
M10	Pupil & staff cycle parking	X		L	L	S	H		X								**X**				
M11	Reduced waiting times to enter school grounds		X	L	L	S	H		X												Y
M12	Relocate playgrounds and free flow spaces		X	M	M-H	M	M				X	X									
M13	Co-ordinate start/ finish times with nearby schools	X	X	L	L	S	L	X													
M14	Reconsider playground layouts to reduce exposure		X	L	L	S	M														
M15	Sheltered waiting areas for parents/ guardians	X	X	L	L	S	M		X												

Summary of Measures, including Assessment Criteria

School Site Measures: school building

2. SCHOOL SITE MEASURES (Key Stakeholder: School/ Borough)																						
School Building																						
N	**School boilers/ heating**																					
N1	Upgrade aging boilers	X		L	L-H	S-M	M-H								X							
N2	Install Optimising Compensator Control System for School Boilers	X		L	L	S	H								X							
N3	Boiler flues and extraction equipment		X	L	L	S	M															
N4	Reducing over-heating and tackling heat gain	X		L	L-M	S	H							X	X							
N5	Replace aging radiators	X		L	M	S-M	M							X	X							
O	**Improve product choice (e.g. cleaning products)**																					
O1	Improve product choice (e.g. cleaning products)	X	X	L	L	S	H															
P	**Regular service & maintenance of appliances and equipment**																					
P1	Regular service & maintenance of appliances and equipment	X		L	L	S	H															
Q	**Improve school building insulation**																					
Q1	Improve school building insulation	X		L	L-M	S-M	M-H					X		X	X							
Q2	Upgrade windows		X	L	L-H	S-M	M-H					X		X	X							
Q3	Replace temporary classrooms with permanent structures	X		L	H	M-L	M							X	X							
Q4	Green Roofs		X	L	M	M	M			X			X									
S	**Ventilation / Air Filtration**																					
S1	Installation of Air Conditioning Units		X	L	L-H	S-M	M-H							X								
S2	Introduce Air Filtration Systems		X	L	M	M	M							X								
S3	Install HEPA Filters in Air Handling Units		X	L	L	S-M	M							X								
S4	Other air filtration systems - air purifiers		X	L	L-M	S-M	M							X								
S	**Other**																					
S1	Air quality monitoring and information provision eco-monitors and walking route maps.	X	X	L	L	S	H									X						

Summary of Measures, including Assessment Criteria

Behavioural Measures

3. BEHAVIOURAL MEASURES (Key Stakeholder: School/ Borough)																			
T1	Attain improved STARS accreditation status, ultimately Gold status.	X		L	L	S-M	H								X				
T2	Promote cleaner walking routes to school	X	X	L	L	S	H		X						X	X			
T3	Promoting Park & Stride	X		L	L	S-M	H		X						X	X			
T4	Promoting car sharing	X		L	L	S	H		X							X			
T5	Walking Route Maps / Leaflets		X	L	L	S	H		X						**X**	**X**			
T6	Parent and Public Workshops	X	X	L	L	S	H								**X**	**X**			Y
T7	Prepare 'Welcome Packs' for new pupils / parents	X	X	L	L	S	H	X	X						**X**	**X**			Y
T8	Deliver Air Quality focused lesson/s to children	X	X	L	L	S	H								**X**	**X**			Y
T9	Awareness raising session amongst staff	X	X	L	L	S	H								**X**				
T10	Daily monitoring of London Air website/ app	X	X	L	L	S	H							X	**X**				
T11	Add Air Quality to Junior Citizenship Scheme	X	X	L	L	S	H								**X**				
T12	Anti-idling campaign	X		L	L	S	H								**X**	**X**			
T13	Attain an improved Award in Healthy Schools London, ultimately a Gold Award	X	X	L	L	S-M	H								**X**	**X**			
T14	Awareness raising events amongst the wider community	X	X	L	L	S-M	M								**X**				
T15	Cycle training and promotional initiatives	X		L	L	S	M	X	X							**X**			
T16	Gamification to promote active travel	X		L	L-M	M	M		X							**X**			
T17	Restrict or reduce personal deliveries	X		L	L	S	M												
T18	CPD supporting teachers subject knowledge on air quality	X	X	L	L	S-M	M								**X**	**X**			
T19	Walking Buses	X		L	L	S	M		X						**X**	**X**			

Wider Measures

4. WIDER MEASURES (Key Stakeholder: Borough/ TfL/ GLA/ Central Government)																			
V1	Targeted scrappage scheme for polluting vehicles entering London	X		H	H	L	L												
V2	Reform Vehicle Excise Duty	X		H	M	L	L												
V3	Promote a transition to electric heating and heat pumps	X		H	M	L	L												
V4	Reform Buildings Regulations to promote heat pumps	X		M	M	L	L												
V5	Zero emission zones	X	X	H	H	L	L												

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